

THE UNIVERSITY OF KWAZULU-NATAL

**A SYSTEMS THINKING EXPLORATION OF THE CHALLENGES
FACING MARITIME EDUCATION & TRAINING: THE CASE OF
PUBLIC HIGHER EDUCATION INSTITUTIONS IN KWAZULU-NATAL**

By

Syanda A. Mthuli

210508740

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Supervisor: Prof. T.I Nzimakwe

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Governance**

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DECLARATION

I, **Syanda A. Mthuli** hereby declare that:

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He who would learn to fly one day must first learn to stand and walk and run and climb and dance; one cannot fly into flying (Friedrich Nietzsche).

The older I grow the more I learn. The more I learn, the more I realize how little I know (JSH Gildenhuys).

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GLOSSARY OF ABBREVIATIONS AND ACRONYMS

ADB - Asian Development Bank
AIS - Automated Identification System
AMET - Academy of Maritime Education and Training
AU - African Union
B.Sc. - Bachelor of Science
BRICS - Brazil Russia China and South Africa
BTEC - Business and Technology Education Council
CBT - Computer-based training
CHED - Commission on Higher Education
CLD - Cause Loop Diagram
CPUT - Cape Peninsula University
DE - Distance Education
DfES - Department for Education and Skills
DOCS - Development of Certificated Seafarers
DPC - Department of Ports and Coasts
DUT - Durban University of Technology
EAC - East African Community
ECDIS - Electronic Chart Display Information System
eMC - eThekweni Maritime Cluster
EMSA - European Maritime Safety Agency
EQF - European Qualification Framework
ERRVA - Emergency Response and Rescue Vehicle Association
ETD - Education Training and Development
EU - European Union
MADE- Maritime Education Development and Enhancement
FTS - Fast Time Simulation
GAFT - Government Assistance for Training
GCNS - Glasgow College of Nautical Studies
GMDSS - Global Maritime Distress and Safety System

IBS - Integrated Bridge System
ILO - International Labour Organization
IMarEST - Institute of Marine Engineering, Science and Technology
IMCO - Inter-Governmental Maritime Consultative Organization
IMDO - Irish Maritime Development Office
IMO - International Maritime Organization
IMP - Integrated Maritime Policy
ISEAS - Irish Seafarer Education Assistance Scheme
ISPS - Ship and Port Facility Security
IT - Information Technology
JICA - Japan International Cooperation Agency
JKUAT - Jomo Kenyatta of Agriculture and Technology
KPA - Kenya Port Authority
LLB - Bachelor of Law
LLM - Master of Law
LRC - Long Range Communications
MCom - Masters of Commerce
M'AIDER - Maritime Aids Development
MA - Masters
MAN - Maritime Academy of Nigeria
MARINA - Maritime Industry Authority
MARINA - Maritime Industry Authority
MarTEL - Maritime Test of English Language
MCA - Maritime and Coastguard Agency
ME - Maritime Education
MET - Maritime Education and Training
MHEI - Maritime Higher Education Institution
MIWB - Maritime Institute Willem Barentsz
MMA - Merchant Marine Academies
MNTB - Merchant Navy Training Board
MPA - Maritime and Port Authority of Singapore

MT - Maritime Training
MUT - Mangosuthu University of Technology
NDP - National Development plan
NIMASA - Nigerian
Maritime - Administration and Safety Agency
NMMU - Nelson Mandela Metropolitan University
NQF - National Qualifications Framework
NSDP - Nigerian Seafarers Development Programme
NTNU - University of Technology and Science
NVQ - National Vocational Qualification
OECD - Organization for Economic Co-operation and Development
OFW - Overseas Filipino Workers
PhD - Philosophical Doctor
RSA - Republic of South Africa
SAIIS - Shanghai Advanced Institute of International Shipping
SAIMI - South African International Maritime Institute
SAMSA - South African Maritime Safety Authority
SD - Systems Dynamics
SMarT - Support for Maritime Training
SMCP - Standard Maritime Communication Phrases
SMU - Shanghai Maritime University
SOLAS - Safety of Life at Sea
SOS - Safety on Sea
SRC - Short Range Certificate
STCW - Standards of Training Certification and Watchkeeping
STCW-F - Standards of Training Certification and Watchkeeping Fishing
SUA - Suppression of Unlawful Acts
SURPASS - Short Courses Programme for Automated Systems in Shipping
SWOT - Strengths Weaknesses Opportunities and Threats
TESDA - Technical Education and Skills Development Authority
TUDEV - Turkish Maritime Education Foundation

TUM - Technical University of Mombasa

UCT - University of Cape Town

UK - United Kingdom

UKZN - University of KwaZulu-Natal

UN - United Nations

UNCTAD - United Nations Conference on Trade and Development

WMU - World Maritime University

VET - Vocational Education and Training

ABSTRACT

The maritime environment from the beginning of this century has had a great socio-economic impact on countries as well as the broader global economy. This has resulted in the need for various stakeholders such as the government and business to play an active role in addressing challenges such as safety and security for example. In the aspect of education and training, the challenges have included the decreasing numbers of youth taking up Maritime Education and Training (MET), technological advancements, the cost, standards, and quality of MET globally. Some of these issues have been identified in developing countries such as the Republic South Africa (RSA). RSA possesses an education and training system which has transformed immensely post its democratization in 1994 and World University Rankings placing its public higher education institutions at the top in African continent, offering an array of programmes from social sciences and natural sciences to those that border on the two, such as MET. However, these institutions still remain confronted by numerous problems, such as the decline in State funding, slow academic succession and transformation, and the increasing demand for institutional capacity, etc. This study, through a Systems Thinking lens explores the challenges facing MET in public higher education institutions, in the province of KwaZulu-Natal (KZN) in RSA. Informed by an interpretivist worldview, a qualitative design, a phenomenological strategy and purposive sampling with the assistance of an interview guide, data was analysed into themes which suggested that MET faces numerous challenges both internal and external of its environment and some of these included limited stakeholder involvement, as well as scarcity. Key stakeholders continue to play an active but limited role by developing partnerships facilitating the provision of MET in attempting to address the challenges facing MET and also close the skills gaps in KZN's maritime industry. The study contributes to a holistic understanding which illustrates how the development of MET institutions fit into the picture of the maritime industry in KZN and how one is not divorced from the other; rather, they reinforce each other, influencing each other's state of being.

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CHAPTER ONE

INTRODUCTION AND OVERVIEW OF THE STUDY

1.1 INTRODUCTION

Tertiary education, herein referred to as higher education institutions, in South Africa are considered vital to both social and economic development. Such education is provided by both the state and private institutions, offering an array of programmes found in various fields or disciplines, including maritime education and training (MET). MET, in the country, is found at both secondary school and higher education levels. However, maritime education is limited to a handful number of secondary schools in the country and at higher-level MET programmes existing in pockets within the larger higher education institutions (HEIs). As a result, there is no single HEI that provides MET on a scale regarded as primary or dominant provider, thus each HEI has its own area of focus in the maritime field (South African International Maritime Institute/SAIMI, 2014).

Public higher education institutions are the key to capacitating South Africa's maritime industry, and are constitutionally mandated, given their provision in the country's administrative system. The reason for this is that public higher education institutions of KwaZulu-Natal (KZN) and the broader country have been created in terms of the provision of Acts of Parliament, which provide for their respective administrative systems. They obtain one-third of their income directly from the state. Thus, it is their constitutional responsibility to bridge the skills gap within the country. As public institutions, they are allowed a large measure of freedom to manage their affairs in terms of the provisions of the Acts of Parliament by which they were established. However, they must observe the education policies prescribed by the authorities in terms of the Acts passed by Parliament (Cloete, 2012).

1.2 BACKGROUND OF THE STUDY

MET is traditionally defined as a system of education and training with the purpose of providing seafarers for the shipping industry (Wang, 2011). However, according to Wang (2011), because of the development of the maritime industry, especially the shipping industry over the centuries, it has become imperative to redefine the concept of education and training within the industry from

a wide-ranging perspective, so as to encompass more disciplines, for example, maritime finance, security, engineering, architecture, law, administration, environmental management, and also other rare disciplines in the shipping industry (Wang, 2011). When people speak about MET in the world, their perception is associated only with the training of mariners or seafarers for shipboard operations. However, this is not the case: the current maritime industry involves professions other than the seafaring (Musa, 2000). This is asserted by Wanga (2015), who states that the concept of MET implies education and training for both sea and shore careers. Gamil (2008) defines MET as:

“A set of independent processes such as teaching, learning, researching and resources including human, material and information that function harmoniously to achieve specified educational objectives in the means of ensuring marine safety and the protection of environment” (Gamil, 2008: 2-3).

As a result, the provision of MET is a complex process influenced by various factors. Thus, it presents an ideal situation for using Systems Thinking aided by systems dynamics (SD) to understand such a study of complex systems which can include: human systems such as families, organisations, cities and nations, and a variety of other systems. This purpose of the study is to examine the challenges, in a more holistic manner, which MET face at public higher education institutions in KZN. Such an understanding may be brought about by holistic thinking rather than that which is one-sided or fragmented, thus providing motivation for using Systems Thinking as a guiding framework for this study (Mulej, Bastic, Belak, Knez-Riedl, Pivka, Potocan, Reberkik, Ursic and Zenko, 2003).

South Africa, as the only BRICS (Brazil Russia India China and South Africa) member country in Africa, and having one of the largest economies in Africa (International Monetary Fund/IMF, 2017), is home to the continent's most developed maritime industry and infrastructure. The country is faced with numerous socio-economic challenges, such as its high levels of unemployment and limited access to higher education, especially amongst the youth (IMF, 2017). As a result, the maritime sector is seen as having the potential to bridge the employment gap (SAMSA, 2013). Despite this, the maritime industry remains limited by a maritime skills gap. It is at a great remove for many within the population, especially those such as the majority of Black South Africans who were disadvantaged and not given opportunities to participate in the industry during the Apartheid

regime. Post 1994, the country's democratization has brought about South Africa's National Development Plan (NDP) which presented the country's vision for 2030. The NDP reflects the view that:

“Education, training and innovation are central to South Africa's long-term development, and higher education is the major driver of the information system linked to economic development. However, education is much more than a simple instrument of economic development” (NDP, 2012: 261-262).

South Africa's Higher Education Act 101 of 1997 states that:

“Whereas it is desirable to establish a single co-ordinated higher education system...; restructure and transform programmes and institutions to respond better to the human resource, economic and development needs of the republic;... and whereas it is desirable for higher education institutions to enjoy freedom and autonomy in their relationship with the State within the context of public accountability and the national need for advanced skills and scientific knowledge” (South Africa's Higher Education Act 101 of 1997:1).

In regions such as Europe, MET is also placed at centre stage owing to the shortage of appropriately qualified, well-trained maritime manpower, which is a core problem that needs to be addressed (CEU, 2009, cited in Pallis, Ilias and Papachriston, 2013). In order to address some of these issues, cooperation between major stakeholders in the shipping and other related industries in Europe and the International Maritime Organization (IMO) in 2008 launched the “Go to Sea Campaign!”. The core of the campaign and one of the things that prompted it according to the Japan International Transport Institute/JITI and the Nippon Foundation is that:

“...fewer young people are attracted to seafaring profession and young seafarers want to move on to land-based jobs. The potential for greater female participation in the maritime business and the role of corporate social responsibility are addressed as potential countermeasures” (JITI and the Nippon Foundation, 2010:1).

In South Africa, too, provinces such as KZN, realise the importance of the maritime industry and its economic benefits in the form of the job opportunities both at home and abroad. There is also its potential contribution to the economy in addressing the country's socio-economic problems, such as slow economic growth, and high levels of youth unemployment. This is seen as imperative.

The government thus understands that for such to be achieved, it ought to develop the needed skills within the maritime industry. However, this cannot be achieved without addressing current problems. This is asserted by the South African International Maritime Institute/SAIMI (2017), which is of the view that a renewed focus on education and training within the maritime industry is essential in ensuring that the ‘blue economy’ makes a much greater contribution to South Africa. Globally, MET for sea-going programmes, is generally in line with the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1978, which sets qualification standards. The STCW was adopted in 1978 by the Conference of the IMO in London. It established basic requirements on education and training, certification and watchkeeping for seafarers and other maritime-related vocations on an international level. It came into effect in 1984 and was significantly amended in 1995. However, the IMO, upon the establishment of the STCW, gave the responsibility for the delivery and assessment of MET programmes to member states, resulting in its not partaking in the delivery, evaluation and inspection of programmes.

The STCW suggests minimum standards relating to MET, its certification and watchkeeping for seafarers and other related programmes which member states are obliged to meet or exceed. Thus, the provision of MET operates within a very complex environment. MET institutions feed directly and indirectly into the broader maritime system. Hence, there are several factors that might affect the provision of MET at academic institutions (Basak, 2017). South Africa’s higher education system has transformed immensely post its democratization in 1994. This can be attested by the institutional restructuring that was launched in 2002. According to Higher Education South Africa (2009), now known as Universities South Africa:

“During the post 1994 period higher education was subject to some far reaching legal, administrative and policy changes, as well as a significant restructuring of the higher education institutional landscape” (Higher Education South Africa, 2008:5).

World university rankings place South Africa’s public higher education institutions as one of the most developed in the African continent, and they offer an array of programmes from social sciences and natural sciences to those contiguous to both, such as MET.

1.3 STATEMENT OF PROBLEM

1.3.1 Higher education landscape in South Africa

To date, public higher education in the country remains fragile as it is faced with numerous problems post 1994. Some are common knowledge, such as the decline in state funding, slow academic succession, transformation, and demands on existing institutional capacity, to name a few (Price Water Cooper House, 2015). In the country, education is the recipient of the major portion of national expenditure. However, government funding to public higher education institutions has been on the decline, prompting institutions of higher learning to develop innovative methods for maintaining financial stability (Green and Hardman, 2014).

1.3.2 Maritime skills shortage and MET in South Africa

To date, South Africa's maritime industry is faced with critical and scarce skills challenges (South African Maritime Safety Authority/SAMSA, 2013). Institutions such as higher education institutions should bridge this gap. However, MET in higher education institutions has long been faced with challenges in doing so. This is evident in that when one looks back at the 1993 National Maritime Conference in the country, a press delegation expressed the view that South Africa's maritime community "had better thrash out and solve the MET problems soon or laugh it off and take in people from overseas", which would be to the detriment of all South Africans (Knowler, 1994:1).

To date, when one scrutinises the province of KZN which has the most intense maritime activity in South Africa, as is the case with many other regions in the world, is confronted by maritime skills shortages. However, South Africa's current maritime skills shortage is not something new. It was predicted by Ingpen (1994) in the early 1990s when there was a shortage of skilled maritime manpower in the country. Future projections for a satisfactory supply of a trained workforce, therefore looked bleak. Kujwa (1996) identified that the lack of coordination in MET and its development would pose a serious risk for the sector in South Africa. Kujwa (1996) further identified that in South Africa:

“Despite the fact that MET is particularly specialized and expensive, facilities were under-utilized and resources were being wasted and those that received education and training in the maritime field were trained for redundancy due to for example not being

trained to accepted standards or training for jobs which were being phased out” (Kujwa, 1996:2).

Ingpen (1994) and Kujwa (1996) two decades ago identified problems facing MET in South Africa, offering possible solutions to them, such as the need for coordination in such a manner that the supply of MET would address the maritime labour demands of the country. However, the cause or underlying factors for such lack of coordination remains unknown. Nevertheless, with the continuous amendments to the STCW, which mainly focuses on sea-going MET provision, the problems identified by Ingpen (1994) and Kujwa (1996) have given rise to new problems. These are connected or collectively responsible for the failure of MET institutions, such as public higher education institutions, in bridging the maritime skills gaps in KZN.

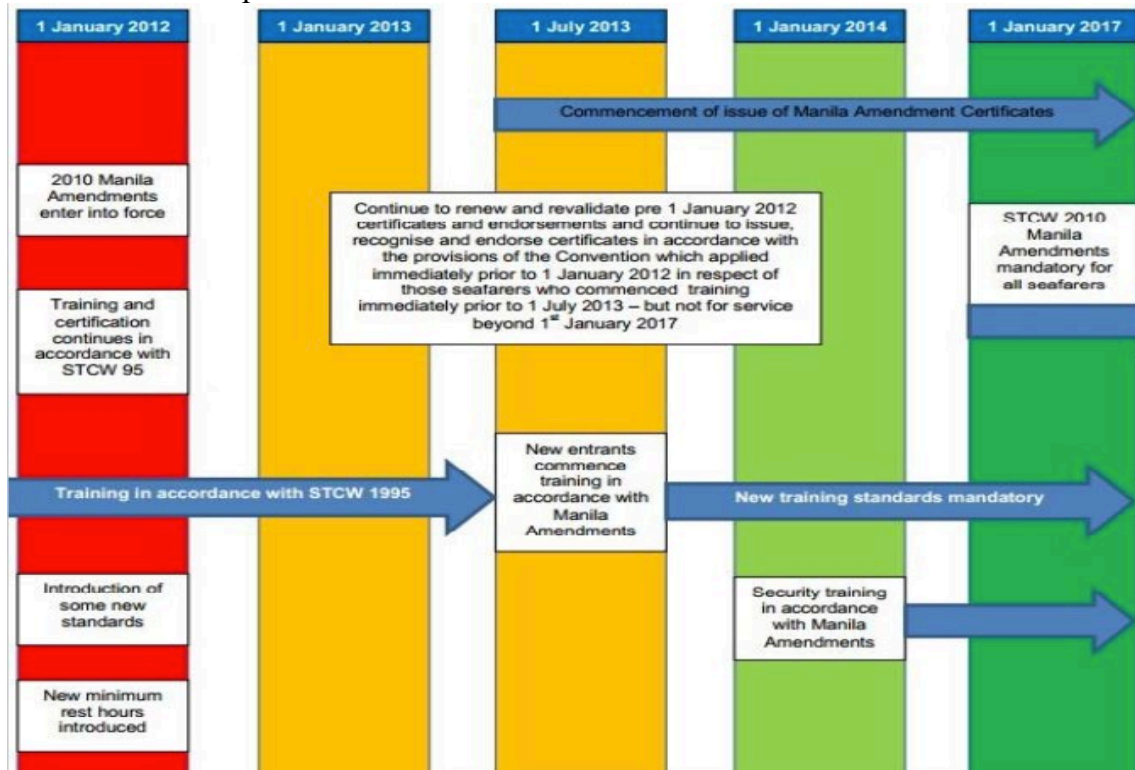
Upon a review of the literature on the state of MET, it was found that MET institutions in the process of domesticating the maritime industry in their respective countries have not been immune from both their immediate and external environments. Contextual factors and actors such as the state and its respective maritime institutions, the industry, and other actors within and beyond the control of MET institutions, play a critical role in shaping MET. These factors are not limited to maritime incidents, quality of, attractiveness, technology, and resources which this study argues are interconnected. Such resources collectively continue to either negatively affect or provide present opportunities; they are, however, rarely considered in connection. Hence, holistic strategies to address the maritime skills gap remain lacking.

1.3.3 Global MET certification and MET institutions

On the 7 July 1995, the IMO adopted a comprehensive revision of STCW, with the amendments enforced on 1 February 1997. Full implementation was required by 1 February 2002. Also on 7 July 1995, the STCW for Fishing Vessel Personnel (STCW-F) was adopted as a separate treaty, as part of the comprehensive revisions to the STCW. The STCW-F came into force on the 29 September 2012. In 2010, the STCW adopted a new set of amendments in Manila, known as ‘the Manila Amendments’. These amendments were essential in keeping training standards in line with new technological and operational requirements for which new shipboard competencies were

essential. The Manila Amendments were effective as of 1 January 2012; the transition period ended in 2017. Such amendments impact MET institutions worldwide (Chong Ju, 2011).

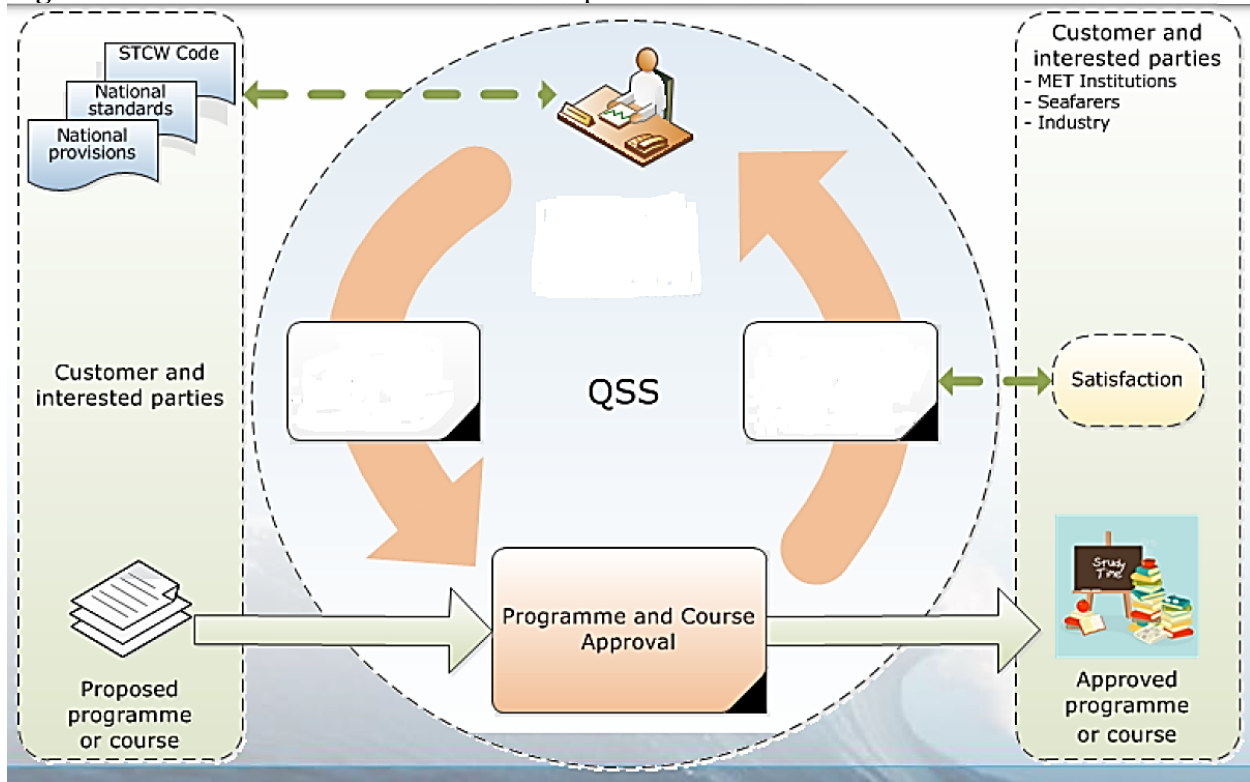
Figure 1.1: STCW Implementation dates of the Manila amendments



Source: Irish Maritime Administration cited in Wanga (2015:35)

MET institutions are not islands, and this is asserted by Mabuti (2013). They exist and operate in an environment that is open, and they are reliant on and influenced by elements and conditions existing inside and outside the system. The figure above presents the systems process of MET certification.

Figure 1.2: MET framework & certification process



Source: European Maritime Safety Agency/ EMSA (2013)

MET institutions must be prepared to be scrutinised, hence they need to certify all stakeholders such as authorities, the public, clients, as well as sponsors (Karma, 2007). Karma (1997) saw this as a practical strategy for ensuring sustainable growth and development, but to also gain the credibility of institutions and their MET programmes. Thus, in the process of designing and delivering MET programmes, MET institutions must be sensitive and responsive to both domestic and international requirements and industry, and provide relevant programmes.

It is generally acknowledged that maritime safety and security may largely be achieved through MET. Nonetheless, MET falls within an education and training system faced with decline in state funding, slow academic succession, transformation and demands on existing institutional capacity. This refers to the case of South Africa's public higher education institutions, which poses serious challenges for MET. It is said that institutions offering maritime programmes in South Africa work in isolation from one another (SAIMI, 2014). When viewing MET at higher education level within the country, maritime studies do indeed exist in isolation. This is because there is no single higher

education institution offering maritime studies on a scale that effectively and efficiently meets the domestic maritime needs of the country (SAIMI, 2014). Hence there is a need for MET that supports the growth of the domestic and regional (Africa) maritime industry. This should address the problems of limited youth pursuing MET, the high accidents caused by human error, and the increasing importance of maritime sovereignty through security, as is the case in disputed oceans. Stan and Buzbuchi (2009) are of the view regarding the maritime industry and the role of MET therein that:

“The educational process has an outstanding role in the career of a maritime officer and the problem of the safety and security is essential in order to avoid catastrophes and for saving human lives” (Stan and Buzbuchi, 2009: 357).

It should be noted that, before the adoption of the first global MET standards, referred to as the STCW 78, states had their own educational systems and certification processes which were based on their domestic, vocational, and educational way of doing things: this led to varied MET systems (Morrison, 1997; and Ashmawy, 2006). In this regard, the STCW 78, as amended, influenced the provision of MET, such as public higher education institutions in KZN. Wanga (2015) suggests that the Manila amendments on the STCW have placed additional challenges on MET institutions. Their respective member states are collectively obliged to achieve complete compliance by 1 January 2017. Furthermore, the internationalization of education in the 21st century to favour well-developed education systems and institutions, compounds existing inequalities (Altbach and Knight, 2007).

Much can such be said about KZN’s MET at public higher education institutions. According to Wanga (2015), other countries in Africa, such as Kenya, struggled to fulfil and meet the Manila amendments before the deadline. A pronounced gap exists amongst the developing and the developed countries in MET, with the latter needing a larger labour force (Musa, 2000:15). The success of an industry lies in good education and training. This is indisputable (Manuel, 2005). Furthermore, limited maritime skills and gaps in countries such as South Africa demand the need and opportunity for cooperation on MET, not only between MET institutions, but also between suppliers and consumers (Li and Wonham, 1999). This, however, can only be achieved by first understanding the factors that influence the process of MET which leads to both challenges and

opportunities for these institutions. From such, strategies may be formulated and put in place. As a result, the purpose of this study is through Systems Thinking; to explore the challenges facing MET at public higher education institutions in the province of KZN, South Africa. To enable this, this study is guided by the following research objectives.

1.4 OBJECTIVES OF THE STUDY

The objectives of the study are:

- To explore the internal factors influencing the provision of Maritime Education and Training in public higher education institutions in KwaZulu-Natal;
- To explore the external factors influencing the provision of Maritime Education and Training in public higher education institutions in KwaZulu-Natal;
- To identify how KwaZulu-Natal's public higher education institutions offering Maritime Education and Training responded, and how will they continue to respond to both internal and external factors; and
- To assess the role of the State in Maritime Education and Training at public higher education institutions in KwaZulu-Natal.

1.5 RESEARCH QUESTIONS

The study will attempt to answer the following key questions:

- What are the internal factors influencing the provision of Maritime Education and Training in public higher education institutions in KwaZulu-Natal?
- What are the external factors influencing the provision of Maritime Education and Training public higher education institutions in KwaZulu-Natal?
- How have KwaZulu-Natal's public higher education institutions offering Maritime Education and Training responded, and how will they continue to respond to both internal and external factors? and
- What is the role of the State in Maritime Education and Training at public higher education institutions in KwaZulu-Natal?

1.6 LOCATION OF THE STUDY

Figure 1.3: The location of the context of this study, province of KwaZulu-Natal in South Africa.



Source: KZN TECHNOHUBS (2016)

This study is based in the province of KwaZulu-Natal (KZN) which is one of nine provinces in the Republic of South Africa. KZN is one of the four coastal provinces. As with its counterpart provinces, the Northern Cape, Western Cape and Eastern Cape, KZN strives to take advantage of maritime resources, thus unlocking their economic value. Amongst the four provinces, KZN is seen as the gateway to South Africa, and the broader African continent boasting two ports, one being the busiest on the African continent (Chasomeris, 2006; eThekweni Maritime Cluster, 2011).

1.7 SIGNIFICANCE OF THE STUDY

Owing to the growth of the global maritime industry and the economic opportunities it presents for KZN, it is imperative to conduct a scientific enquiry into the problems hindering MET, specifically at public higher education institutions in this province. Public higher education institutions such as those that provide MET within KZN and the rest of the country are created to address government policy needs such as addressing the provinces labour market which in this case is the maritime industry. They ought, therefore, to structure and transform themselves and their programmes to respond to the human resources needs of their province and broader country, as per their constitutional obligations. The role played by MET, especially that which is provided

by public higher education institutions, is pivotal to the success of the maritime industry (Baylon and Santos, 2011). If such issues are not addressed, KZN's past and present MET problems will continue to negatively affect the province's maritime industry, and as a result, threaten the country's maritime ambitions and its maritime footprint in Africa.

In South African, gradually the higher education system is consequently perceived as neither domestically responsive nor internationally competitive. An array of stakeholders in the country is demanding more efficiency and effectiveness at universities (Habib, 2016). The provision of MET is a complex system encompassing not only physical elements, but also social, economic, and sometimes even political elements. Thus, as a component of a complex system, the provision of MET by public higher education institutions cannot be studied effectively using conventional approaches. Such approaches consider MET a single independent activity isolated from all others. These institutions are governed by international regulations, resourced domestically, and weathered by agents of change beyond their control in their process of responding to the state's national and provincial policies, and domestic and global maritime industry demands. While a logical model could be developed from a conventional approach to explore the challenges facing MET in public higher education institutions in KZN, this would be insufficient to describe the complexity of relationships and influences within the global system of MET provision. As a result, prior to the study, certain gaps were identified in the body of knowledge on the question relating to:

What are the challenges facing Maritime education and training in public higher education institutions in KwaZulu-Natal?

By addressing the above principal question, this study sought to collate all information into one solid whole. Thus, this study contributes with the use of a Systems Thinking lens which is grounded in a qualitative approach, in the pursuit of understanding the challenges facing MET in public higher education institutions in KZN.

1.8 RATIONALE FOR THE STUDY

The province of KZN has two multi-purpose ports, one being the busiest port in the southern hemisphere. To add to that, the province has a third port under construction, a dug-out port. This

maritime infrastructural investment, which totals billions of rands, will require the necessary skills to facilitate this growing industry in the province. As a result, improving the quality of basic education and higher education in this sector is critical to minimising the current gap between the trained population and the requirements of the workplace (SAMSA, 2013). However, in the 21st century, managing and leading any higher education institutions in South Africa is a very challenging task (Habib, 2016). Habib (2016) claims that:

“Where the managerial and strategic challenges tend to be more acute, is an even more onerous one. Although there have been significant changes and massive state intervention in the last 20 years” (Habib, 2016:36).

Today, the development of the education and training system in the maritime industry is a complex process, influenced by pressures of globalisation, rapid advancements in technology, fluctuations in safety and security standards, the changing image of the maritime industry, and the turbulent influence of the state. The researchers Altbach and Knight (2007) define globalisation in higher education as:

“The economic, political, and societal forces pushing 21st century higher education toward greater international involvement” (Altbach and Knight, 2007:290).

The global quality of the maritime labour supply in the maritime industry remains an area of apprehension, with all the regulations in place pertaining to MET to improve standards (Musa, 2000). Because of the increase in maritime incidents, the role of the MET system has taken centre stage in training competent persons for the maritime field (Stan and Buzbuchi, 2012: 533). As Davy and Noh (2011) assert, MET is vital in improving sea safety.

Nevertheless, MET development and sustainability not only addresses issues of maritime safety and competency, but also plays a crucial role in bridging the maritime skills gaps in countries such as South Africa, where MET's role is challenged. How these challenges arise, and influence one another, and the overall provision of MET at public higher education institutions, is unclear. However, it is generally accepted that MET in South Africa has, and continues to have, the same problems. The complexities of these factors ought to be investigated to address the challenges facing MET, especially at public higher education institutions. Because such institutions were

created by Acts of Parliament, they have a constitutional obligation to address the labour market demands of the Republic of South Africa.

1.9 RESEARCH METHODOLOGY

Academic research, herein referred to as research, is regarded as a systematic pursuit of knowledge. What makes it systematic is the processes that it encompasses, which is understood as the research methodology. In the social sciences, research is generally understood to be pillared on the three philosophies of positivism, interpretivism, and critical realism. An interpretivist philosophical approach was adopted and deemed necessary for achieving this study's objectives. A researcher in the social sciences has a choice between three designs: a quantitative, qualitative, or mixed methods design, to assist in answering research questions (Creswell, 2014). This study adopted a qualitative design. An aim or a '*type*' of study is guided by, but not limited to, the study's design in the social sciences. This study's purpose was to conduct a Systems Thinking '*exploration*' of the challenges facing MET in public higher education institutions of KZN.

Cresswell (2009; 2011; 2014) identified five strategies in social sciences research, which are narrative, ethnographic, phenomenological, grounded theory and case study strategies. This study adopted a phenomenological strategy. Interviews, using an interview schedule/guide, assisted the researcher to conduct seven in-depth interviews with key stakeholders from public higher education institutions. The stakeholders came from both government and a maritime institute in KZN. Interviews averaged an hour each and producing fifty-two pages of transcribed data onto a Microsoft Word document.

The sample of the study was broken down into two stages. This was done so that the study's objectives could be met. The first stage utilised a probability sampling strategy, followed by a census sampling. All public higher education institutions in KZN offering MET, and all government institutes and departments that coordinate and promote MET, were sampled. The second stage was a non-probability sampling strategy in which the technique followed was purposive sampling. Within these organisations, only individuals with certain characteristics, such as strategic positions and knowledge apropos the provision of MET at public higher education institutions and government departments and institutes in KZN were selected.

A process of thematic analysis was conducted to organise and interpret the data. After the collected data was read, organised, analysed and coded, themes were constructed, after which, a systems-thinking methodology known as systems dynamics (SD) was selected to guide the final analysis of this research.

1.10 LIMITATIONS OF THE STUDY

Limitations of a study are generally understood as being influences that the researcher cannot control. Such may also be understood as shortcomings, conditions, and or influences beyond the control of the researcher which places restrictions on their methodology and conclusions. As a result, these limitations ought to be mentioned by the researcher prior to the enquiry.

This study originated from a focus of MET at public higher education institutions in South Africa. Some constraints included the geographical spread of public higher education institutions providing MET, in that the researcher could not gain access to most of the institutions; the lack of interest by the institutions; and the slow process of obtaining permission to gain access to the respective institutions.

Broadening the geographical boundaries proved to be too time-consuming and costly, thus this study overcame this limitation by focusing on the province of KZN, in which the researcher works, studies, and resides. This too proved very problematic because of resources constraints, the limited number and availability of people with experience and expertise in the field of MET in the province. For example, the Maritime Studies Unit at UKZN has three staff members only.

Also the research methodology, specifically the research strategy and sampling technique limited the sample size to a small concentration of interviewees. This was overcome by finding guidance and justification from the available body of knowledge regarding the appropriate sample size for qualitative inquiries.

Lastly, the lack of relevant literature and studies on South Africa's MET, and specifically MET in higher education institutions, was another limitation. However, this also proved to be one of the strengths of the research, as will be explained later.

1.11 STRUCTURE OF THESIS

Chapter One: Introduction and Overview to the Study

This was the introductory part of the study, providing the study's background, and significance and rationale for the study. The chapter further presents the research questions that helped in answering the research objectives. Also, a brief presentation of the research methodology used in the study to achieve its purpose was given, and the limitations were also outlined.

Chapter Two: A Global Overview of Maritime Education and Training

This chapter is the literature review. In this chapter, the researcher gave an overview of MET globally by reviewing selected cases from different regions of the world. Issues facing MET in each region and country were identified. Academic and non-academic studies, such as government and non-governmental organisational (NGO) reports were used in the presentation, so as to give the reader an understanding of the state of MET globally, and the key issues therein.

Chapter Three: South Africa's Maritime Industry

In this chapter, the researcher, in following the general funnel approach rule when conducting a literature review, presented the state of the maritime industry and MET in South Africa. Issues therein were highlighted, and the various strategies and policies in place to address them were explored. Institutions established to address these issues were also examined. The chapter continues to present the area of the study by means of an overview of KwaZulu-Natal's maritime industry and strategies underpinning its development. It further identified the challenges and institutions supporting the development of the maritime industry in the province. In addition, there was a closer look at the provision of MET.

Chapter Four: Global Factors Influencing Maritime Education and Training

This chapter identifies factors that influence MET. It also draws from Chapter 2, 3 & 4 by interrogating factors critical in shaping MET globally. The chapter also identifies the challenges facing MET globally.

Chapter Five: Theoretical Framework: A Systems Thinking Exploration

This chapter presented the theoretical framework of this study, which comprised the concept of Systems Thinking, its origins, application, and methodology. The researcher further explained the use of Systems Thinking in conducting such an enquiry, and the limitations thereof. The language and notations involved in a Systems Thinking exploration were also explained.

Chapter Six: Research Methodology

Chapter Six presented the research methodology of the study. It provided a summary of the procedures and processes followed in order to investigate the concepts identified in the conceptual framework of the previous chapter. The researcher's philosophical assumptions and foundation for such, the study design, aim, strategy, and data collection tools were presented. Furthermore, the sampling strategy and techniques employed, data quality control, and ethical considerations of the study were provided.

Chapter Seven: Presentation of Findings and Analysis

Here the researcher reflected the empirical data collected and presented, which was informed by the methodology adopted and followed. The findings are presented, together with an analysis based on the study's objectives.

Chapter Eight: Discussion of Findings

In this chapter, the researcher discussed the analysed findings. This discussion is informed by a Systems Thinking approach, hence CLDs were constructed in the discussion to show the complexity, and eventually the inter-connectedness, of the findings.

Chapter Nine: Conclusions and Recommendations

This is the final chapter. It concludes the research project by presenting the author's conclusions, giving recommendations with regard to the challenges facing MET in higher education institutions of KwaZulu-Natal. The researcher went on to highlight areas for further research on which more clarity must be obtained.

1.12 CONCLUSION

States around the world play an active and central role in the governance of the maritime environment. In the industry, the State, through its institutions such as Transnet in the case of South Africa, manage and own ports and provide MET through its public higher education institutions. This has been informed by a number of factors such as, but not limited to; safety and security and the socio-economic components as well territorial sovereignty associated with the oceans. As a result, this doctorate in Administration, aims through a Systems Thinking lens, explore the challenges facing the provision of MET by public higher education institutions in KZN, which is home to two of South Africa's seven commercial ports, one, the port of Durban which is busiest in sub-Saharan Africa, and forth largest port in the Southern Hemisphere. This chapter has served its purpose of introducing the study, by presenting the background, the problem statement, and the rationale for the study. A summary of the research methodology deemed necessary to achieve the study's purpose and objectives, and the limitations thereof, were also offered. In addition, the structure of the thesis was outlined. The next chapter presents the literature review, which takes a global overview of MET.

CHAPTER TWO

LITERATURE REVIEW: A GLOBAL OVERVIEW OF MARITIME EDUCATION AND TRAINING

2.1 INTRODUCTION

A literature review is the foundation of thought to Du Plooy-Cilliers, Davis and Bezuidenhout (2014). It puts a research study into perspective, determining what previous scholars have written on the topic, regardless of when; and hence it is imperative that shortfalls are acknowledged and justification is given for the methods adopted to address them. The purpose of the chapter is to give a synopsis of MET in a global context by examining the country and region. Thus, the chapter offers a motivation for the enquiry by identifying and studying various scholarly work around the topic. In particular, it illustrates the contemporary standing of MET globally. A scholar, Chen (2000) identified that MET varied from state to state, depending on the specific situations of geography, history, culture, legislation, economy, politics, technology, and society. Hence, by giving an overview, and by examining other countries' MET in this regard, the reader obtains an idea of the provision of MET in these countries, and the policies governing it.

Saunders, Lewis and Thornhill (2003) point out that a literature review is a preliminary enquiry aiding in producing and refining an enquiry's ideas. As a result, knowledge does not exist in a vacuum, thus work only has value in relation to other people's work. New ideas may be obtained on how to improve KZN's MET system, with specific reference to public higher education institutions within the province. There was no systematic method for selecting the cases of countries presented in this chapter. Rather, the availability of literature for each country qualified it to be included in the overview of global MET. This study acknowledges that, owing to fragmentation and broadness of the maritime industry and the discipline falling into a number of fields, there was a challenge in the gathering of recent literature, especially that which addresses MET. However, Beer and Meethan (2007: 472) comment that, "what essentially defines maritime-related industries is the environment in which they operate." In conducting this literature review it is imperative that the researcher identifies first-hand the weaknesses found therein.

Traditional ways of reviewing the body of knowledge are through historical, thematic, theoretical and empirical reviews of literature. However, a researcher may focus on one or more of these methods (Du Plooy-Cilliers, Davis and Bezuidenhout, 2014). In this regard, this study followed a combination of an historical and thematic review. Owing to limited up-to-date and other literature on MET from selected areas around the world forming cases, the researcher adopted an historical review. The researcher was of the view that no research may be deemed unnecessary, even if outdated. Thus, conducting a literature review is not merely identifying sources, assessing source reliability and validity, and reviewing such by means of summarising their main findings: it goes beyond that.

2.2 MARITIME EDUCATION AND TRAINING IN EUROPE

Europe is a continent incorporating numerous countries such as Norway, Greece, and Spain, with rich maritime histories and a culture extending back for many centuries. The maritime industry fuels its economy through trade with countries as far away as Brazil, South Africa, and Japan. According to Albayrak and Ziarati (2012), the European Council requires the complete alignment by EU member states with the union's maritime legislation on areas of safety and non-safety, so as to increase the performance of maritime safety administrative institutions in the region, advancing maritime safety.

The European Union's (EU) strategy with regard to MET stresses that states ought to learn from one another by working collectively in the regions. Education and training policies ensure that knowledge and innovation are a collective synergy, which is the EU's most vital asset (Albayrak and Ziarati, 2009). Thus, "innovation projects aim to improve the quality of training systems through the development and transfer of innovative policies, contents, methods and procedures within vocational education and training" (Albayrak and Ziarati, 2009:4).

The growth of the maritime industry in Europe has presented problems for the industry. It is plagued by the slow and decreasing number of youth entering the industry. Walczak (2008) further identifies the questions sought to address by the EU's Green Paper on the continent's further Maritime Policy, which are:

"How can the decline in the number of Europeans entering certain marine professions be reversed and the safety and attractiveness of jobs ensured, how can better working conditions,

wages and safety be combined with sectoral competitiveness and how can the quality of education, training and certification be assured” (Walczak, 2008:430).

MET institutions in Western Europe are experiencing a declining number of students pursuing maritime studies (Pallis and Ng, 2011; Ng, Koo and Pallis, 2011; Lobrigo and Pawlik, 2014). The maritime industry therefore needs to sustain the existence of nautical studies programmes at MET centres, which otherwise are threatened by extinction in some regions, according to Pawlik (2014). The main issue is to entice a certain number of students into nautical studies programmes. This may be addressed by market expansion. Such a situation implies internationalization of MET programmes to cater to international prospective students, in which demographic trends make the seafaring profession unappealing to the domestic market (Lobrigo and Pawlik, 2014).

- **United Kingdom (UK)**

The United Kingdom (UK) is an island country which relies heavily on the ocean and its ports. About 95% of all its imports and exports are port serviced (SAMSA, 2011). According to SAMSA (2011), the UK is seen as a leader in terms of MET and is one of the major world centres for shipping. As with South Africa, the United Kingdom (UK) has a number of stakeholders involved in the maritime industry and MET research. In the UK, active research is carried out by various institutions such as the Department of Transport, the British Chamber of Commerce, the Baltic and International Maritime Council (BIMC), and the International Shipping Federation (ISF). Skills are developed at the UK Maritime and Coastguard Agency (MCA) (SAMSA, 2011). Although many institutions are involved in the maritime industry and MET research, unlike in South Africa, all “skills data is recorded and kept centrally” (SAMSA, 2011: 203). What this means is that since ‘maritime skills data’ is centralised, the effective and efficient use of it is guaranteed. This enables a clear tracking and understanding of the skills base in the industry.

Table 2.1: Trends in the UK’s Maritime Industry

Trends	
Maritime labour database	Inaccuracy of the data in terms of ‘quantitative’ numbers of the seafaring pool has proved problematic.
Maritime industry awareness	Private sector support. This came in the form of UK-based ship owners developing and coordinating a set of initiatives directed at marketing careers in the maritime sector, and growing the number of merchant ship officers (SAMSA, 2011).
Public Private Partnership	The UK government’s approach to the country’s maritime industry has included conducting an enquiry into actions required by government to support the industry.

Source: Compiled by author using data from SAMSA (2011)

According to SAMSA (2011), problems such as a shortage of suitably qualified seafarers, a gap in the demand and supply, limited marketing of the industry in terms of maritime career awareness directed at youth and MET constraints. These collectively mean that although much research has been done in the industry, inaccuracy of the data in terms of ‘quantitative’ numbers of the seafaring pool have proven a problem (SAMSA, 2011).

According to Beer and Meethan (2007: 473), in the United Kingdom, “the majority of skills gaps occur in the workforce of the equipment and services provider and design and construction sub-sectors”. Furthermore, business and management and engineering skills gaps are particular problems common to both sub-sectors. So too are seamanship and boat skills; while in the operations and shipping sub-sector, the introduction of new technology, both on board ships, and vessels and in port operations, has created skills gaps in information technology (IT). Beer and Meethan (2007) further identify that businesses in Cornwall reported that the greatest gaps are in IT, engineering, painting and finishing, welding and fabrication, and business management skills. The UK government and the private sector have responded to the above-mentioned problems in a number of ways. These include career awareness programmes directed at augmenting the number

of people entering the maritime industry, especially the youth. This has taken the form of increasing the awareness of careers at sea; and widening access to training opportunities (SAMSA, 2011).

The UK government's approach to the country's maritime industry is unique in that the government has approached the industry by conducting an enquiry into actions required by government to support the industry. Therefore linkages were identified to uncover the contribution shipping can make in achieving the aims of government transport policy (SAMSA, 2011). This took the form of "determining the levels of manpower and skills shortages, establishing the importance of shore-based shipping services and determining how employment can be promoted" (SAMSA, 2011: 204).

- **Scotland**

The country, which is part of the UK experiences similar challenges to rest of the state around recruiting youth into the maritime industry, especially sea-going officer trainees (cadets). Nevertheless, in the recent past, the country has taken active measures to inspire interest in careers at sea. This has had a positive effect: the number of youth taking up MET has increased (the Mackinnon Partnership, 2008).

In Scotland, further education and higher education institutions are dominated by specialised departments providing an expansive range of MET programmes, varying from lengthy to short courses, although limited to such as naval architecture and marine biology in some universities (the Mackinnon Partnership, 2008). According to the Mackinnon Partnership (2008), many Scottish maritime employers in the industry source education and training for employees outside the country, such as MET institutions in England. This goes to their concern that, for example, officer trainees were not taught sufficient practical skills.

MET tends to be rurally based; however, it attracts not only rural maritime employees to their specialised programmes, but also people internationally (the Mackinnon Partnership, 2008). Owing to low salaries in lecturing, there has been a shortage of human resources, specifically suitably qualified MET instructors; shore-based jobs in the growing maritime industry and related sectors are more attractive, pay better, and are plentiful (the Mackinnon Partnership, 2008). As a

result, MET institutions are gradually relying on international teaching staff from abroad to take up teaching posts (vacancies).

Table 2.2: Issues in Scotland’s Maritime Education and Training

Issues	
Lack of MET facilities	The availability of space, and high-quality training simulators within Scotland, is limited. There is also a need to upgrade current training simulators to be on a par with technological advances.
Inability to recruit sufficient qualified and experienced lecturers	This is owing to industry competition and the limited number of experienced lecturers.
Fragmented training	In some sectors, employers are at a disadvantage. Merchant navy training does not properly recognise the needs of various sub-sectors, such as workboats, tugs, and the off-shore sector. Much training, and the MCA requirements on which it is based, rely on a rather traditional model of how ships work, which is drawn from the deep-sea merchant navy, and does not fit the reality of many sub-sectors.
Lack of transferability of qualifications	Scotland frustrates several employers from the various sectors: employers are frustrated because the MCA does not recognise key qualifications issued by others. This implies additional costs for employers if they retrain people who have completed qualifications not recognised. The issue is one commonly raised, and it relates to the whole of the UK, not only to Scotland.
Lack of funds	Government funding favours training rather than education qualifications (the opposite of the English model) and collaboration between the different parties enables them to maximise the funds available through a collaborative arrangement. It is, however, an example of a pragmatic partnership to find ways round a problem:

	lack of funding for SVQs. Shortages are addressed, and gaps plugged by recruiting East Europeans.
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Source: Compiled by author using information from the Mackinnon Partnership (2008)

In Scotland, some maritime sectors want training designed with their particular needs in mind. There is growing interest in off-shore maritime sectors, hence the need to see appropriate training developed parallel with the needs of the growing maritime industry and sectors therein (The Mackinnon Partnership, 2008). Below Table: 2.3 presents current trends in Scotland pertaining to MET.

Table 2.3: Trends in Scotland's Maritime Education and Training

Trends	
MET partnerships	Partnerships promoted by maritime business have been created in MET programmes and innovations in MET, such as E-learning
The use of foreign labour	In sectors such as Emergency Response and Rescue Vehicle Association (ERRVA), jobs are less appealing, Operators are therefore reluctant to spend money on training staff; hence, increasingly, therefore, employees come from Eastern Europe. They are reported to have good English and to be better trained than British colleagues.
In-house training	In-house training by port authorities covering statutory requirements are deemed valuable in bridging skills gaps, by partnering with colleges and other companies. This has produced a good deal of competence matrices. This is seen as a means of saving money rather than per the traditional way of training. There is no work-time lost owing to training provision. For example, Aberdeen Harbour Board has bought its own training simulator as there was no satisfactory alternative locally.

Source: Compiled by author using information from the Mackinnon Partnership (2008)

- **Greece**

Greece has a very rich maritime culture. It is one of the oldest seafaring countries in the world and the maritime industry has always been an integral part of its economy (Mthuli, 2014). It has a very structured MET approach (SAMSA, 2011).

Table 2.4: Trends in Greece’s Maritime Education and Training

Trend	Description
Training institutions	There are various marine academies in Greece for both deck officers and engineers. All these academies fall under the supervision of the Ministry of Mercantile Marine.
Funding	Funding for training is provided by the Greek government, with mandatory contributions from owners of vessels registered in Greece and from the European Union.
Tuition fees	No fees are charged for training, accommodation, or subsistence, as all maritime training is sponsored as set out above.
Post training	There are two government funded centres for post training, which run professional support courses and professional development programmes for seafaring officers. There are also some private institutions that run courses.

Source: Compiled by author using information from SAMSA (2011: 210).

- **Poland**

Poland is an eastern European country on the Baltic Sea. Like its many European counterparts, Poland has a very rich maritime heritage. The country enjoys a rich maritime industry, with its strong position within the global maritime market, because of its capability of building high quality ships of various kinds (Poland at Sea - Maritime Magazine, 2012: 3). The country further has vast experience in supplying the global maritime labour market (Walczak, 2008).

Poland has not been immune to the broader challenges facing Europe’s maritime industry, such as the lack of interest in maritime professions. However, Walczak (2008), observes that the situation

in Poland is not as intense as in Western Europe. Nevertheless, the country is faced with issues such as high unemployment, especially amongst the youth. There is also a drop in the number of students pursuing maritime courses although not noticeable at maritime universities.

Poland has three MET higher education institutions, three post-high maritime schools, twelve sectoral secondary schools, and another five higher education institutions that strengthen maritime education. This ensures a steady supply of maritime professionals in the country (Walczak, 2008). The state of MET in Poland is of European standard, the institutions and its facilities being well equipped, with both teaching and research staff and educational structures satisfactory and in line with the Bologna Declaration. However, Poland still remains committed to coordinating MET so as to meet both the national and regional EU needs (Walczak, 2008).

Summary

In conclusion, the literature above has shown that Europe has a strong maritime history and culture. Its economy and member states depend on trade and the maritime industry for its prosperity. Its maritime industry is well regulated and maritime safety in Europe is vital. There is easy access to MET entry and there is a diverse scope of MET provision. With the EU member states there is government centralised certification of MET qualification so as to meet STCW requirements. Europe's maritime industry has problems such as labour-market supply and demand gaps brought about by the decreasing number of youth taking MET courses. This threatens its maritime industry. The limited marketing of the maritime industry is a result of limited maritime career awareness on the maritime services side in the UK, and the introduction of new technology. However, government has taken an active role in addressing the predicament, by approaching the maritime industry. As a result, MET partnerships in the EU to overcome the problems have been initiated. A public-private partnership driven by government has been created. This involves bringing in domestic shipping companies to address the skills needs in the EU region, so as to achieve the EU's Maritime Transport Policy. However, at MET institutional level, problems such as the shortage of qualified staff have been brought about by the inability to attract and retain MET staff. Low salary packages at MET continue to threaten the maritime industry in countries such as Scotland and the UK.

2.3 MARITIME EDUCATION AND TRAINING IN THE AMERICAS

- **Canada**

Canada has five institutions producing maritime qualifications for both seagoing and shore-based vocations. These institutions offer courses leading to certificates of competency (Chen, 2000). According to Chen (2000), under the Canadian Constitution, education comes under the jurisdiction of each province, and this includes MET, even though certification is a federal responsibility. The Canadian MET system focuses mostly on training.

Table 2.5: Trends in Canada's Maritime Education and Training

Institution	Trend
Marine Institute of Newfoundland	Grown out of the former fisheries' training institute, this organisation has excellent premises and facilities, a staff which is reasonably well-qualified and constantly upgraded, and having fairly strong financial support. This is owing to provincial government considering maritime training a priority, as part of its policy to deal with chronic unemployment. Training in fisheries, navigation, oil and gas operations has therefore been given a high profile, and the Marine Institute has benefited from this.
Institute Maritime du Quebec	Established reputation for maritime education for Francophone Canadians. The institute, which is strongly supported by the Province of Quebec, enjoys an international reputation, and has demanding entrance requirements.

Source: Chen (2000: 58-60)

MET in Canada varies from one province to another, because it is under the jurisdiction of each province. There are some differences between them in their teaching programmes. The country subscribes to international maritime training standards set out under the requirements of the IMO (Chen, 2000). These requirements are enforced by the Ministry of Transport, through a series of tests, examinations, and re-examinations, while, according to Chen (2000), the Marine Safety Directorate of the Ministry of Transport takes charge of issuing the Certificate of Competency. Students who successfully complete the programme will have sea service requirements needed to

have the Watchkeeping Mate Certificate of Competency reduced by 12 months; and will have sea service requirements for the ONII Certificate of Competency reduced by 6 months (Chen, 2000).

- **Brazil**

Globally Brazil has one of the largest economies, in Latin America certainly the largest, and in terms of GDP had the highest expected economic growth rates, between the year 2011 to 2015 at 4.9% annual average (UK Business Monitor International, 2016). Much of the country's wealth has come from its vast oceans bordering the country. The remarkable economic growth and development in the country drives the rising importance of the maritime industry domestically. The country is not a traditional shipping nation though. Since the 1960s however, Brazil's current maritime industry, with the enactment of the country's maritime policies concurrently have been developing. This has been because of the economic development and progress in Brazil, and this has been reflected in the petroleum, export activities and explorations developments as well as valuable mineral reserves detected in the country's geological formations (pre-salt layer).

The economic activities and the growth in global trade has encouraged the expansion globally of the merchant fleet. The merchant fleet employs most of the seafarers in the world. Like other global players, the seafaring labour market in Brazil follows the global trend in lacking ship's officers, which cannot be supplied by the country's domestic maritime labour market (Lobrigo and Pawlik, 2012). In Brazil, the anticipated supply of ship's officers according to Lobrigo and Pawlik (2012) has usually relied on the allocated student study placements in MET programmes. This supply of ship's officers forecast depends on the anticipated Escola de Formação de Oficiais da Marinha Mercante (EFOMM) MET graduates, and successful participants of Curso de Adaptação a Segundo Oficial de Náutica e Máquinas (ASON/M), and Curso de Acesso a Segundo Oficial de Náutica e Máquinas (ACOM/M) apprenticeship programmes.

Table 2.6: Issues in Brazil's Maritime Education and Training

Issues	
Attracting youth to MET	Attracting more young people to consider a seafaring career.
Limited MET provision	Only two maritime schools in the country which comprise the School of Formation for Officers of Merchant Marine EFOMM. These two schools are CIAGA in Rio de Janeiro and Centro de Instrução Almirante Brasz de Aguiar (CIABA) in Belem, which are directly controlled by the Brazilian Navy.
Long MET process	Maritime course takes four years.
MET under single government	MET in Brazil is unique because in most countries significantly involved in the maritime industry, such as the Philippines, India and China, nautical science programmes are also offered by universities, technical colleges, and private maritime academies. These are not necessarily controlled and operated directly by a single government authority such as the navy. However, they are supposed to be licensed to offer MET programmes. Licensing and accreditation processes may be used as tools to monitor and ensure the quality of nautical study programmes.
Higher dropout rate of experienced seafarers	The dropout rates of ship's officers in Brazil are estimated to be 27%, 35%, 41%, 64%, 74% and 80% of those who have finished their formal training and education after 3, 5, 8, 11, 14 and 17 years, respectively.

Source: Compiled by author using information from Lobrigo and Pawlik (2012)

Table 2.7: Trends in Brazil's Maritime Education and Training

Trend	
Tuition	In both maritime colleges are military institutions where tuition fee is waived and students are provided with on-campus accommodation and a monthly stipend.
Restrictive maritime labour policy	Brazil has a strong restrictive policy against employment of foreign seafarers on Brazilian flagged vessels. This restricts employment of foreign maritime professionals on vessels registered in Brazil, as well as on foreign vessels that are mainly engaged in domestic trade, i.e., in cabotage and offshore operations. Moreover, the legislation requires that a certain percentage of the crew at all levels on vessels and platforms operating in Brazilian territory should be reserved for local seafarers.

Source: Compiled by author using information from Lobrigo and Pawlik (2012)

The long MET process contributes to slow domesticating of the local maritime industry. This leads to the current condition of the imbalance in the Brazilian seafaring labour market, as well as the prospects for merchant marine officers (Lobrigo and Pawlik, 2012). The Department of Ports and Coasts (DPC) in the first year of studies makes the decision of how many prospective students are to be offered space at both the MET institutions according to Lobrigo and Pawlik (2012). Industry requirements influences this decision as well as the budget, facilities available and capacity. What plays an key role is the budget, because for increased student enrolment, further investment might be needed.

The DPC launched two MET programmes that allows non-officer seafarers or ratings and professionals which hold first university degrees to become officers in merchant-ships. Aside from MET students enrolled in EFOMM. The programme is the qualification adaptation course ASON/M (Segundo Oficial de Na'utica e Ma'quinas). A programme called the ACON/M is for ratings who would like to follow an officer career at sea. Nonetheless, according to Lobrigo and Pawlik (2012), the capacity of formation centres in Brazil for ship's officers needs to be expanded, there needs to be also a relaxation of pertinent legislative maritime policies which restrict seafarer employment, and convince seafarers to remain active in their sea-going seafaring vocations for a longer period. There is also a need for the creation of additional study placements for MET by means of non-military technical colleges and universities and this would rise in Brazil the accessibility of the seafaring vocation (Lobrigo and Pawlik, 2012).

Summary

MET in the Americas is a two-part operation. On the one hand, the north has easy access to MET programmes. Its MET institutions in countries such as Canada have a good international reputation. They have well-financed MET, excellent facilities, and staff who are reasonably well-qualified. On the other hand, in the south, MET is limited and under the control of one single government body. However, MET in both North and South America is very important to government because of its economic benefits. In Brazil, in this regard, there are very restrictive maritime labour policies that seek to protect the domestic labour market and place Brazilian MET graduates at an advantage. In Canada, the government considers maritime training a priority, as part of its policy to deal with chronic unemployment. The result is that training in fisheries, navigation, and oil and gas operations has been given a high profile; and the Marine Institute has benefited from this. The commitment of these American countries to the maritime industry is also shown by their financial investment in MET.

2.4 MARITIME EDUCATION AND TRAINING IN ASIA

The emergent competence of the maritime industry as a means of moving goods, the growing global economic liberalization, and the projections for the development of shipping remain strong in Asia. Although the Organization for Economic Cooperation and Development (OECD)

countries remain an important source of maritime labour, a rising number of personnel such as ship officers, are nowadays employed from developing countries in the Far East and South-East Asia.

In major maritime labour supply countries such as the Philippines and India, many of the seafarers enjoy work opportunities on international shipping companies flying foreign flags. Likewise, China has experienced this phenomenon with its seafarers, although to date most work on domestic Chinese fleets, meeting local requirements. Such is the case of Brazil (Eler, Calambuhay, Bernas and Magramo, 2009) and (Enrico Lobrigo and Thomas Pawlik, 2012).

Chong Ju (2011) identifies that the Far East supplies roughly 34% of seafarers worldwide, however, regardless of that, MET institutions in this region encounter numerous problems especially relating to the STCW Manila Amendments. Far East MET institutions such as universities have difficulty implementing the STCW because: (a) they cannot secure berths, which is, “fulfilling the on-board training requirements for deck and engine officers thus on-board training placements are not enough” (Chong Ju, 2011: 125). Thus they depend on commercial ships for on-board training, (b) MET institutions are yet to establish E-learning systems even though the STCW identifies this education method as advantageous in offering MET. However, Chong Ju (2011) asserts that owing to lack of financial resources and infrastructure, E-learning is not a close reality, (c) there is a need for financial support in the form of investment. There are additional costs in installing equipment such as simulators that needs upgrading to more advanced training systems so as to meet the STCW Manila Amendments. The next section, below, starting with China, examines individual countries in the Far East, and their state of MET.

- **China**

China is an international shipping centre. Her success has been sustained growth in the international trade and shipping activities. One of the main factors in the economic development of China has always been the maritime industry (SAMSA, 2011). The country has made huge achievements in the maritime field, such as in ship and port building, as well as cargo handling. Nevertheless, to sustain such development, Dong (2014) is of the view that there ought to be strong strategies in place. Such strategies should support maritime services’ education, its purpose being

to encourage and develop human capital for maritime services, for disciplines such as maritime brokerage finance, insurance, as well as maritime law.

According to Shicheng (2009), who examined the challenges and opportunities for MET in China, the Chinese economy is enormously dependent on international trade, with shipping carrying 90% of its trade. The country's economy is so intertwined with that of the rest of the world that during the world 2008 economic crisis, China's seafaring labour market was badly hit, as was its MET system. What the crisis did for China was that it created challenges for its maritime labour markets, especially those sea-going. Nevertheless with the speedy development of its economy, the country's maritime industry has been rising in the last thirty years, with MET insitutions providing the necessary human resources in the industry.

From 1909, when MET was first established in Shanghai, the country has played a hugely influential role in the domestic and international shipping industry (Dong, 2014). China has a long tradition of shipping and shipbuilding. Similarly, the country has a long history of MET. The MET system in China is well administered, and has a clearly structured hierarchy (European Commission, 1998). Thus, Chinese MET has been playing a vital role in the Chinese shipping industry.

Dong (2014) identifies that in China, MET usually encompasses three parts: "typical MET which focus on seafarers' education and training, maritime services' education, and other education and training on rare subjects such as maritime archaeology" (Dong, 2014:115). China's MET over the past decades has provided human capital for its shipping industry, such as seafarers, shipping managers, and researchers in maritime (Dong, 2014). However, traditional MET in the country has ignored shipping services' fields, laying emphasis on crew training (Wang, 2011). Despite this, Wang (2011) maintains that to date:

"The curriculum are apparently heavy on theory and light on practice especially for on board practicing procedure during which the school is only responsible for little proportion but leave over more to the company after graduation, it consequently leads to an increasing of time consuming of the cultivating circle, even to some extent result in an incomplete crew education process for those who have no chance to work on board ships, causing a huge waste of maritime educational resources, as well as maritime talents" (Wang, 2011: 72).

Sea experience is valuable for seafarers and as well as shipping firms offering land-based positions (Wang, 2011). Throughout the process of initiating and expanding MET in the country, it has slowly developed into an educational system with various levels comprising higher, senior vocational, junior vocational, and other MET platforms (Wang, 2011). Within the country, institutions of higher education have continuously remained the key provider of human capital to the maritime services' sector in the country. To date, nearly 30 of these institutions offer, at different levels, maritime finance, law, and maritime economics (Wang, 2011).

Wang (2011) posits that MET remains challenged, because quality of MET focuses on the maritime services side. This includes the curriculums, the teachers, and students, which are not always fully on a par with the needs of the fast developing maritime industry, such as the shipping market. For example, Wang (2011) noted that in China:

“For teachers, the characteristics of maritime services require a globalized perspective and relevant field background which they don't really have; and for students, English has become the biggest obstacle for their career development no matter how hard they are doing; as for the curriculum design and implementation, almost all schools are trying to make their courses all- embracing in every major, aiming to produce omnipotent graduates in maritime fields, which finally leads to an opposite consequence” (Wang, 2011: 87).

The table below takes a closer look at MET in higher education in China.

Table 2.8: China’s Higher Maritime Education and Training

Higher MET	<p>Higher MET integrates vocational MET with degree education. This is normally a four-year “consistency” programme compared with the “sandwich” mode. Students are expected to develop an understanding of elements of maritime theory and the expertise of maritime practice by going through basic courses such as mathematics, computer skills, maritime English, etc., and specialised courses, accompanied by STCW (International Convention on Standards of Training, Certification and Watchkeeping for Seafarers) training for ship’s officers.</p> <p>Most of the graduates are expected to become ship’s officers, or managers in shipping companies, while others may become teachers or research staff after taking higher studies at master’s or doctoral level. There are 15 higher MET colleges and institutes in China.</p>
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Source: Compiled by author using information from Wang (2011)

Table 2.9: Trends in China’s Maritime Education and Training

Trends	Description
Formal training policy	The government has formulated policy to encourage the training of officers who become employed by shipping vessels and on-shore shipping companies.
Dedicated tertiary institutions	There are fifteen tertiary institutions dedicated to and focused on training for the maritime industry
Career paths	Students have the opportunity of training from undergraduate sub-degree level to PhD-level maritime programmes.
Ensuring international standards	Training subscribes to international standards, and the approach is one of a “good outlook.”
Training quality & funding	What leads to somewhat lower quality of MET graduates has been the lack of teaching staff, funding, experimental and infrastructure such as facilities.

Increased student enrolment	The average enrolment of students is large, reaching 43 334 annually over the past five years. The teacher-student ratio ranges from 1:18 to a level of approximately 1:25. The number of related schools, disciplines, and corresponding students, is still inadequate for the huge shipping market of China
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Source: Compiled by author using information from SAMSA (2011: 207)

According to SAMSA (2011), China's MET constraints are the flexibility of maritime degree courses, meaning that, owing to the curriculum design, students do not have the flexibility to work on-shore at shipping companies or on vessels. Shickeng (2009: 2) assessed that the Chinese maritime labour market is especially sea-going as 'ship-owner orientated' rather than 'seafarer orientated', thus more and more Chinese sea-going labour has had to compete with labour from other countries on the global market. Eventually what this means is that, "the scale, teaching curriculum and modes for both cadet programme and seafarers updated training, is required to be adjusted accordingly to provide better services for the industry" (Shickeng, 2009: 2).

Many MET institutions in China, such as the Shanghai Maritime University (SMU), in order to address some of the challenges, have responded by focusing on innovation and customer orientation. This has included offering comprehensive MET programmes from diploma programmes, to Bachelor of Science (BSc) degrees and on-the-job training. Furthermore, investment has made in developing teaching and research, and improving training infrastructure, together with a new SMU campus capable of housing 20 000 students (Shickeng, 2009).

Owing to the continuous growth in the maritime transport industry's 'specially shipping' and the domination of China in international trade, the Chinese MET system, especially SMU, has been given many new opportunities. The development of the Chinese MET system will help China seize such opportunities. The growth of the maritime industry, especially on the 'shipping' side relies on the exceptional maritime personnel, who, in turn, would not exist without the good performance of MET (Shickeng, 2009). Table: 2.9 below presents the advantages and disadvantages MET confronts in China.

Table 2.10: Advantages and Disadvantages Facing MET in China

Advantages	<ul style="list-style-type: none">• The certification system and the related administration for unlimited certificates of competency is well defined and controlled.• The content of curricula is in compliance with STCW95 and in certain areas the standards are higher than the minimum requirements of the Convention. The student can acquire sufficient theoretical knowledge after academic studies.• Of recent years the number of maritime students who come from the city has decreased slightly. However, there are still adequate numbers of maritime students, students from the countryside making up the shortfall of city students.
Disadvantages	<ul style="list-style-type: none">• There is a shortage of capital used in the development of MET. Although the government, since 1978, has gradually increased investment in this field, this is unsatisfactory by comparison with the requirements of the shipping industry at home and abroad.• The old equipment used for training purposes at higher maritime institutions requires replacement.• There is a shortage of teachers who have more theoretical coverage of subjects, together with shipboard experience.• The inadequate knowledge of English among students is the biggest weakness.• The teachers need to improve their English as well, in particular in the skills of listening and speaking.• The pace of absorbing and digesting the new knowledge and technology should be speeded up.• The use of modern tools in teaching and learning should be encouraged.

Source: Compiled by author using information from Chen (2000:71-73)

- **Singapore**

In Asia, Singapore is seen as tremendously stable, politically and economically (SAMSA, 2011). The Maritime and Port Authority of Singapore (MPA) leads Singapore's maritime sector, while the Singapore Polytechnic manages the training in the Singapore maritime industry (SAMSA, 2011). Thus, the MPA is the driving force in the maritime development initiatives in Singapore.

Table 2.11: Trends in Singapore's Maritime Education and Training

Trends	Description
A large variety of MET qualifications and courses	A number of institutions conduct training and offer short courses for diplomas, focusing on the maritime industry and onshore shipping industry.
Quality of training	Singapore seafarers are fluent in English. They receive continuous training and have very up-to-date facilities.
Simulation centre	The MPA has a simulation centre with an array of simulators to ensure full hands-on training.
Awareness programme	Stakeholders such as the MPA, the Singapore Maritime Foundation and the Singapore Shipping Association have come together, sharing resources to create awareness around maritime careers.
Funding	The above-mentioned stakeholders also provide funds for scholarships. The Maritime Cluster Fund is managed by the MPA, whose purpose is to assist business development in the maritime sector while developing maritime human resources.
Centre of excellence	The purpose of the centre is to ensure that Singapore grows its present knowledge pool above and beyond its current core maritime business. It sees itself as an international maritime centre of excellence.

Source: Compiled by author using information from SAMSA (2011: 208-209)

MET constraints in Singapore are firstly that it falls under the umbrella of two statutory boards: the Singapore Polytechnic, under the Department of Marine Technology and Transport (under the Ministry of Education); and the MPA, under the Ministry of Communication and Information technology. This presents a somewhat bureaucratic nightmare (SAMSA, 2011). Furthermore, owing to low seafarer wages and the availability of jobs onshore, many qualified seafarers work onshore rather than at sea/on vessels (SAMSA, 2011).

- **The Philippines**

The Philippines, like many of its neighbouring Asian countries, benefit immensely from the maritime industry. The country has a noteworthy competitive advantage compared with other countries in that it enjoys a pool of globally renowned, skilled, and experienced seafarers (Richter, 2016). The country has about four billion dollars of annual remittances of sea-based Overseas Filipino Workers (OFW), about 22% of total OFW remittances in 2012 (Ritual, 2015). Thus, the MET sector is a vital and favourable contributor to the growth of the maritime industry in the country (Richter, 2016).

However, the country has a present shortage of officers in its maritime industry (Ritual, 2015). This situation has arisen as a result of numerous factors within the country (Eler, Calambuhay, Bernas and Magramo, 2009). Eler *et al.* (2009) cite state institutions and their respective agencies, manning and shipping companies, MET institutions, as well as the seafarers and their aptitudes. Also, there is persistent demand for new, faster, bigger, and greener vessels. This is thanks to globalisation of the industry and trade.

The Philippines is a major supplier of certified seafarers in the international seaborne trade, providing more than 25% of the crew that manage, operate, and support the labour requirements of international marine vessels (Ritual, 2015). Maritime Education (ME) at higher education institutions typically consists of a four-year degree, either in marine engineering or transportation (Richter, 2016). Usually, ME students go through a four-year structured programme comprising three years of theoretical study prior to a one-year practical onboard job training on a vessel (Galvez, Tuapin, Sabay and Starke, 2016).

There is flexibility in ME because students are offered an alternative approach structured to deliver vessel training in their third year. Thereafter, students return to school to complete their fourth and final year (Galvez *et al.*, 2016). On the contrary, Maritime Training (MT) is comprised of shorter courses that are designed to improve the competencies of seafarers and focus on the general operations on board, including safety and crisis management, and dangerous cargoes (Richter, 2016).

The STCW Convention 1978, as amended in 1995 and in 2010, made a large impact on MET systems in the Philippines, competency-based learning being implemented (Ritual, 2015). International attention is now focused on the capacity of the Philippines to continuously supply competent seafarers who meet the STCW as amended in 2010 (Ritual, 2015). The country's Maritime Higher Education Institutions (MHEIs) are monitored and evaluated by the Commission on Higher Education (CHED), the Maritime Industry Authority (MARINA) and the Technical Education and Skills Development Authority (TESDA) to determine compliance with STCW. Ongoing authorised programmes are regularly monitored; those found to be non-compliant are ordered to close immediately or to phase out (Richter, 2016).

In the Philippines, there is a proposed Fund for Maritime Education Development and Enhancement (F-MADE) which is to be used exclusively for enhancing the quality and competitiveness of qualified MHEIs within the country. This will enable the continuous production of highly competent officers for the Philippines and for the international shipping industry, in accordance with the STCW Convention as amended, and the STCW Code (Ritual, 2015).

The F-MADE is to be utilised for the modernization of facilities and teaching resources; the upgrading of faculty competencies; the enhancing of research and development capacity; and for the support of shipboard training. The preliminary considerations in the provision of grants include the following:

- Application of the QA framework Performance of the MHEIs and the graduates;
- High compliance with STCW-compliant CHED PSGs and accreditation levels;
and
- Good reputation and potential (Ritual, 2015).

The proposed sources of the fund will be from a portion of the CHED Higher Education Development Fund maintained in the Bureau of Treasury, a share of the fees paid by shipping companies and similar entities in government, special budgetary allocation of Congress for the purpose, and other unspecified stakeholders (Ritual, 2015).

Summary

Globalisation has greatly benefited Asia, specifically its maritime industry. It has brought mass economic opportunities such as seen in the maritime labour markets. However, globalisation of the maritime industry has brought with it regulatory measures in terms of certification of MET which has negatively affected the reputation of its maritime labour markets worldwide. This is seen as vital in the quest for sustained success of Asia's maritime industries. The STCW has affected and shaped the MET systems in Asia. With the expansion of the global maritime industry demands, there has been a shift from MET focus on MET catering for crewing needs to MET also catering for shipping services. Traditional Asian MET was slow and not meeting industry demand, hence it needed the internationalization of MET delivery and outlook. Several factors contributing to maritime labour demands have been applying pressure on the MET system. Higher education, for this reason, has taken MET centre stage, in offering a wide range of MET programmes. Thus, Asian governments, in taking this stance, are playing a very active role in MET. They are correcting past challenges such as limited funding for MET, lack of teaching staff and infrastructure such as facilities, result to the low quality of graduates pursuing MET. These governments acknowledge that funding for MET development must keep in pace with labour demands and technological advancements in the maritime industry. They understand that these factors have a direct impact on MET, thus government control, and the financing of MET modernization of facilities and teaching resources, the upgrading of faculty competencies, enhancing of research and development capacity, are all vital to the success of MET in Asia.

2.5 MARITIME EDUCATION AND TRAINING IN OCEANIA

- **Australia**

Australia, like most English-speaking countries in Europe, has an extremely efficient and developed maritime sector. Australia, as with many of its neighbouring countries such as those found in Asia, relies heavily on international trade. The Australian MET system for the maritime industries has developed rapidly since the 1970s, when there was the beginning of a period of speedy technological change in the shipping industry. The Australian Maritime College, established by an Act of Federal Parliament in 1978, plays a significant role in the MET in Australia. It provides educational programmes and practical training for the shipping and fishing industries, from certificate to doctoral levels (Chen, 2000). Chen (2000) identified that courses not only reflect the general trend in industry towards recruiting a greater proportion of graduates into executive positions, but are also flexibly structured and suitable both for school leavers and for experienced mariners wishing to upgrade their qualifications.

Australia is seen as an international leader in vocational training and skills development (SAMSA, 2011). According to SAMSA (2011: 205), “South Africa’s own National Qualifications Framework (NQF) is based on the country’s framework”, meaning that Australia’s national qualifications framework forms the basis of the South African version. Furthermore, SAMSA (2011) states that many of South Africa’s maritime qualifications which are currently registered on the NQF have been benchmarked against Australian qualifications. Australia has been successful in the identification of skills gaps in its maritime sector and has drawn up focused countermeasures to tackle training needs in the maritime industry. According to SAMSA (2011), this has taken the form of partnering with various key stakeholders such as private, governmental, and academic institutions.

Table 2.12: Trends in Australia's Maritime Education and Training

Trends	Description
Research and studies	Numerous studies have been conducted with regard to maritime skills over the past decade.
Detailed information with regard to skills shortages	Australian authorities have done a detailed analysis of the skills shortages and their causes, There is also information around skills transferable to maritime onshore based sectors.
New policies	A suggestion that the Australian Government develop policies to encourage the growth of the shipping industry.
Fee support/waivers	A suggestion to provide this to scholars wanting to enter the maritime education and training environment.
Increased funding	A suggestion to increase funding to national institutes and to support vocational training provision.
Support of academic institutions	The subsistence of the Australian Maritime College and the maritime policy unit within the college supports maritime initiatives and training in the country.

Source: Compiled by author using information from SAMSA (2011: 205-206)

Table 2.13: Constraints within Australia's Maritime Education and Training

MET constraints	Description
Inflexible career pathing	There is a general lack of career pathing and no flexibility in career pathing progression
Fewer Australian flag vessels	Results in fewer training berths available for trainee cadets.
Lack of awareness	A poor industry image and lack of awareness of the industry is contributing to the skills shortages.
Skills shortages	Due to the persistent growth of a number of sub sectors in the industry such as transport, offshore oil and gas exploration, export of bulk commodities, construction and container trade.
Suitability of qualifications	Because of the global nature of the industry and the competitiveness, there is a lack of suitably qualified seafarers.

Source: Compiled by author using information from SAMSA (2011: 205-206)

Summary

In line with many countries around the world, MET in Australia is legislated by government. Technology has played a vital role in the development of Australia's MET systems. Partnerships created in the maritime industry have made MET successful within the country. However, Australia as with its counterparts in Europe, faces issues such as inflexible career paths. Lack of awareness born of a poor industry image has resulted in skills shortages and the challenge of unsuitable qualifications.

2.6 MARITIME EDUCATION AND TRAINING IN THE MIDDLE EAST

- **Turkey**

In the Middle East, Turkey is one of the oldest countries in the region. The country, bordering Western Asia and Eastern Europe, has a rich maritime heritage and history because of its location and ancient commercial roots. To date, however, the country is no different from most others regarding MET issues. To overcome its MET difficulties relating to technological advances, the attractiveness of MET, and the STCW MET requirements for the merchant navy personnel, global MET partnerships were established. Ziarati (2010) assessed that the maritime industry would then observe the increasing quality of the country's seafarers, who would carry the world shipping to the highest standards in the second half of the next decade.

To ensure this, the Turkish Maritime Education Foundation (TUDEV) established partnerships with well-known international maritime institutions and professional maritime bodies in the EU which are also well-respected. These include universities in countries such as the UK. Such partnerships have been leveraged upon to develop up-to-date MET programmes in Turkey (Albayrak and Tudev, 2008). These partnerships have also resulted in student and staff exchange programmes. Partnerships have not only provided opportunities for collaboration and joint programmes, but also initiated a number of EU-funded projects (Albayrak and Ziarati, 2012). According to Albayrak and Ziarati (2010), the outcomes of such projects have assisted the country in MET programmes, such as those that require on-board training on ships and the use of advanced MET simulators. To understand the problems in detail, a pilot project SOS (Safety on Sea, 2005-07), funded by the EU Leonardo programme, was launched. A partnership initially consisting of Turkey, Scotland, England, and Norway was formed to identify major problems and good practices

in the partner countries. The partnership developed integrated world-class programmes of education and training both for navigation engineering and marine engineering cadets wishing to acquire internationally recognised qualifications as officer of the watch (Albayrak and Ziarati, 2012).

Several universities in the EU and major awarding bodies such as the Business and Technology Education Council (BTEC) assisted Turkey in the development of the programmes and accrediting bodies, such as the Institute of Marine Engineering, Science and Technology (IMarEST) and licensing authorities such as the UK's Maritime and Coastguard Agency (MCA). The European Maritime Safety Agency (EMSA) reviewed the programmes to ensure complete compliance with the requirements of EMSA, which eventually occurred (Albayrak and Ziarati, 2008). Albayrak and Ziarati (2008) identified that such projects were in line with the EU's Integrated Maritime Policy (IMP) and Knowledge 2020, that calls for countries to work and learn collectively. This is expected to spark knowledge and innovation, which is the region's greatest valued asset.

What is anticipated to make a major impact on the country's maritime industry is the development of recently revised MET programmes which are within the European Qualification Framework (EQF). These programmes will largely address the problem of safety at sea, according to Ziarati (2010), and the issues surrounding quality of existing officers working in the industry, as well as the education and training of cadets in Turkey. As a result, the accomplishments of such initiatives have resulted in other projects being started, consequently assisting the maritime industry to update existing skills, sustain the existing efforts in place to improve safety at ports and on the seas around Turkey (Ziarati, 2010). Not only for own interests, for a long time Turkish Chamber of Shipping domestically has been investing in MET, so as to become a key seafarer supplier to the global maritime industry. Because of such initiatives through partnerships both local and international, Piri Reis University was founded by TUDEV (Albayrak and Ziarati, 2012).

Summary

It is expected that, in the near future MET partnerships like those seen in Turkey will be the driving force in the improvement of MET, globally. International MET partnerships which develop, design, and fund MET programmes in Turkey are cooperative and coordinative strides needed for

the successful development of the maritime industry through MET. The EU IMP and Knowledge 2020 calls for partnerships in education and training. The sharing of knowledge in industries such as that of maritime has been a driving force and beneficial to countries such as Turkey. Other local stakeholders such as chambers of commerce will continue to play a very important support structure for MET and the shipping industry, globally.

2.7 MARITIME EDUCATION AND TRAINING IN AFRICA

The maritime industry is vibrant on the African continent, playing a vital role in the African economy. Maritime transport in Africa is the main mode of moving 92 percent of its trade from and into the continent. Unfortunately, inadequately skilled workforce and lack of institutional capacity in the maritime industry to regulate and enforce maritime policies, hinders the advancement of a viable transport system in the region (United Nations, Economic and Social Council, 2009).

Article 8 of the African Maritime Transport Charter speaks to MET and the role African Union (AU) member states have to play in promoting the provision of MET at all levels, including secondary school level, so as to develop the maritime industry on the continent. Article 8 further encourages countries and all stakeholders to collaborate with the various MET institutions for the goal of cooperation in research, innovation, and MET, on matters of policy as well as funding. It calls for compliance with international MET standards, the promotion of securing training berths, and the introduction of a common system and standards for mutual recognition of MET qualifications in order to foster employment in the continent's maritime industries (African Union, 2010). Maringa (2015), scrutinising the quality of MET in Africa identifies that there are a number of challenges on the continent relating to achieving quality MET; however, collaboration is needed to attain quality MET.

MET provision around the world differs geographically in methods delivered. This is informed by available infrastructure in the form of facilities and equipment. As a result, developing states, for example in Africa, find more challenges in delivering training and education that is of higher standard than their counterparts in developed countries, owing to resource constraints (Maringa, 2015). This is asserted by Ihenetu-Geoffrey (2012) who identifies that most African countries are

constrained by lack of funds. This factor leads to the lack of prioritising maritime matters. According to the African Union Maritime Charter cited in Mthuli (2014), all member states ought to strive to cooperate with one another, investing in MET on the continent. In Africa, this situation does not obtain.

The draft African Union Maritime Charter, with regard to education, training, and research, calls for member states to work together with and fund MET on all levels (eThekweni Maritime Cluster, 2011). Africa's soft maritime infrastructure needs utmost attention; hence, according to Ihenetu-Geoffrey (2012):

“People, training and systems are required, as any strategy is only as good as the people who are tasked with implementing it. Human resource development is a fundamental component of any maritime strategy. This includes training for personnel in their specific tasks and how best to integrate their roles with personnel from commerce. Systems integration and technological upgrades may also be required. Public awareness of the inherent value of maritime resources is fundamental to success and understanding the impact of human activities on the maritime systems should lay the foundation for responsible utilisation of these disappearing resources” (Ihenetu-Geoffrey, 2012: 44-45).

International partnerships for training are growing in Africa Mthuli (2014). EThekweni Maritime Cluster (2009) identifies partnership with South Africa's SAMSA and Sweden's World Maritime University (WMU), Nigeria with Egypt, and Egypt with Japan. Such partnerships are pivotal to the improvement of MET in Africa. This is further asserted by (Maringa, 2015), who suggests that one of the ways of overcoming MET challenges such as resource constraints, is by increasing collaboration amongst MET institutions in Africa. MET, in both the commercial and naval sectors, is vital to Africa's development and security (Ihenetu-Geoffrey, 2012). Therefore there is a direct link between MET providers and the success of Africa's economic and security development.

- **Western Africa (Nigeria)**

Nigeria has a rich maritime history brought about by its indigenous maritime sectors. The Maritime Academy of Nigeria (MAN) in Oron, Akwa Ibom state, is one of Nigeria's oldest maritime training institutions, having been established in 1979. However, some stakeholders, such as operators in

the maritime industry, and even government agencies, declare that many Nigerian MET institutions, including MAN, cannot provide adequate maritime training for Nigeria (Dada, 2008). The Nigerian maritime sector is at a crossroads of opportunities and threats. The Nigerian Maritime Administration and Safety Agency (NIMASA) has decried the manpower gap in the nation's maritime sector, disclosing that no fewer than 50,000 seafarers are needed for the shipping industry to realise its full potential, and stimulate the desired economic growth in Nigeria (Daily Independent-Lagos, 2009). The table below presents the state of MET in Nigeria.

Table 2.14: The State of Nigeria's Maritime Education and Training

Opportunities	<p>There are opportunities in the rapidly growing economy in oil, gas, bulk carriers, and seaborne trade. The increasing demand for maritime programmes presents an opportunity for MET in Nigeria to grow the country's maritime sectors mentioned above.</p> <p>The ship owners' association from the Republic of Norway is to enter a collaborative training programme with Maritime Academy of Nigeria (MAN).</p>
Threats	<p>The major constraint in Nigeria's MET relates to problems of accommodating the increasing number of applicants seeking admission to maritime programmes. The issues here have been inadequate lecture halls. Inadequate facilities make it impossible for MET institutions to admit a large number of students. Maritime Academy of Nigeria (MAN), for example, admits no more than 500 of the 6,000 aspiring students seeking admission. According to MAN, the development of more infrastructures in the institution would help increase the number of students admitted annually to pursue a career in seafaring. Hence the problem of infrastructure lies in funding.</p> <p>There are threats in terms of policy implementation problems. As with many other countries in Africa, Nigeria lacks solid maritime policies, also the implementation of any policies.</p>
Issues	<p>The country is fraught with development problems, infrastructure decay, and influx of foreign seafarers.</p>

Source: Compiled by author using various sources (Dada, 2008; Daily Independent-Lagos 2009; Airahuobhor, 2009a; Airahuobhor, 2009b; Airahuobhor, 2009c; Nzeshi, 2010)

The Nigerian government must play a central role in the development of the country's MET. Ihenetu-Geoffrey (2012) identifies that the federal and state authorities ought to provide adequate security and a conducive environment for teaching and learning; formulating policies that will ensure the growth and continuous improvement of the MET institutions; carrying out strategic plans, which will create competitive environment for the teaching-learning process; provision of funds for research; and book publication that can benefit the MET community and the nation at large.

For such to be achieved, stakeholders have various roles to play in the development of MET within Nigeria. On the one hand, the government is obliged to release funding grants, provide for personnel emoluments, and funds for capital projects. On the other hand, some companies donate training equipment. Others are employers of labour, as well as MET customers. The management and staff of MET institutions have the responsibility of implementing policy decisions made by the Boards of the Academy and the Federal Ministry of Transport (Ihenetu-Geoffrey, 2012). Thus, the increasing demands for well-trained maritime professionals, the continued revision of the STCW over the years, and other developments in the maritime industry, have all had a great impact on the MET systems and institutions in developing countries (Musa, 2000).

- **Eastern Africa (Kenya, Uganda & Tanzania)**

The maritime industry and its sub-sectors in the Eastern African region are buzzing with growth. This is evident by the economic activities, for example, in areas such as the ports of Mombasa, Dar es Salaam, as well as the planned new port of Luma which is under construction (Kiplimo and Nthia, 2015). Thus, these activities are bound to increase and will need additional educated and trained human capital to carry out the numerous maritime and maritime-related tasks feeding into the region's maritime industry. Prior to the current developments in the region, however, Musa (2000) identified that:

“The number of seafarers has been decreasing in the East African region as compared to the 1970s during the time of the East Africa Community (EAC). Then, EAC had its own fleet of ships and the region's economy was also on the rise” (Musa, 2000:19).

In the region of East Africa, MET has go through numerous phases ever since its commencement in the 1960s. At that time Kenya, Uganda, and Tanzania, the three neighbouring states which make up the Eastern Africa region, worked jointly as the East African Community (EAC). Education and training of maritime personnel had begun in partnership with the United Kingdom to provide manpower to the Eastern African Line until its collapse in 1977 (Kiplimo and Nthia, 2015). This is asserted by Musa (2000), in that:

“For a long period, most of the Kenyan maritime officers were trained in United Kingdom.

This is derived from the fact that Kenya is a former British colony” (Musa, 2000:5).

Musa (2000) alleges that Kenya has one of the leading ports in the Eastern region, however, it does not have a well-defined maritime policy, and consequently has not established a sound MET system of its own. However, according to Kiplimo and Nthia, (2015), institutions that offer MET in Eastern Africa remain in their developmental stages, owing to their limited experience in the process of providing MET that adheres to international requirements and standards in its institutions. For example, Kenya only achieved the IMO ‘white list’ status in May 2010. The country thus has the responsibility to ensure that it achieves the minimum standards of training and certification of its seafarers (Mabuti, 2013). Post colonization, this East African country’s greatest challenge pertaining to MET is responding to the revised international (IMO) conventions Musa (2000). Kenya has had certain challenges in complying with the STCW 78 and the latest STCW 2017. The Manila Amendment Convention will also influence Kenya’s MET (Wanga, 2015). Currently in East Africa, according to Kiplimo and Nthia (2015), each country undertakes it’s MET individually, at various levels. However, there is a revival of the EAC block on the implementation of joint MET of seafarers in Eastern Africa (Kiplimo and Nthia, 2015). Table 2.14 below presents the MET institutions in East Africa.

Table 2.15: East Africa's Maritime Education and Training

Institution	Courses offered
Bandari College (under KPA)	Diploma in Nautical Studies and Marine Engineering; craft and artisan certificates in marine and nautical studies, STCW mandatory courses, STCW advanced courses, training for ratings both for deck and engine.
Mombasa Technical Training Institute	Craft and artisan certificates in Marine Engineering and Nautical studies.
Maritime Training School	Professional mandatory courses (yet to be launched).
Technical University of Mombasa (TUM)	Diploma in Marine Engineering and Nautical Studies.
Jomo Kenyatta University of Agriculture and Technology (JKUAT)	BSc. Marine Engineering.

Source: Kiplimo and Nthia (2015:306)

As in many other countries around the world, the government plays a key role in the governance of MET in East African countries. For example, in Kenya the Merchant Shipping Office at which MET and certification is governed, is under the control of the Ministry of Transport and Communication. It relies on Kenya Ports Authority for conducting its activities (Musa, 2000). This is also the case in Tanzania, according to Musa (2000), where the MET system is under the Ministry of Communications and Transport. As with many other former British colonies, including Kenya, the legal instrument which establishes the issuance of certificates of competency, is the Merchant Shipping Act of 6 November 1981 (Act No. 43 of 1967).

The professionalisation of MET for seafarers in countries like Kenya started only a few years ago according to Kiplimo and Nthia (2015), although trade through maritime means in the East Africa region goes back a number of centuries, Kiplimo and Nthia (2015), state that:

“For example Bandari Colledge[sic] was set up in 1980 to offer foundation certificates courses and to train KPA staff in port operations, administration and management as well as marine while at the same time offering training for seafarers to obtain STCW certification by IMO. Despite having been white listed by the IMO and therefore having an opportunity to complete for the international maritime operations, Kenya is yet to develop adequate maritime training facilities to offer the much required training” (Kiplimo and Nthia, 2015:305).

The provision of MET is very low in Kenya (Kiplimo and Nthia, 2015). At present there are no dedicated MET institutions for seafarers in Kenya. Kiplimo and Nthia (2015) state that the number of students pursuing MET is also low annually. There is no single higher education institution such as a university in the country; and the Eastern Africa region alone is devoted to the provision of MET.

A study by Musa (2000), using the case of Bandari College, pronounced that it was established to offer MET to Kenya Ports Authority (KPA) staff in cargo handling, management, and administration, operations and maintenance of equipment and marine craft (tugs, pilot, and mooring boats). Musa (2000) pinpointed many challenges with the provision of MET at Bandari College. According to him:

“In terms of training facilities, the Bandari College has teaching facilities available to train skills both deck and engine room ratings. However, there could be some further improvements in training facilities, such as survival training – the construction of a swimming pool; fire-fighting complex – the construction of a fire simulation complex; seamanship/waterside facilities – equipping the current seamanship workshop. Actually, it can be said that these facilities are underutilised since no meaningful crew training programmes are run regularly” (Musa, 2000:7).

Kiplimo and Nthia (2015) indicate that young people in East Africa, because of the limited offering of MET in the region, seek MET internationally, or in some neighbouring states such as South Africa, offering some of the courses not found in Eastern Africa. Hence, according to Kiplimo

and Nthia (2015), the gap is between the availability of and the need for seafarers. This gap has been perpetuated, resulting in the current state, in which the scarcity of qualified seafarers to serve both domestic and international companies remains. Table 2.15 below presents the challenges in MET in East Africa.

Table 2.16: Challenges Facing Maritime Education and Training in East Africa

Problem	Cause
Lack of qualified, trained staff	Shortage of instructors, for example, in Kenya, is partly attributed to a knowledge gap in the seafaring profession since 1977, when the EAC programme with Britain ceased.
Lack of fully equipped workshops and laboratories	High costs of equipment and lack of funds for MET institutions.
Lack of berths which cause deficiencies in training.	Students, to be able to work on board sea-going vessels, must be trained on board a training or chartered ship for 12 months. Such facilities as required by the IMO, are lacking.

Source: Compiled by author using information from Kiplimo and Nthia (2015)

To overcome East Africa's MET problems, Kiplimo and Nthia (2015) concur that MET institutions ought to have structured strategies that cater for the development of staff. However, because there is limited maritime teaching staff in Kenya, whilst it builds its human capital in the industry, and its knowledge base in MET, the country has considered use of foreigners as a short-term solution, particularly for specialised MET (Mabuti, 2013:31).

Mabuti (2013) asserts that Musa's (2000) conclusion is correct that the present MET system and Bandari College in Kenya must be reflected upon and raised to a necessary level. The organisational structure and management, academic programmes, facilities, and qualified personnel must be enhanced; thereafter there could be an effective and efficient MET system in Kenya. Thus, it is imperative that the countries in the region must contribute funds by investing in MET. Focus must be on training facilities such as training ships, or collaborating with ships'

owners so as to acquire slots for cadets. Cadets may then receive practical training so to attain the necessary sea time, as stipulated by the IMO's regulations. However, there is also a need to develop collaborative partnerships with other MET institutions, not only in the region, but on the rest of the continent.

Summary

Lack of solid maritime policies is disastrous. The creation and implementation of new maritime policies that address MET issues are needed in Africa. Therefore the MET sector in areas such as Kenya in East Africa, requires a great deal of development and improvement (Musa, 2000). There is thus among African states a collective understanding that the success of any domestic maritime industry depends on its domestic MET. Growing maritime economic activities tend to need maritime infrastructure. This, in turn, leads to the demand for maritime labour, both for the construction of that maritime infrastructure, and for servicing it thereafter. This is the case in Western, Eastern, and Southern Africa. For developing MET institutional capacity, government must invest more in MET, especially facilities such as simulators and training ships for sea-going maritime labour. International MET partnerships with renowned institutes such as that of TUDEV in Turkey have been successful in Europe: this can be the case in Africa.

Education is the first step towards the effective and efficient utilization of the available resources (Ali, 2009: 233). Thus, with the growth of the global maritime industry there is a need to provide MET institutions which are world ranking, whether they focus on shore-based, port-sector operations, or sea-going shipping sectors, and/or coastal zone development and environmental protection (Ali, 2009). MET institutions feed directly into the global maritime industry and vice versa in South Africa.

Internationalization and globalisation are related, but are not identical, according to Altbach and Knight (2007). These entities share certain characteristics. On the one hand, internationalization comprises the practices and policies embarked upon by academic systems and institutions and/or even individuals to manage the global academic environment. On the other hand, globalisation is the context of economic and academic trends that are part of the reality of the 21st century (Altbach and Knight, 2007). Thus a systems-thinking approach asserts that most of our experiences,

thinking, practices and institutions are interrelated and interconnected. As a result, systems are linked in ways that either may or may not enhance the realisation of one or more goals or purposes. These may be micro, small, self-contained, with few interconnections, for example, within MET institutions and countries; or macro, large, complex, consisting of a large number of interconnections, such in a global context (Werhane, 2007:467).

The international activities of higher education institutions are dramatically expanding in volume, scope, and complexity. This has been the case over the past two decades (Altbach and Knight (2007). One of the reasons for this is that institutions such as those that provide MET are embedded in larger economic, political, cultural and legal systems. While the contours are unclear, internationalism will continue to be a dominant force in higher education (Altbach and Knight, 2007). To overcome challenges associated with globalisation and internationalization, MET institutions should devise strategies that are holistic. Success in the global maritime industry has always depended on holistic rather than one-sided thinking (Mulej *et al.*, 2003: 71).

2.8 CONCLUSION

The literature above has presented some cases reflecting the state of MET around the world. The cases have indicated that there are several critical factors that influence the provision of MET at various MET institutional levels: this may be at secondary or post-school level. The role of the State (government) and roles of public education institutions and public maritime support institutions and other private maritime industry institutions are crucial in ensuring the effective and efficient sharing and use of maritime resources. This enables the smooth process of reacting to the demands of the growing maritime industry and sectors within. The next chapter, Chapter Three provides an overview of South Africa's maritime industry and MET.

CHAPTER THREE

SOUTH AFRICA'S MARITIME INDUSTRY AND MARITIME EDUCATION AND TRAINING

3.1 INTRODUCTION

This chapter aims to give an overview of South Africa's maritime industry and Maritime Education and Training (MET). This is followed by KZN, which is the focus of this enquiry. However, it starts by giving a picture of the state of the country's maritime industry and sectors within. The first step is to define South Africa's maritime sector, to enable the understanding of its breadth and the difficulty in defining it. After the definition process, the study moves on to provide a SWOT analysis of South Africa's maritime sector. The study then progresses to identifying how South Africa intends to overcome the maritime skills problem. A proposed framework for South Africa's Maritime Skills Development Strategy is presented by means of a diagram. Thereafter, an exploration of the state of MET in South Africa follows, and the various national policies and public institutions that cater for the development of the country's maritime industry. The study uses KZN as a point of reference, however, using the funnel approach, it departs by providing first a brief background of South Africa and its MET.

3.2 THE REPUBLIC OF SOUTH AFRICA

The Republic of South Africa (RSA), better known as South Africa, is a country on the southernmost tip of the African continent, marked by several distinct ecosystems. It supports a population of 52.98 million, according to the World Bank (2013). The country is divided into nine provinces. Of these provinces, four are coastal; KZN being one of them. KZN is bounded on the south by 2,798 kilometres (1,739 miles) of South African coastline stretching along the South Atlantic and Indian Oceans (SAMSA, 2008). Figure 3.1 below presents a geographical map of South Africa.



Figure 3.1: Map of the Republic of South Africa.
Source: Mindomo (2017)

By international standards, and in comparison with its counterparts in Africa, the World Bank classifies South Africa as an upper-middle-income economy, and a newly industrialised country (World Bank, 2011). Its economy is the largest in Africa and the 34th-largest in the world (International Monetary Fund, 2015). South Africa has been identified as a middle power in international affairs, and maintains significant regional influence (Lynch, 2010). The country is seen as gateway to Africa, and it has one of the most developed maritime industries in Africa (SAMSA, 2011). However, the country struggles with very slow economic growth and one of the highest unemployment rates in the world, especially amongst its youth. As a result, on its developmental agenda to fight socio-economic issues such as slow economic growth and unemployment, the potential of the maritime economic contribution is seen as massive in tackling these issues. This has resulted in various national developmental policies and plans: the National Development Plan (NDP) and Operation Phakisa have been adopted.

Operation Phakisa stresses the importance of the ‘blue economy’ and education and training therein. Other development policies such as the New Growth Path, focus on identifying quality work opportunities in areas that have the potential for creating employment on a large scale, with

the goal of attaining five million new jobs by 2020 (Department of Economic Development, 2011). The maritime industry is seen as having quality work opportunities. The South African government has stated that the maritime industry has the potential to bridge the country's high unemployment rate which sits at an overall 27 percent, with 25 percent youth unemployment (StatsSA, 2017). By international standards this is very high.

In South Africa, the maritime industry, dubbed the 'blue economy' is seen as a significant economic contributor, hence essential in addressing the country's high employment rate and slow economic growth that remains at 0.5 percent (StatsSA, 2017). However, South Africa's maritime industry post democratization of the country in 1994 has existed in a vacuum, under-resourced and fragmented, despite being necessary to the country's economy. As a result this has restricted the industry's potential, and the country's and industry's global competitiveness (South Africa Maritime Industry Conference/SAMIC, 2012). The next section examines South Africa's maritime industry.

3.3 AN OVERVIEW OF SOUTH AFRICA'S MARITIME INDUSTRY

It is said that the location of South Africa favours the country and has long done so. This is asserted by Mthethwa (2003), who observed that the geographic location not only offers access to South Africa and other African countries, but also the Southern Hemisphere. Every year, three hundred million (300 million) tons of cargo move through the country's ports in both imports and exports. To add to that, 1.2 million tons of liquid fuels such as crude oil, gas, petrol, inter alia, move along the country's coast, however, the rapidly expanding offshore oil and gas activities require a supporting fleet of vessels and labour market in the country, which the country cannot domestically supply (South Africa's Department of Environmental Affairs, 2017). According to South Africa's Department of Environmental Affairs (2017), the country is well situated to take advantage of many maritime opportunities in the region, such as the East-West cargo traffic, and the booming African offshore oil and gas industry. This would take place through maritime manufacturing, which includes rig and ship repair, refurbishment and boatbuilding. Notwithstanding this competitive advantage, the country currently only has only a one percent (1%) share of the global market of ship repair and refurbishment. South Africa is one of the leading African countries in

terms of maritime transport; hence the need for trade implies the need for skills (SAMSA, 2010:43).

To date, world trade projected at 90 percent is seaborne, and the world has a maritime fleet of over 50 000 vessels. This, excluding land-based support labour at ports, employs about 1.4 million seafarers. At present there is a shortage of about 250 000 seafarers; 34 000 officers and 224 000 ratings (Mokhele, 2013). Because 98 percent of all trade between South Africa and its trade partners is seaborne, it has been proposed that the country ought to be supplying 30 000 to 45 000 seafaring jobs to the international shipping industry. To supply this share, the country needs to annually train 3 000 to 4 500 seafarers (Mokhele, 2013). However, according to the eThekweni Maritime Cluster's Report (2011), South Africa, to date, supplies only approximately 244 seagoing officers per year. The Transport and Training Authority (TETA) reports a shortage of 1 483 officers (891 deck officers and 592 engineering officers) and 430 ratings (420 deck ratings and 10 engineering ratings). There is thus a critical skills shortage in the South African maritime sector. It follows therefore, that this industry and sectors within it have the potential to generate employment.

Yet maritime career opportunities remain to a great extent untapped, largely due to a general lack of awareness of the industry amongst South Africans (Mokhele, 2012 cited in South African News Agency, 2012). There is not only limited knowledge about the careers offered by this sector, but there is also limited interrelation amongst service providers (eThekweni Maritime Cluster's Report, 2011: 12). The South African Maritime Transport Policy (2008) acknowledges that there is a lack of knowledge regarding maritime-related careers. This sector is rarely considered an option for those entering the labour market. There is thus a need for a more determined effort to make job seekers aware of maritime employment opportunities: MET institutions can play an active role therein.

Kujawa (1996: 13), in the 90s, identified that the current lack of employment opportunities could also encourage the youth to make a career at sea. However, this has not been the case. One of the problems within South Africa's maritime industry is low numbers of youth making a career at sea. This is mainly owing to inefficient marketing campaigns at schools by institutions offering

maritime programmes. School leavers are not aware of the opportunities for careers in the shipping and shipping-related maritime sector. However, Kujawa (1996) observed that the level of MET offerings, enrolment, and the quality of prospective students, was steadily increasing. This is asserted by Mthuli (2014), who examined MET in Durban, a port city in South Africa.

In the 90s in South Africa, Kujawa (1996) observed that the creation of a maritime culture and awareness amongst potential students will increase the levels of recruitment and retention of personnel. Subsequent to this observation, there has been an increase in the level of maritime recruitment in South Africa. However, this has not kept pace with the development of the maritime sector. Kujawa (1996) proposed that the future of South Africa's maritime industry was reliant on students and growing employment levels, by fulfilling the domestic demand for, and the export of well-qualified competent maritime personnel. Based on empirical evidence (*see* Guo, Liang and Ye (2007) Ng, Koo and Ho (2009); Cross (2010); Ziarati, Demire and Albayrak (2010); Pallis and Ng (2011); Lobrigo and Pawlik (2012); Bergqvist, Hjella and Lekakoun (2013); Jensen *et al.* (2013); Pallis, Ilias and Papachristou (2013) relating to factors causing people to choose the maritime as a career prospect, a number of factors have been identified, including culture, tradition, and social relations. According to Kalvitien, Bartusevicine and Sencila (2011):

“analysing the possibilities on how to improve MET efficiency of studies, it is urgent to investigate the motivation concept of profession choosing and its relation with the approaches to learning that is the prerequisite of high efficiency of studies” (Kalvitien, Bartusevicine and Sencila, 2011).

A figure below presents a diagram of South Africa's maritime industry, post 1994.

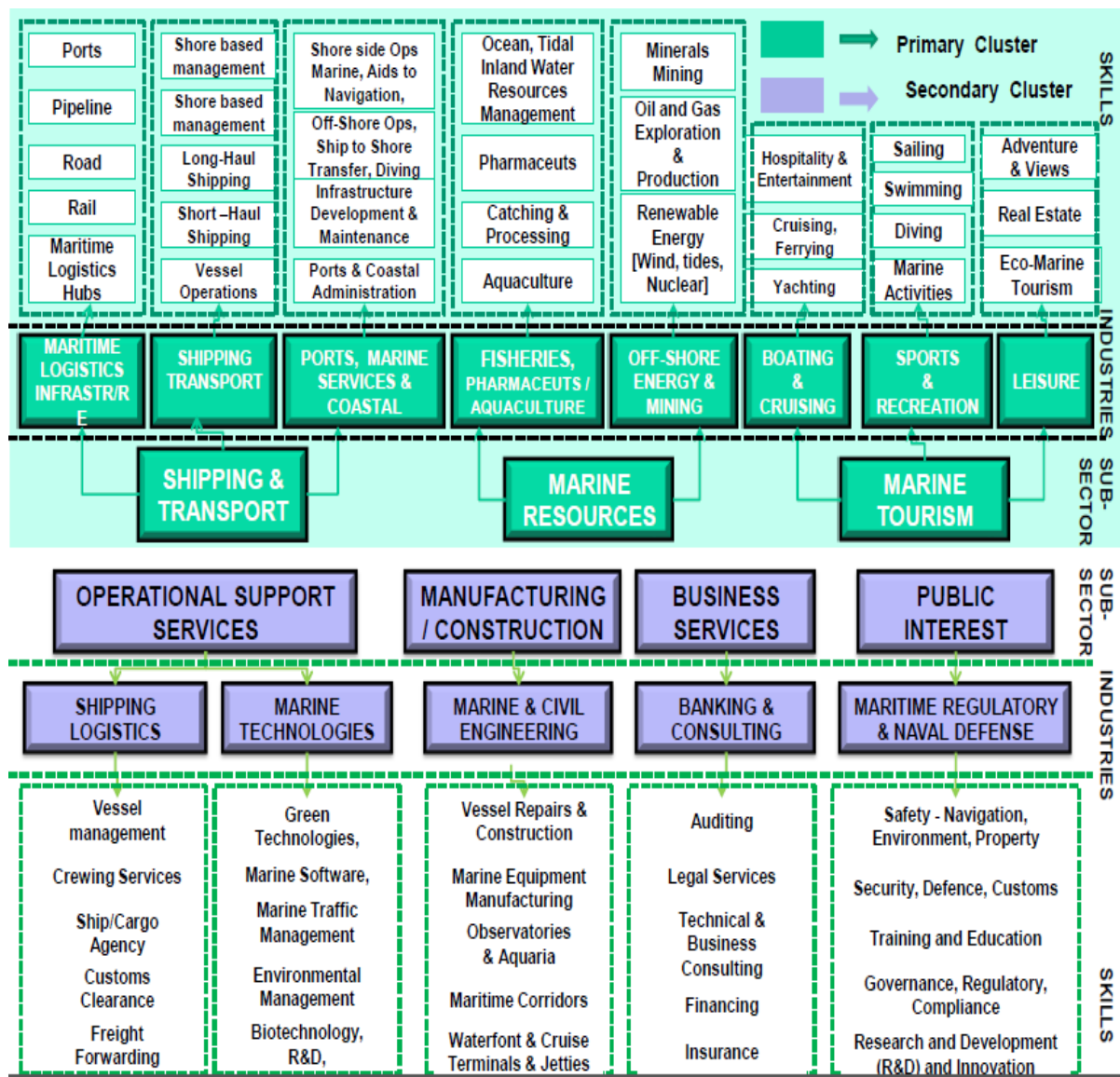


Figure 3.2: South Africa 's maritime industry
Source: SAMSA (2011:46)

South Africa's maritime industry is extensive. This makes it very difficult to describe definitively (Mthethwa, 2003). In defining South Africa's maritime industry and subsectors within, SAMSA commissioned the development of the South African Maritime Sector Skills Development Study. This was completed in 2011, undertaking an extensive analysis of the sector, and developing a model of the sector. The model groups the activities of the sector into eight (8) clusters, which have been presented above (SAMSA, 2013).

Post its colonial rule, during apartheid, the maritime industry in South Africa was limited to only the white minority race. Although 1994 signalled an end to apartheid, Bonin, Lane, Ruggunan and Wood (2004), post 1994, still claimed that a intensely entrenched racial division of labour persisted. Two important developments took place post 1994, after full democracy arrived in South Africa, significantly impacting on maritime employment and MET, according to SOMMSA (2016):

(a). The sale of Safmarine (the unofficial South African national shipping line) to foreigners in 1999 ended the expansion of the South African merchant fleet which had been initiated in 1947. The resultant demise of the South African-flagged fleet removed the need for these companies to employ South African citizens, given their new flag state's more liberal manning requirements (SOMMSA, 2016).

(b). Broad-Based Black Economic Empowerment (BBBEE) initiatives resulted in many experienced seafarers seeking employment abroad, where their skills were highly sought-after and where they could earn US dollars on a tax-free basis. The other major change closely allied to this development was the sudden acceptance after 1994 of the South African Certificate of Competency internationally, something not possible during apartheid, and under sanctions (SOMMSA, 2016).

As a result, to date, South Africa remains hindered in bridging its maritime skills gaps. The independent consultancy firm, Deloitte, which conducted the SAMA 2011 Maritime Industry Skills Study, suggested that maritime skills development in South Africa:

“...is connected to its location, emerging shifts in global shipping patterns, encouraging reputable training institutions to increase their capacity and becoming a regional supplier of seafarer training” (eThekweni Maritime Cluster, 2011: 51).

According to the eThekweni Maritime Cluster (2011) report which reviewed a number of national and international models for attaining a reputation for excellence in MET and research, in cities such as Rotterdam, Singapore and Antwerp, the major city becomes a centre to a number of well-recognised education, training and research institutions. Such institutions complement one

another, receiving support from the education, government, and private sectors. In KwaZulu-Natal the eThekweni Maritime Cluster (2011) posits that:

“...Durban has the elements and, most importantly, the comparative advantage necessary to become and be regarded as a centre of excellence in maritime education, training and research in South Africa or the Southern African region” (eThekweni Maritime Cluster, 2011: 13).

However, there is a critical skills shortage in the country’s maritime industry. This sector has the potential to generate job opportunities; however, such opportunities remain untapped, owing to numerous factors. SAMSA (2011) has identified certain global trends in the maritime industry: the shortage of seafarers, the increasing age of maritime professionals, difficulty in retaining skills in the sector, the decrease in the number of people, specifically youth entering the sector, and poor quality of services, owing to having persons with limited or no experience in the respective jobs, and technological advances.

These are some of the factors which have contributed and continue to contribute to maritime skills shortage in South Africa and the rest of the world (SAMSA, 2011). The absence of intense determination in promoting and publicizing the maritime industry to the youth is evident in countries such as Jamaica (Cunningham, 2015). A phenomenon has resulted in the aging profile of many maritime professionals; such as the global seafaring average age of 45 (Zizrati and Ziarati, 2012), thus Walczak (2008) comments that the progressive aging of European ship’s officers is a serious problem; while at the same time, the number of ships and relevant quality requirements are on the rise. Concerted solutions must be offered, and a radical approach must be taken by all concerned in the maritime community (Zizrati and Ziarati, 2012), including MET institutions and the government. The figure below presents a SWOT analysis of South Africa’s maritime industry.

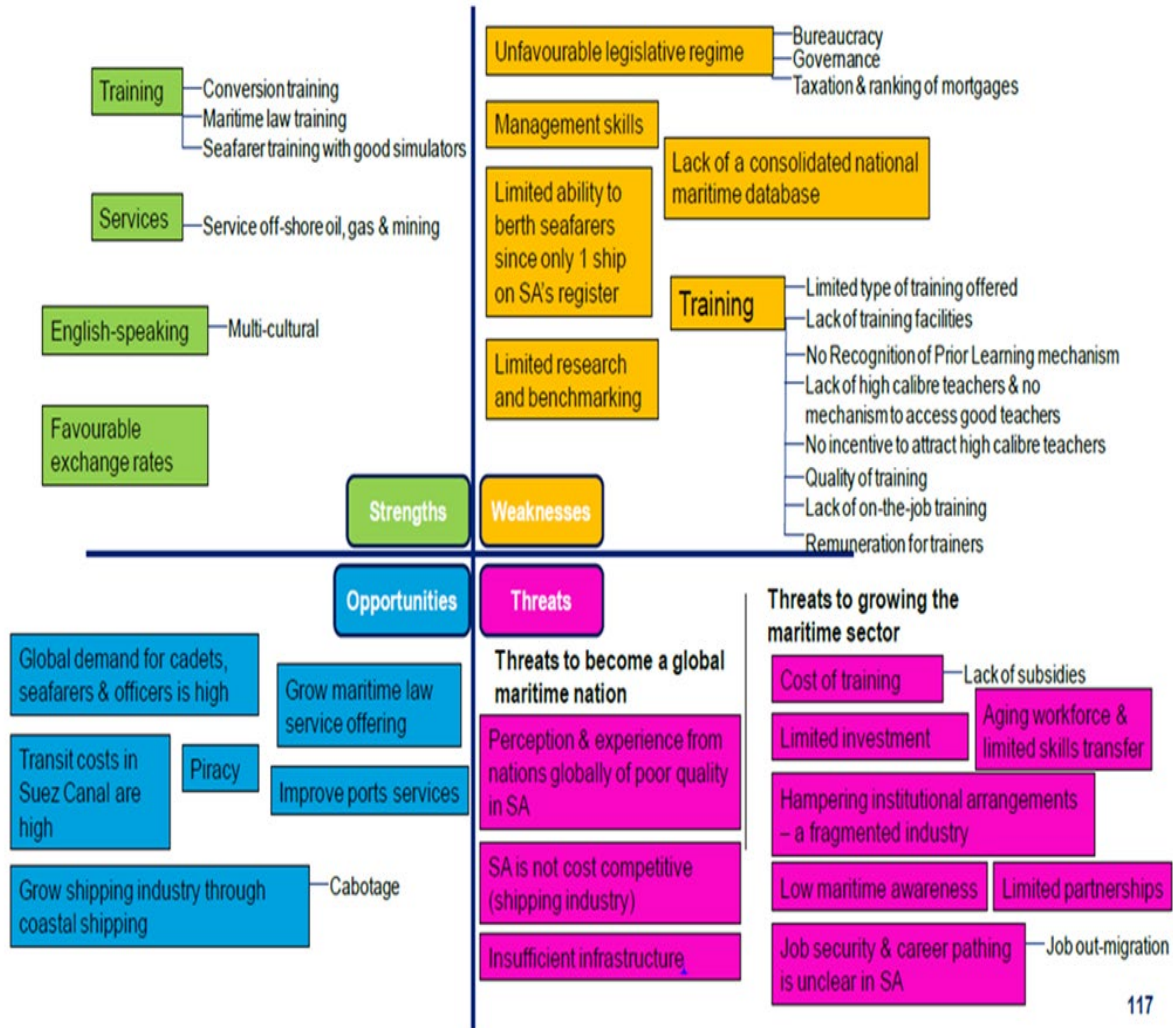


Figure 3.3: South Africa 's maritime industry's SWOT
Source: SAMSA (2011: 117)

It is generally acknowledged that South Africa's maritime industry, by international standards, is well developed, and its continuous development and growth is satisfactory. However, its growth and development has been threatened by training needs and challenges to its maritime industry, as illustrated by the above diagram. The government understands that the country's oceans can contribute 177 billion Rands to the country's GDP. This would result in the creation of an estimated one million jobs by 2033 (Moorcroft, 2017). The table below presents the critical and scarce maritime skills in South Africa.

Table 3.1: Critical and Scarce Maritime Skills in South Africa

Sector	Critical Skills
Shipping, Ports and Logistics	Navigation Officers; Engineers; Engine and Deck Ratings; Hydrographers; Oceanographers; Maritime Technologists; Marine Ecologists; Meteorologists; Fire-Fighters; Transport and Logistics Managers; Maritime Project Managers; Vessel Traffic controllers; Sea-watch and rescue operators.
Offshore Oil and Gas	Geologists/Geophysicists; Engineers (Chemical Engineers, Geotechnical, Drilling, Structural, Marine, Mechanical); Deck Officers; Artisans.
Fisheries and Aquaculture	Aquatic Health or Aquaculturalists; Deck Officers; Marine Engineers; Artisans; Ratings, Engine.
Vessel Construction and Repairs	Naval Architects; Production Managers; Designers; Electricians; Electronics; Metal fabricators; Boiler makers and welders; Riggers; Technicians.
Commercial Services	Marine Attorneys/Lawyers, Marine and Environmental Lawyers; Maritime Economists; Maritime Financiers/underwriters; Maritime Consultants, Crewing, Training, Research and innovation and business.
Marine Tourism	Hospitality Officers (Chefs, Stewards, etc.); Marine Conservation Officers; Dive Videographers/Photographers.
Safety, Security, Defence	Security, Defence personnel, Inspectors, Lawyers, Quality professional, etc.

Source: SAMSA (2013:12)

Table 3.1 presents a broad, qualitative picture of skills that are considered critical and scarce in South Africa's maritime sectors. The KZN Integrated Maritime Strategy avers that there has been a slight increase in the number of maritime graduates in South Africa. In spite of this, there still remains a shortage of higher-level management, technicians and engineers as well as contract managers (KZN's Integrated Maritime Strategy, 2013: 94). There is an overlap of these skills across various disciplines within the natural sciences and the social sciences, which are in primary and secondary clusters in South Africa's maritime industry.

The maritime industry supports the development and sustainability of South Africa's economy. Economic points of entrance and exit, such as the Port of Durban and the Port of Richards Bay, to name only two, are seen as vibrant economic entrance hubs for the country. The country's ports,

such as that of Durban, one of Africa's busiest ports, have come under scrutiny over the years. Port inefficiencies are also seen as stumbling blocks to meeting the full economic potential of South Africa's ports. Alongside the global outcry in terms of the dearth of MET, South Africa has adopted a standpoint in addressing its own issues in this area. In addressing its maritime skills needs, South Africa is in the process of creating its first-ever Maritime Skills Development Strategy, presented in the figure below:



Figure 3.4: Proposed Maritime Skills Development Strategy framework for South Africa
Source: SAMSA (2010)

Figure 3.4 above has presented a realistic framework for guiding South Africa's maritime industry on how to develop its skills base. The development strategy touches on a number of key issues. It shows how partnerships through public and private intervention are an effective way forward in developing South Africa's maritime skills. However, the sector and its activities fall into a number

of departments, such as the Department of Transport, and the Department of Tourism and Environmental Affairs in South Africa. These departments have an enormous number of role-players, therefore finding and defining the roles and responsibilities of these stakeholders can be problematic. With regard to skills, the strategy further acknowledges the importance of sustaining a pool of talent within the sector, and building on that existing pool. The strategy also acknowledges that what underpins the success of the strategy is career-path guidance and articulation options.

MET institutions understand their challenges and the strategies put in place to overcome skills shortages in South Africa. This entails within the maritime and marine fields, the need to produce a skilled labour force by improving training and education, skills quality and development, as well as advancing research and fostering development. The strategic goal in achieving this would be the developing of human resources through education and training, skills quality and development as well as knowledge enhancement (KZN Integrated Maritime Industry Development Strategy, 2013: 111). The increasing demand for human capital is a result of the constant growth of the country's maritime transport and seven State owned as well as run commercial ports. Nonetheless, "irrespective of envisaged growth, this immediate domestic requirement necessitates strategies to meet the need of enterprises linked to shipping" (South Africa Draft Maritime Transport Policy, 2008:36). The next section views MET in South Africa.

3.4 MARITIME EDUCATION AND TRAINING IN SOUTH AFRICA

Education and training is a vital part of development, this resulting in the success of today's knowledge economy and society (Albayrak and Ziarati, 2009). However, prior to 1922, South Africa, as a colony of Great Britain, did not have its own merchant fleet or any MET infrastructure (SOMMSA, 2016). However, post its colonization, South Africa is identified by Bonnin and Wood (2002) as having a robust maritime history and tradition. South Africa has within its maritime industry very specialised individuals (although limited in number) and excellent MET facilities, although also limited, which are possibly the best on the African continent (SAMSA, 2011).

MET in South Africa has a long and complex history. Changing politics and the associated shifting priorities significantly influenced the direction MET has taken since its commencement in 1922 (SOMMSA, 2016). Rooted colonial, Eurocentric thinking initially, followed by the apartheid era's separation of education and training along racial lines, particularly disrupted any chance of coherent policies emerging. This was including in the provision of MET.

Prior to 1994, the vivid changes to international shipping in general, and to South Africa's shipping in particular, also impacted on the support for MET in South Africa. The influence of strong local shipping companies helped to grow a cohort of domestically educated and trained seafarers who were as competent as any other leading maritime nation (SOMMSA, 2016). Only after the start of true democracy in the country, post 1994, has there been a slow but managed process of modelling education and training into an efficient and coherent process. Bonnin and Woods (2002) noted that post 1994:

“Training and development in the South African shipping industry has not only to take on board the exigencies of global competition, and new certification regimes, but also the pressing need to promote equity, and, above all, to facilitate the upward mobility of black seafarers” (Bonnin and Woods, 2002: 5).

It is generally acknowledged that in terms of education and training as well as standard, MET in South Africa's public higher education institutions has an outstanding status. In addition, because it is an English-speaking country, it has been seen as a favourable country regarding maritime assurance in terms of its MET certificates (Bonnin *et al.*, 2004). This has resulted in the country having sixty-two accredited training providers offering a range of courses, of which some are STCW-compliant, whilst others are more industry specific (SOMMSA, 2016). However, according to SOMMSA (2016), the sudden disposal of Safmarine's shipping assets in 1999, and the flagging out of Unicorn's fleet, changed the demand for South African maritime qualifications, leading to an interruption in industry-supported MET. Post 1994, South Africa's government approach to the maritime sector in South Africa was of racial transformation and equity (Ruggunan, 2008; Ruggunan, 2010).

To date, twenty years into democracy, South Africa's government approach to the maritime industry and its sectors therein has shifted to not only equity and racial transformation, but also to marketing the maritime sector through publicising and creating awareness campaigns to attract more youth to consider the maritime industry as the employer of choice. This has taken the form of promoting MET so as to drive more people, especially the youth into the industry.

The South African government remains committed to discharging its regional obligations, and to promoting the development of the maritime transport as part of the developmental programmes of the African Union (AU), Southern African Development Community (SADC) and the ideals of the New Partnership for Africa's Development (NEPAD). It recognises the potential social and economic opportunities that the maritime industry bestows on South Africa and Africa. In terms of the provision of MET in Africa, South Africa has a competitive advantage in that:

- Students are trained to internationally regulated STCW compliance hence their qualifications are internationally recognized,
- English is the lingua franca of multinational crews and South Africa's sea-going students are all English speaking, and
- In the past and currently South Africa's seafarers enjoy high reputation branding in the international maritime labour markets (Raggunan, 2015:42).

Raggunan (2015) asserts, however, that there are challenges that threaten the country's ability to be a major international maritime labour supplier such as the a lack of awareness of maritime vocations among prospective students, a very limited intake of seafaring cadets nationally, lack of sufficient training berths for sea-going students, and shortage of adequate data about MET students' demographics, which informs their vocational choices and their objectives in remaining in their respective careers.

Such problems identified by Raggunan (2015) may be addressed by a well-crafted and directed maritime policy. However, South Africa does not, and has never had a comprehensive maritime policy. This makes it difficult to address many of the maritime problems facing the country, such as the threats brought about by training needs and challenges, identified above. The country's maritime ambitions have been thwarted by issues such as the lack of maritime skills, MET gaps,

and ways in which the sector can attract more young talent and become a first choice for the youth of South Africa, when making a career choice.

The current government recognises that, for many South Africans, especially among the black youth, the maritime industry is a distant and unknown career choice. In 2013, SAMSA awarded scholarships to 30 students to study Master's and PhD programmes in Maritime Studies at the World Maritime University (WMU) in Malmo, Sweden (South African Government News Agency, 2013). The establishment of WMU came about in 1981 owing to "a lack of well trained and educated personnel for both seagoing and shore positions in the developing countries" (Kujawa, 1996:4). This is an indication of the South African government's commitment to developing its maritime industry and its limited provision of MET in South Africa, especially at public higher education institutions.

With the importance of the maritime sectors to South Africa, its economy, faced with a high youth unemployment and the lack of skills within the maritime sector, the government, through strategies and policies such as Operation Phakisa, is becoming involved in educating the youth on the maritime industry, the sectors within, and the vast employment opportunities it possesses. In this regard, MET institutions, especially public higher education institutions, are affected. They can therefore play a key and strategic role in addressing some of these issues facing South Africa, its maritime industry, and the country as a whole.

3.4.1 SOUTH AFRICA'S MET CERTIFICATION

The South African Maritime Safety Authority (SAMSA) in South Africa is the official certifying body for the STCW 95. This is a wing of the national Department of Transport in the country. SAMSA is the only body that represents South Africa at the IMO. It is the standards setting and monitoring body with a mission to promote the shipping and the broader maritime industry and safety at sea of the country (SAMSA, 2016).

SAMSA, for training programmes, also issues certification that conforms to the global STCW of Seafarers, 1978, as revised in 1995 (STCW-95) under the UN's IMO (SAMSA, 2016). SAMSA's primary source of funding is through levies from the shipping industry (SAMSA, 2001). Only

SAMSA formally issues STCW 95 compliance certificates. However, a secondary body, the Transport Education and Training Authority (TETA) oversees the training of ratings – the relevant Sectoral Education Training Authority (SETA) (Bonnin and Woods, 2002). However, in the 90s, Bonin *et al.* (2001) pronounced that the lack of a maritime policy gave rise to issues resulting in MET and accreditation being fragmented and conflicted. This referred, for example, to the issuing of certification for STCW compliance by SAMSA. TETA meanwhile provides accreditation for programmes in terms of the general national training framework, SAQA.

According to South Africa's Draft Maritime Policy (2008);

“Service delivery arrangements such as for example the provision of MET in South Africa's maritime zones lack coherence with no properly functioning forums or structures to ensure coordinated development of South Africa's maritime sector. This results in conflicting legislation, duplication and inefficient service delivery...” (South Africa's Draft Maritime Transport Policy, 2008:18).

MET in South Africa not only has to be in line with STCW standards, but also, according to Bonnin and Woods (2002), must fit into the National Qualification Framework (NQF). Hence, to be registered on the NQF, all existing learning must be translated into the SAQA format (Bonnin and Woods, 2002). Accredited courses should be designed in such a way as to encourage the transferability of skills in terms of the 1995 SAQA Act (No 58). This means that a seafarer undergoing STCW training in the country should gain credits which are transferable to other educational institutions, should he or she wish to switch careers (Bonnin and Woods, 2002). Furthermore, Bonnin and Woods (2002) point out that, if learning is obtained in accordance with unit standards that have been registered on the NQF, at that point the credits acquired will be nationally accepted, irrespective of where the learning was attained.

Maritime training standards in South Africa are regulated in terms of the IMO Convention, STCW 95 (as amended). The country is a signatory to the convention, and SAMSA is the implementing authority that presides over seafarer qualifications. Maritime training in the country has thus been viewed in a positive light, internationally. The country has achieved the IMO White List status, a premier status that enables international recognition of qualifications produced by that country.

The SAMSA mandate requires maritime training institutions and programmes to be accredited by SAMSA. In terms of the NQF, the SAQA presides over all qualifications issued within the country. The high quality and standards of South Africa's MET specifically offered by public higher education institutions have resulted in the country's MET being given White Status by the IMO. White Status refers to a list of countries (the white list) that are in compliance with the revised STCW (the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers) as amended, which entered into force on 1 February 1997.

A sound and complete maritime industry institutional capacity should be created with the aim of building human resources expertise in this field. Over the years various institutions of higher education have been created in the country, with a maritime focus (Mthethwa, 2003). Nonetheless, achieving international recognition for producing quality MET has not resulted in bridging the maritime skills gaps in the country. As a result, the need for understanding the other factors influencing MET, such as supply, remain imperative. MET institutions must actively, in cooperation with the relevant stakeholders' bridge the maritime skills gaps in South Africa.

3.4.2 THE SUPPLY OF MET IN SOUTH AFRICA

Maritime studies may comprise either Maritime Education (ME) or Maritime Training (MT) or a combination, Maritime Education and Training (MET). Such programmes exist in isolated pockets in the form of departments, with few students within several large public higher education institutions in the country, bearing in mind that South Africa has 25 public higher education and training facilities, with 34 SAMSA, TETA and SETA accredited FET colleges (SAMSA, 2013). Furthermore, there is also no evidence of joint degrees or qualifications or foreign aligned or accredited qualifications being offered in local higher education institutions (SAMSA, 2013).

South Africa has no single public tertiary institution that provides MET on a scale and level that can promote it as the dominant or primary service provider of the maritime industry and sectors within. As a result, there are limited unique or specific focus areas for individual public higher education and training (tertiary/universities). Many of the institutions have programmes in similar fields, with only limited specialization, for example, the University of Stellenbosch (Military – Maritime security) and Rhodes University (Ichthyology) (SAMSA, 2013).

MET in South Africa lacks coordination and focus that could be substantially to the benefit of the sector and the individual institutions (SAMSA, 2011; SAMSA, 2013). There are some unique areas and sub-sectors, however, limited education focus and attention is being provided. According to SAMSA (2013), this indicates the opportunity and the need for a stronger level of coordination in the education provision to the industry. As result, the state has developed institutes to facilitate this coordination. The figure below presents the flow of MET in South Africa.

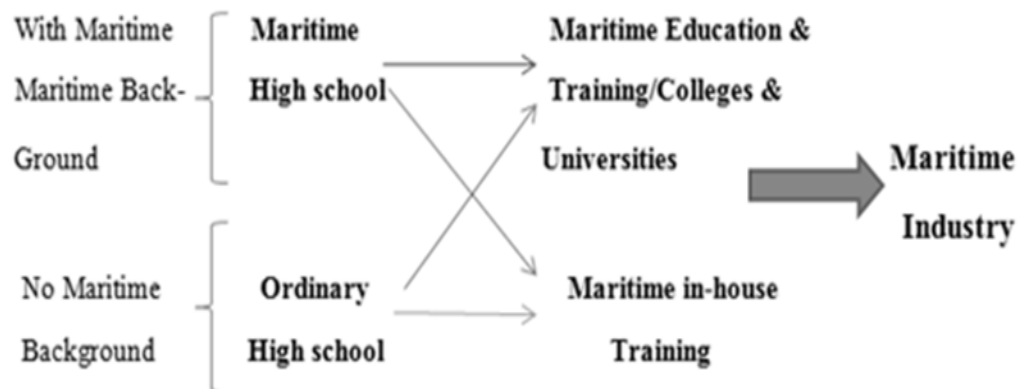


Figure 3.5: MET flow in South Africa
Source: Mthuli (2014:65)

The provision of MET in South Africa is the responsibility of both government and the private sector which feeds into the domestic maritime industry. ME is found, although in a very limited capacity, as low as high-school level in the country, which is a common characteristic of Western maritime countries. The table below, Table: 3.2 presents ME at secondary level in South Africa, by region.

3.4.3 INSTITUTIONS OFFERING MET IN SOUTH AFRICA

Table 3.2 Maritime Education in Secondary Schools in South Africa

Province	Location	School	Subjects
KwaZulu-Natal	Durban	New Forest High	Maritime Economics Nautical Science
	Durban	J G Zuma	Maritime Economics
	Durban	Sithengile Secondary	Maritime Economics Nautical Science
Western Cape	Simon's Town	Simon's Town High School	Maritime Economics Nautical Science
	Simon's Town	Lawhill Academy	Maritime Economics Nautical Science
Eastern Cape	Simon's Town	King Cole Maritime College	Maritime Economics Nautical Science

Source: Compiled by author using various sources (SAMSA, 2010; 2011; 2013)

At secondary-school level, learners have the option of joining either the seafaring or non-seafaring skills streams that lead to increased awareness in the maritime industry. MET at secondary level is vital in South Africa for realising its maritime ambition. However, this route has presented both barriers and successes. The province of KwaZulu-Natal (KZN) alone has 1 750 schools with the FET phase, which is Grades 10 to 12. Of them all, only 0.003% of the learners have access to maritime education (KZN Department of Education, 2013 cited in Creamer Media Reporter, 2014). The Integrated Maritime Industry Strategy for KwaZulu-Natal stresses that through education and training as well as skills development, it is essential to produce a skilled labour force for the maritime industry (KZN, Department of Economic Development and Tourism, 2013).

In Simon's Town, Western Cape's "Lawhill Maritime Centre", for example, continues to successfully provide two maritime subjects from Grade 10 to Grade 12, with the intention of better preparing the students for the tertiary education and training programmes leading to seagoing

careers as marine navigators or engineers, or for entry into other areas of the Maritime Industry (SOMMSA, 2016). Provision of these two maritime subjects within other schools is being promoted by the Department of Higher Education, and with the support of the government's Operation Phakisa. For the expansion of this programme to be successful, targeted schools must have suitably qualified and experienced teachers (SOMMSA, 2016). In 2013, in realization of the importance of maritime education, training and awareness in KwaZulu-Natal, the Department of Education in the province released a media statement that, from 2015 it would build two comprehensive Maritime Schools near the ports of Durban and Richards Bay. These schools would be offering subjects such as maritime economics and nautical science (KwaZulu-Natal Department of Education, 2013).

At tertiary level, South Africa has no solely MET-dedicated public higher-education institution, better known as universities. Public higher-education institutions in South Africa are administrative executive institutions, and have been established under the national sphere of government. South Africa has seven public higher education institutions that provide MET, however, there are other public post-school providers of MET. These include Further Education and Training Institutions (FETs), Government and Parastatal Organisations, such as Transnet and the private sector, which are not part of the scope of this study. Table 3.3 below presents public Higher Education and Training institutions which provide MET programmes in South Africa.

Table 3.3: Maritime Education and Training in Universities in South Africa

Location	Institution	Courses
KwaZulu-Natal	University of KwaZulu-Natal (UKZN)	<ul style="list-style-type: none"> • Postgraduate Diploma: Maritime Law • Postgraduate Diploma: Maritime Transport • Postgraduate Diploma: Maritime Studies • Master of Laws: Marine and Ship Surveying • Master of Laws: Maritime Studies • Bachelor of Science Honours: Marine Ecology • Master of Business Administration: Maritime Transport Economics and Management • PhD Maritime Studies • PhD Maritime Law
	Durban University of Technology (DUT)	<ul style="list-style-type: none"> • Chief Mate Certificate of Competency • National Higher Diploma: Maritime Studies • National Diploma: Maritime Studies • Non-Diploma: Marine Engineering – (Marine Engineering is offered as a Non-Diploma programme but the programme is under development to offer (in 2011) a Higher Certificate on completion of S2 and an Advanced Certificate on completion of S4).
	Mangosuthu University of Technology (MUT) (Proposed courses)	<ul style="list-style-type: none"> • Maritime Nautical Studies • Marine Engineering (Commencing in 2019) • Maritime Electronics/Electrical Engineering and Communications (Commencing in 2019) • Ports Management and Operations
Western Cape	Cape Peninsula University of Technology (CPUT)	<p>Marine Navigation</p> <ul style="list-style-type: none"> • Deck Officer (S1/S2) • Chief Mate/Master (S3/S4) <p>Marine Engineering Dept of Mechanical & Industrial Engineering</p> <ul style="list-style-type: none"> • Engineer of Watch • Second Engineer Officer • Chief Engineer Officer <p>Marine Engineering Dept of Maritime Studies</p> <ul style="list-style-type: none"> • Engineer Officer of the Watch • Second Engineer Officer • Chief Engineer Officer

		Offshore Survival <ul style="list-style-type: none"> • National Diploma: Maritime Studies • National Diploma: Fisheries Resource Management • National Diploma: Oceanography • Bachelor of Technology: Oceanography
	University of Cape Town (UCT)	<ul style="list-style-type: none"> • Marine & Environmental Law • Marine Research
	University of Stellenbosch (US)	<ul style="list-style-type: none"> • Bachelor of Philosophy: Maritime: Transportation and Logistics • Bachelor of Military Science: Technology and Defence Management • Post-graduate degrees in Maritime Studies –BPhil –MPhil – PhD
Eastern Cape	Nelson Mandela Metropolitan University (NMMU)	<ul style="list-style-type: none"> • Postgraduate Diploma: Maritime Studies
	Rhodes University (RU)	Marine Resources - Ichthyology <ul style="list-style-type: none"> • National Diploma • Bachelor Degrees • Master's • Doctorates.

Source : Compiled by author using various sources (SAMSA, 2010 ; 2011 ; 2013)

There is a reasonable spread, although not consistent with MET higher-education programmes across 7 institutions, excluding MUT, directly supporting the maritime industry in South Africa. The inconsistency is in, for example, programmes that focus on the business services. SAMSA (2013), in this regard, maintains that, because the spread of MET programmes is undoubtedly not consistent across the 7 clusters of the maritime industry, the individual responses to demand by each MET institution have inevitably not shaped a coherent response to the demands of the industry. This is in terms of the levels of programmes required, for example, the limited number of higher level master's and doctoral programmes (SAMSA, 2013). Whilst the demand identifies specific gaps and other necessities, an overall perception from numerous core stakeholders in the maritime industry in South Africa suggest that the higher-education programmes need to add about

50% more students to meet the immediate demands of the local maritime industry and sectors within (SAMSA, 2014).

The skills for professional services are provided through specialised maritime education programmes in higher education – undergraduate and postgraduate degree studies. These include, amongst others, Maritime Law, Maritime Economics, Maritime Civil Engineering, Maritime Environmental Sciences, Petroleum Geoscience, Customs and Excise, Petro-Chemical Engineering, and Naval Architecture. The seafaring qualifications are broken down into domestic (port operations, coastal, and fishing) and international qualifications (STCW). The seafaring diploma qualification (STCW) is offered by two public institutions in South Africa, the Cape Peninsula University of Technology (CPUT), and Durban University of Technology (DUT).

The non-seafaring streams generally fall within the onshore marine support sector, particularly port operations, as well as professional services. The onshore maritime support sector employs cargo handling and logistics facilitation skills, including stevedoring, ship handling, ship agencies, forwarding and clearing, and customs. However, there are no public institutions that provide qualifications for these skills; and there are only a few, limited, private institutions that provide such training. These private institutions are often linked to international institutions, which makes this training a very expensive qualification.

Mthethwa (2003), in the early 2000s, estimated that South Africa had the potential to develop its maritime industry and MET through institutional development. This could be achieved by vocational schools and universities developing special curricula and programmes in maritime. They would have to set up new schools; however, this would require vast resources, such as teaching staff and funding. Mthethwa (2003) expressed that:

“South Africa produces thousands of graduates per annum, be it in high school and/or tertiary institutions. A great number of these graduates are not employable in growth sectors for a variety of reasons, one of which is inappropriate qualification. The development of appropriate curriculum and tertiary training and a gradual shift in the control of shipping related activity to the local markets would be auger well for coastal communities in particular as shipping/marine logistics career orientation can lead to new career opportunities” (Mthethwa, 2003:44).

In this regard, the next section considers the challenges facing MET in South Africa which may be seen as stumbling blocks to this development.

3.4.4 CHALLENGES FACING MET IN SOUTH AFRICA

3.4.4 (i) Maritime Education in secondary schools in South Africa

In recapping, MET in South Africa is found at both secondary and tertiary (higher) education levels, within the coastal provinces of KwaZulu-Natal, Eastern Cape, and the Western Cape. At the secondary level, targeting the youth creates an environment of dynamic force for sustained positive change in the maritime industry (Cunningham, 2015). In this regard, Cunningham (2015) postulates:

“The relevance of MET at the secondary level has been found to be necessary to increase awareness as well as to mitigate the trends and challenges influenced by the philosophical and sociological changes experienced in society and the Maritime Industry” (Cunningham, 2015:iv).

Haun (2014), however, concurs that, in many areas around the world, secondary level MET is an idea for discussion at the policy level, yet to be a reality. ME is a vital component of MET in the broader supply chain in education and training within the maritime industry. As a result, Cunningham (2015) articulates that:

“MET provides knowledge and skill about the shipping industry, which can be appreciated at the secondary level once the pedagogical approach is applied in the appropriate context at the appropriate level” (Cunningham, 2015:2).

Certain secondary schools offer ME subjects linked to MET and skills essential for working in the maritime industry, whether sea-going, such as seafaring, or shore-based, such as in shipyards or port facilities (Haun, 2014). The need for and importance of ME at secondary level cannot be understated in this regard. Cunningham (2014), suggests that problems encountered by the global maritime industry, such as incompetence, as well as high levels of seafarer dropout, are also partially caused by lack of MET and awareness during secondary level. When appraising maritime education (ME) and its implementation in the United States of America, Cunningham (2015) exposes the greatest challenge as finding the most economical way for secondary schools to adopt ME. In the coordination of ME, little attention has been paid to stakeholders and their respective roles.

In South Africa, at secondary level, maritime education (ME) has witnessed many obstacles in the country. In the province of KZN, it faces numerous hindrances according to the eThekweni Maritime Cluster an entity of the eThekweni Municipality, which include:

- Securing funding for such maritime courses; and
- Attracting suitably skilled and qualified educators that have a universal comprehension of the maritime industry and sectors (eThekweni Maritime Cluster, 2011).

The region of the eThekweni Municipality, there is a high concentration of secondary maritime education, there are three secondary schools which offer maritime subjects: Sithengile Secondary, New Forest High, and J G Zuma High School. Their maritime courses are facilitated by and partially funding by the Institute of Chartered Shipbrokers South Africa (ICSSA). This is a professional membership body through the provision of an internationally recognised education programme, to the shipping industry, sets the highest standards of professional service (KZN-Integrated-Maritime-Strategy, 2013).

J.G Zuma High School, north of Durban which is within the boundaries of eThekweni Municipality, started offering maritime economics as a subject in January 2013. It draws its enrolment from the township areas of KwaBester, KwaMashu, and Ntuzuma and Inanda. According to Mthuli (2014), this arose from the need to work closely with schools in the promotion of maritime professions, which government sees as a priority in developing an effective MET system in the province. It is anticipated that initiatives such as these at high school level will contribute to improving South Africa's skills shortages in the maritime sector (University of KwaZulu-Natal, 2013). The need for secondary maritime education is vital in South Africa. This is asserted by Mthuli (2014), who states that:

“To get to tertiary level, students at high schools need to know what maritime is, in a sense students need to have some kind of exposure so to be aware of the maritime opportunities post-secondary” (Mthuli, 2014:125).

This is further backed by Cunningham (2015), in that:

“The relevance of MET at the secondary level has been found to be necessary to increase awareness as well as to mitigate the trends and challenges influenced by the philosophical and sociological changes experienced in society and the maritime industry” (Cunningham,

2015:1).

Of twelve education districts in KZN, only three have schools that offer Maritime Education (KZN Department of Education, 2015). According to eThekweni Municipality (2011), there are very few high schools offering maritime studies/subjects. This affects a sustainable supply chain into higher institutions of education. Adding to the problem is the level at which pupils at these schools pass their science subjects. However, the eThekweni Municipality acknowledges that the reasons for this can largely be attributed to:

- The lack of financial resources;
- Lack of maritime teachers; and
- Lack of facilities dedicated to maritime studies (eThekweni Municipality (2011).

These obstacles and others have been verified by the KZN Department of Education as:

- Lack of resources;
- Lack of maritime background; and
- Uneven balance of maritime resources at schools (KZN Department of Education, 2015).

The department acknowledges the lack of learner and teacher support material. Some of the teachers teaching maritime economics in secondary schools have not studied the subject. Sithengile and New Forest were at an advanced level compared with the other schools (KZN Department of Education, 2015). This is confirmed by Mthuli (2014) who notes that most teachers of maritime-related subjects in KwaZulu-Natal did not have any maritime background, except for three schools at which ex-DUT maritime graduates taught. Furthermore, some schools do not have classrooms dedicated to teaching Maritime Economics or Nautical Studies (KZN Department of Education, 2015). Cunningham (2015) assessing the relevance of MET at secondary level in Jamaica, expresses that to reform the secondary curriculum so to make it purposeful to communities and the general society in terms of exposure to the maritime industry, there is a need for a paradigm shift in the education system. However, limited resources allocation to MET at secondary level makes it unlikely to allow such achievement currently.

Both non-maritime high schools and maritime high schools feed directly into either maritime in-house training or maritime education and training. Tertiary institution offerings and poor performance in the form of high failure and drop-out rates were owing to students having a weak grasp of mathematical and physics concepts, and lacking some sort of a maritime background, which are essential to MET at tertiary level. Mthuli (2014), however, confirms that, for students to gain access to MET programmes at tertiary level in KwaZulu-Natal, it is not a prerequisite to have maritime subjects at secondary level. Tertiary MET institutions focus only on their particular mathematics and physical science subjects. According to the eThekweni Municipality (2011) an intervention in the form of bridging courses was repeatedly introduced.

The study by Pallis and Ng (2011) found that students in Asia and Europe considered maritime programmes easy, and used such programmes as university/college entry points, and academic performance safety-nets. This is not the case for their South African counterparts, perhaps because of the lack of exposure to the possibility of a maritime study option, or South Africa's very limited secondary maritime schooling, or the competencies of secondary maritime subject teachers. However, there is an opportunity for secondary maritime education, and potentially a demand for such education, particularly as focus on the sector and the programme offerings in the FET and higher education levels are expanded (SAMSA, 2013). As a result, the geographical and economic well-being of countries such as South Africa, and their interest in the maritime industry, promote the relevance of MET at secondary level, which brings awareness and career opportunities for the youth. The next section scrutinises MET at tertiary (university) level in South Africa.

3.4.4 (iii) Maritime Education and Training public higher education institutions in South Africa

There are many hurdles facing tertiary institutions in South Africa. Most notably, and generally acknowledged, have been underfunding and lack of, or slow racial transformation. This is asserted by Habib (2016), who estimated that South Africa's tertiary institutions receive merely R22 billion in funding/government subsidies, whereas the higher education and training department of the country requests the R37 billion which would put them at world average. For MET at public higher-education level in South Africa, many obstacles have existed in the past.

In 2005, the Cape Technikon and the Peninsula Technikon merged to become the Cape Peninsula University of Technology. This site is now known as the Granger Bay Campus of the Cape Peninsula University of Technology and is the Cape's main establishment for preparing students for SAMSAs-approved Certificates of Competency. Limited marine training for Marine Engineers and Radio Officers took place at the Cape Technical College during the 1970s and 1980s before merging with the Cape Peninsula University of Technology (CPUT) (SMMSA, 2016: 3).

In 2002, CPUT introduced several block courses to enable those engineers already in the industry to upgrade their qualification, for example, from a class-four engineer to a class-two or class-one. These were not the traditional technikon semester courses but were designed to suit the industry, as they release people from employment (Bonnin and Woods, 2002). These block courses were accredited by SAMSAs, and were STCW-95 compliant. According to Bonnin and Woods (2002), the CPUT also started to provide a dual qualification of a National Diploma in Mechanical Engineering for Marine Engineers with a sea-time component and maritime modules. However, one of the problems of offering the course full time, according to Bonnin and Woods (2002), was the consideration of attracting qualified lecturing staff, because of the high salaries chief engineers were earning in the industry. Bonnin and Woods (2002) acknowledge that this became a problem for SAMSAs-accredited courses.

To add to MET's woes at public higher-education institutions in South Africa, Bonnin and Woods (2002) noted that all shipping companies that usually offered sea-time training for the country's MET students had decreased the number of available training spaces in their ships, with the exception of Smit Pentow. As a result, students were unable to complete their qualifications. Technikons, now known as universities of technology, had to look at securing sea-time training from other shipping companies as far as abroad. This was because of a weak link at the time with domestic ship owners. Institutions, for example, the CPUT which is in the Western Cape province of South Africa had exhausted 'every opportunity'. Nonetheless, CPUT did manage to attain some sea-time training spaces (training berths) for its students in South Africa from a company called TK Tankers. Other foreign shipping companies, one operating off-shore in Angola called Tidwater also provided berths, according to Bonnin and Woods (2002). However, they further identified that, in CPUT, foreign students registering for their MET course, in most cases, had already

secured placements. Thus it was only the South African cadets who needed assistance securing berths.

In the province of KwaZulu-Natal (KZN), the Durban Institute of Technology, now known as the Durban University of Technology (DUT), is one of only two public higher-education institutions in South Africa. The other is CPUT. These two institutions alone offer a seafaring diploma on the African continent, apart from one found in Egypt. Together with the SAMSA, all students managed to secure training berths. For DUT's marine surveyor students, a company called Safmarine came to the fore (Bonnin and Woods, 2002). Bonnin and Woods (2002) note that such was a new scheme. However, shipping companies such as Safmarine were unprepared for the flood of students who required sea-time training. As a result, DUT, together with its counterpart CPUT, had to acquire sea-time training for their students with a company not traditionally associated with DUT – Smit Pentow. The institution had to negotiate and make a number of presentations to P&O Nedlloyd, a Belgium-based shipping company, in hoping to secure ten training berths accommodating their students (Bonnin and Woods, 2002).

According to Bonnin and Woods (2002) DUT and CPUT collectively felt that government had to become involved in the issue of the availability of berths in the country because of the magnitude of negotiation involved. This needed to be at a higher level. On the one hand, for example, it was identified that the government could negotiate bilateral agreements similar to the one the government of Indonesia had with P&O Nedlloyd, after which the company trained a certain number of Indonesian cadets annually (CPUT, 2002 cited in Bonnin and Woods, 2002). On the other hand, DUT suggested legislating interventions around training berth provision. Such a legislative intervention could be similar to that in place in Brazil, in which shipping companies on its Whitelist are legislatively mandated to avail space for the country's cadets.

Mthuli (2014), viewing the economic contribution of MET to Durban's maritime industry, found that MET institutions such as DUT and UKZN had to deal with hurdles such as funding, and the inability to attract properly qualified staff to teach their maritime programmes. This was owing to their remuneration packages not being sufficiently attractive to keep maritime specialists from being poached by the maritime industry (Mthuli, 2014). As a response to this, DUT was left with

the alternative of attracting foreign people from overseas which also presented its own challenges. The slow process of issuing of work visas/permits frustrated prospective MET lecturers. This resulted in their turning down placements in South Africa (Mthuli, 2014). In the case of UKZN, the difficulty in recruiting maritime academics was augmented by poor salaries according to industry standards. However, the institutions have been fortunate to have obtained local maritime professionals on a pro-bono/goodwill basis (Mthuli, 2014). UKZN was not alone in this regard. UCT's Maritime Law programme experienced similar issues (Mthuli, 2014). According to Mthuli (2014);

“The weaknesses that exist in Durban's higher education institutions are a stumbling block to the growth of the broader maritime industry to a point that, there is an inability to produce the required human capital in some professional areas...” (Mthuli, 2014:124).

The shortcomings of the MET system in Durban have presented an opportunity for 'fly-by-night' private MET institutions, which are in most cases not accredited (Mthuli, 2014). Such institutions see the demand and low supply of maritime skills in Durban as a vulnerable system to be milked (Mthuli, 2014). Apart from all the hurdles mentioned above, South Africa has limited maritime study options, especially for communities in disadvantaged areas or inland areas, which compromises the level of awareness of maritime careers. As a result the majority of young people do not consider the maritime as a career.

Bonnin *et al.* (2004:7) believe that in South Africa, maritime industry training and development has to rectify the racial inequities of the country's past, while also addressing the exigencies of new certification regimes and international competition. Historically, public education providers such as universities were primary partners on the skills development agenda in South Africa. Post 2010 witnessed a major development in the country's Skills Development, Education & Training governance structure. Public providers of education and training are now centre stage; the need to equip them to play their new role is an urgent national priority (SAMSA, 2010:29). However, this does not mean that private providers no longer have a role to play. Rather (as primary providers, they need to be prioritized because they are the first line of contact in MET for many of those that are already within the maritime industry in South Africa.

3.4.4 (iii) Maritime Education and Training in public Further Education and Training institutions

The recapitalization of the public Further Education and Training (FET) colleges system is seen as imperative. Such processes are changing the country's public FET landscape. Among the notable ones was the merger of 152 technical colleges into 50 multi-campus public FET colleges (South Africa's Department of Basic Education/ DBE, 2010). According to DBE (2010), a critical resource in meeting the skilled labour demands of an increasingly competitive global economy in South Africa is the (FET) college system. As a result, the global demand for maritime skills and the low supply of maritime skills in South Africa has prompted government to consider the provision of MET at Vocational Education and Training (TVET) institutions better known as FETs. The potential of such institutions is seen as having the potential to greatly assist in bridging the maritime skills gaps in South Africa (eThekweni Maritime Cluster, 2011).

In 2016, SAMSA confirmed that it was developing a new curriculum for eight national maritime-sector occupation qualifications. As of 2017 these are on course and at their final stages (SAMSA, 2017). These courses are to assist government in reaching the objectives of Operation Phakisa project. They include Port Operations Master, Marine Electro-Technical Officer, Aids to Navigation Manager, Aids to Navigation Technician, Dock Master, Traffic Controller (Vessel Tracking System), and Maritime Search & Rescue Mission Coordinator and Diver (Commercial). These qualifications will be formally endorsed by SAQA and will enhance the maritime skills base in South Africa and on the African continent, while being internationally recognised (SAMSA, 2017).

In South Africa FETs are spread between public and private institutions. As of the beginning of 2017, the government of South Africa has expanded the reach of MET to FETs, in respect of the stumbling blocks encountered, such as lack of suitably qualified tutors (SAMSA, 2017). The government sees such challenges as positive because they will pave the way for high creativity and innovation on MET in South Africa. This includes the introduction of online tutoring or E-learning for some MET modules, starting with at least three STCW modules for maritime engineering (SAMSA, 2017).

Prior to 2017, South Africa had only two FET colleges with specifically focused maritime programmes. One is the Port Elizabeth Public FET College in the Eastern Cape province; and the other is the College of Cape Town which is in the Western Cape province (SAMSA, 2013). There are no TVETs in the country that offer shore-based training and seafaring training (Moorcroft, 2017). However, according to SAMSA (2013), a number of FET colleges in the country are actively considering offering short-course programmes so as to contribute in bridging the maritime skills training gap (SAMA, 2013).

The Umfolozi TVET college in Richards Bay, north of KZN, is one such college (Moorcroft, 2017). In 2013, SAMSA engaged with the South African Department of Higher Education and Training to assess the current FET MET programmes. It was found that most Maritime Training (MT) is conducted by private providers and not Public FET colleges. It was noted that there is an interest by public FET colleges to provide MT, however, owing to declining funding and certification problems they are reluctant to pursue MT (SAMSA, 2013). According to SAMSA (2013), the most significant challenge was certification. Courses have to comply with international standards as well as the National Qualifications Framework. This has proven to be very difficult. Those that offer maritime programmes tend to focus on the shore-based skills such as marine tourism and boat building, as opposed to more intensive MET programmes such as seafaring.

To promulgate policies for the implementing MET at the public FET level in South Africa requires considering numerous factors, including resources such as funding and skills supply, demand for FET MET, the regulations, and standardization of MET. This cannot happen overnight, and cannot be done in isolation from industry players. Coordination and cooperation with stakeholders through engagement only can achieve such an end. However, before MET is further expanded to public FET level in South Africa, the troubles in both public secondary and higher education must be addressed.

3.4.5 PRIVATE PROVISION OF MET IN SOUTH AFRICA

A global overview of MET has shown that private MET providers play a crucial role in the maritime industry. A major employer of certificated maritime personnel has always been the South African harbour authorities; traditionally, port captains, pilots, and tug masters required a Foreign

Going Master Mariners CoC; and marine engineers needed Chief Engineers CoCs (SOMMSA, 2016).

After 1994, the new management of South Africa's ports sought to transform the racial and gender profiles of these positions. Given that it typically takes about 8 years to achieve these qualifications, the only effective way of meeting the transformation targets was to downgrade the certification requirements (SOMMSA, 2016). This programme also ensured that many experienced (and now over-qualified) personnel left the harbour service and sought employment abroad; leaving an overall lack of experienced personnel in senior management positions, according to SOMMSA (2016:4). A direct consequence of these actions has been the requirement for upgraded "in-house" training and education, which has been addressed in part by the establishment of a TNPA training facility (SOMMSA, 2016). As with other training and education programmes, however, it has also been affected by the shortage of qualified tutors (SOMMSA, 2016).

In South Africa private maritime skills training institutions, because of competition, have had to share resources. This has resulted in a waste of resources in marketing and the advertising of courses. This is seen as not adding to strengthening skills and broadening the availability of resources specifically tailored for training (eThekweni Municipality, 2011). Therefore, although such competition may generally be seen as good, in the South African maritime industry there is a waste of resources on aspects such as marketing and advertising of courses. In addition, the quality of training is a major concern. The eThekweni Municipality (2011) pointed out that:

“...there is a proliferation of private colleges offering some form of maritime training, although many of them were unregistered or non-accredited” (eThekweni Municipality, 2011: 9).

On reflection, in the late 90s during the rapid expansion of the maritime industry, there was a major problem of unregistered or non-accredited certification of courses in countries that supply large numbers of maritime labour, according to Lane and Veiga (2001). This was because of under-resourced and not enough regulatory agencies. Veiga (2001) emphasises that this problem was not unique to South Africa.

To date, in areas such as KwaZulu-Natal in South Africa, local government believes that the private sector cannot and is neither in a position nor prepared to address some of the maritime skills development challenges, such as transformation and equal-opportunity job creation in the sector (eThekweni Municipality, 2011). The establishment of in-house maritime training facilities by private shipping companies are seen as self-serving, having been established for their own skills supply and quality (eThekweni Municipality, 2011). In-house training has long been used by many industries when traditional education and training systems fail. The Mackinnon Partnership (2008) commented that such methods are valuable in bridging skills gaps, and such have proved very successful through partnerships in Scotland's maritime industry. This has led to the acquisition of and sharing of resources such as simulators, collectively saving on training costs and work lost owing to such. To date, a comprehensive understanding of and contribution to private provision of MET in South Africa remains limited.

3.4.5 (i) Contribution of in-house MET provision in South Africa

The provision of in-house training in the maritime industry has been seen as promoting self-interest in South Africa (eThekweni Maritime Cluster, 2011). Private providers have a role to play, for example, Dinwoodie (2000) in the 90s highlighted that, in countries like the United Kingdom, the education and training for non-seafarers, perhaps by educational institutions such as higher education institutions, was crucial, where many prospective employers were too small to fund training or provide in-house. This implies that those with the means and resources to provide their own MET can do so, however, the role of public MET institutions comes in as a means of intervention, in a sense when the market requires such.

In South Africa's most badly affected maritime sectors, according to KZN's Integrated Maritime Strategy (2013: 94), the skills gap is slowly closing, mainly as a result of in-house training. Maritime in-house training has developed to bridge the gap between the skills that the industry needs (for example ship building and repair as identified in the case of challenges facing MET in KwaZulu-Natal) and the skills of employees. Instead of waiting for or looking for institutions to provide a particular skill or scarce workforce member, shipping companies have started the initiative to train their own employees, and have also provided training for other companies within the industry that do not have the means to train such for their own workforce. This is not unique

to South Africa. In the UK when state subsidies for individuals seeking higher education in British universities declined, many corporate training programmes emerged, aimed at meeting the needs and skills gaps in the country (Dinwoodie, 2000).

According to the KZN's Integrated Maritime Strategy (2013):

“In-house training that is being provided by numerous large port operators, an issue that was identified was the provision of the Skills Development Levy (SDL) in order to assist in creating a sustainable approach to skills development, and it had been highlighted that some subsidization from the SDL has been reduced through Transport Education and Training Authority (TETA), and this has placed immense pressure on some of these industry firms to continue undertaking training” (KZN's Integrated Maritime Strategy, 2013: 94).

Maritime in-house training may therefore be seen as a vital contribution to MET in South Africa. This is further asserted by government's commitment to increase the intake of such in-house training programmes within the maritime sector by initiating the Skills Development Levy (SDL) through TETA. However, there is a negative attitude from companies to training their employees. According to Beer and Meethan (2007: 469): “first the danger is that employers who invest in training staff run the risks of losing both money and workers if they are subsequently ‘poached’ by rival employers, who have not borne the cost.” To Hoque *et al.* (2005 cited in Beer and Meethan, 2007: 469), “this is clear disincentive for employers to provide the depth and breadth of training opportunities.” The government has therefore been forced to incentivise such training by business through TETA, in the hope of increasing the intake.

In the United Kingdom, the government has taken the initiative of promoting Vocational Education and Training (VET) as a skills policy (Beer and Meethan, 2007). The liberal market economy's priority in investment for training tends to be focused on short-term gains and immediate needs. Training is offered in a rather ad hoc manner, and often at the expense of longer-term strategic goals and skills development (Sims *et al.*, 2000 cited in Beer and Meethan, 2007). However, according to Unwin (2004), one of the shortfalls of the VET system has been a failure of policy-makers to create adequate incentives or consequences to motivate employers to take VET more seriously, despite the government's skills policy on competitiveness (Beer and Meethan, 2007).

Where tertiary MET institutions fall short, private MET, either in the form of private education and training institutions or in-house programmes, bridge the gap. However, this has not been sufficient to overcome and effectively, efficiently, and economically address South Africa's maritime workforce development challenges. The view that in-house training by shipping companies is purely for self-interest is somewhat misleading. If the orthodox MET establishments cannot deliver, it is understandable that shipping companies will develop their own workforce and that of their counterparts. However, this too rests upon having the means and resources to achieve such.

In pursuit of workforce development through human capital development, in-housing training plays a central role. According to Mathur (1999: 205 cited in Luthuli, 2013: 37), with regard to human capital development, this is the “accumulated stock of skills and talents and it manifests itself in the educated and skilled workforce in the region”. However, according to Ogunade (2011 cited in Luthuli, 2013: 37), “human capital is not limited to formal education” like that found at higher education institutions. Luthuli's view on this is that human capital may be developed outside formal or standard school settings and maritime in-house training may be considered an example of this. According to Ogunade (2011, cited in Luthuli, 2013) there are three human capital development strategies that may be used in developing countries such as South Africa. These are:

- State driven strategies;
- Foreign Direct Investment (FDI)-dependent training; and
- Enterprise-based training strategies (maritime in-house training is an example of this).

Most technologies are introduced into society via business innovativeness, therefore one must understand that employers know what skills are needed for such technological advancements (Tan and Batra, 1995). This also somewhat justifies the in-house training offered by shipping companies. New technology in the industry both sea-going or land-based actively continues to be one of the key influencers of MET, globally, in terms of its adoption, access, and development.

3.5 THE MARITIME INDUSTRY, THE STATE (GOVERNMENT) AND MET IN SOUTH AFRICA

The growth and intertwinement of the global maritime industry, its economic opportunities, the safety and security and sovereignty it holds, have become vital to modern states. Socio-economic variables borne by globalisation have been seen as threats to government sovereignty. Thus states have to take active roles in governing their domestic maritime industry, influencing the industry at international level. Through state institutions, governments around the world govern and develop their MET under unique social circumstances, reacting in individual ways to global changes in the shipping industry. According to Ruggunan (2010), these interactions are distinctive, because states are very different socially, economically, and politically, and have undergone unique historical routes. Ruggunan (2010) argues that “When processes of the national state interact with global trajectories of the shipping industry and seafaring labour markets, the outcomes are diverse” Ruggunan (2010:42).

To Ruggunan (2008) this accounts for the different policy strategies and outcomes engaged in by various state institutions of these countries. Although there is an increased willingness to cooperate and collaborate in the maritime industry even between public higher education institutions and other public entities (SAIMI, 2014), the maritime skills gaps still remains the principal concern of the country’s maritime industry. According to Ruggunan (2008):

“State institutions that service the seafaring industry have had very little impact on the restructuring of the labour market for South Africa ’s seafarers, nationally and especially globally”, thus “racial equity transformation of the national seafaring labour market are key goals of the post-apartheid state as opposed to more ambitious and concerted efforts to engage in job creation strategies to export South Africa n mariners into the global market” (Ruggunan, 2008: 285).

Beer and Meethan (2007), stress that what must be borne in mind is that training skills gaps, skills shortages and skills needs are conditioned in part not only by local labour market conditions, but also by the global political economy. Thus the demand-side of training cannot be simply imposed by centralised government policy; rather, training must be tailored to local, regional and international labour markets. Bonin *et al.* (2001:16) pointed out that, because of the maritime labour market demographics post 1994 in South Africa, “skills planning, career pathing[sic] and

training should have been essential components in achieving employment equity in the maritime labour market”.

In considering this, scholars such as Beer and Meethan (2007) add that markets governed by anti-economic liberalism will tend to produce short-term and ad hoc solutions, as in the case of South Africa and its maritime sector post 1994. There is the need for long-term strategic interventions from government agencies as ‘active partners’ in MET development in South Africa to truly address MET domestic demand and challenges. Thus, while the changes to the maritime industry in terms of labour market demand and certification occur globally, according to Ruggunan (2010), state institutions are key players in shaping and restructuring labour markets. Ruggunan’s notion supports Standing (1999) and Botlanski and Chiapello’s (2007) arguments: because labour markets are imbued with institutional arrangements, labour markets are more complex than a market for lemons. Thus, the state role in shaping MET has been circumstance-based. The anti-economic liberalist approach of racial equality and equity was a policy direction based only on unique domestic social, political, and economic contents in South Africa, post-apartheid. Ruggunan (2016) is in this regard, posits that “Despite processes of globalisation, the nation state can still be an important actor in shaping global labour markets” (Ruggunan, 2016:309).

As a result, in today’s global neoliberal environment, the role played by higher education has become the central pillar holding up policy for governments around the world. Thus universities are now seen as key drivers in the knowledge economy. As a consequence higher education institutions have been encouraged to create links with industry for new partnerships (Olssen and Peters, 2005). In South Africa, such links have been fostered by state institutions such as the newly established South Africa International Maritime Institute (SAIMI) and the eThekweni Maritime Cluster (eMC). As a result, these institutions may be seen as significant in assisting to bridge the skills gap in South Africa. Institutions such as these bring together industry and MET institutions so as to foster cooperation and coordination for these stakeholders. In this way, they collectively work towards achieving the goals of national strategies and policies such as Operation Phakisa and the National Development Plan (NDP).

3.5.1 THE OPERATION PHAKISA INITIATIVE

In 2013, the president of South Africa introduced the Big Fast Results Methodology which the Malaysian government had used to achieve significant economic transformation within a very short time. The approach helped address national key priority areas in the country such as crime, poverty and unemployment (South Africa's Department of Environmental Affairs, 2017). In South Africa, with the support and assistance of the Malaysian government, the Big Fast Results approach was adapted to the country's context. The approach was renamed Operation Phakisa ("phakisa" meaning "hurry up" in the Sesotho language), to highlight the urgency of delivery (South Africa's Department of Environmental Affairs, 2017).

In the South Africa context, in this regard Operation Phakisa, "is a results-driven approach, involving setting clear plans and targets, on-going monitoring of progress and making these results public" (South Africa's Department of Environmental Affairs, 2017). Thus, the initiative is designed to speed up the implementation of solutions on central development issues in the country (South Africa's Department of Planning, Monitoring and Evaluation, 2017). According to South Africa's Department of Planning, Monitoring and Evaluation (2017), the initiative to address developmental challenges of the country is highlighted in the National Development Plan (NDP) 2030, namely, inequality, unemployment and poverty. Operation Phakisa stands, therefore, as an innovative and revolutionary approach and a cross-sector programme in which various public and private stakeholders engage. This translates into detailed policy plans for tangible results through collaboration and dedicated delivery, accelerating the delivery of some of the development priorities (South Africa's Department of Planning, Monitoring and Evaluation, 2017). Thus, through Operation Phakisa, the "Government aims to implement priority programmes better, faster and more effectively" (South Africa's Department of Planning, Monitoring and Evaluation, 2017).

In 2014 Operation Phakisa was launched to assist in implementing the NDP, with the overall goal of boosting economic growth and creating jobs in South Africa. The starting point was the surrounding vast ocean in the country that had not been fully taken advantage of, and the huge economic potential of this untapped resource (South Africa's Department of Planning, Monitoring and Evaluation, 2017). The oceans have the potential to contribute up to 177 billion rand to the gross domestic product (GDP) and create just over one million jobs by 2033 (Moorcroft, 2017; South Africa's Department of Planning, Monitoring and Evaluation, 2017). Therefore, four critical

areas were identified to explore and unlock the economic potential of South Africa's vast coastline. These are: Maritime Transport and Manufacturing; Offshore Oil and Gas Exploration; the Aquaculture work stream, and Marine Protection Services and Ocean (South Africa's Department of Environmental Affairs, 2017).

The government of South Africa welcomes the partnership with business and civil society to gather, operate, and collaborate in realising the goals of the NDP. This study's focus on MET coincides with global demand of maritime skills and the South Africa's government's 'blue economy', aimed at taking full advantage of, and optimising the economic benefits of the country's vast coastline which Operation Phakisa encompasses. In 2013, South Africa's national Department of Environmental Affairs conducted a study that estimated that the country's coastline and ocean has the potential if tapped into, to contribute 800 000 to 1 million direct and indirect jobs for South Africa, which has a very high unemployment rate, especially amongst its youth.

It is with issues in the mind such as high levels of unemployment and slow economic growth, that the government of South Africa strives to use the economic potential of its 'blue economy'. This is by not only increasing the supply of skills demanded through industry awareness but also finding a balance in this respect. MET institutions play and continue to play an important role in this maritime labour and skills supply chain, especially in provinces such as KZN in South Africa, on which the enquiry of this study falls. In realising its maritime goals and ambitions, the South Africa government has until recently established both national, regional, and local institutions to facilitate this process.

3.5.2 STATE (GOVERNMENT) INSTITUTE SUPPORTING OPERATION PHAKISA IN SOUTH AFRICA

3.5.2 (i) South African International Maritime Institute

The South African International Maritime Institute (SAIMI) is a newly created state institution with the main purpose of facilitating collaboration and linkages amongst role players in MET and research, in South Africa, and with other similar institutes in the African continent (SAIMI, 2017). This may be achieved by means of encouraging maritime skills development, education, training and research that foster the growth of the economy supported by the maritime industry (SAIMI,

2017). Maritime development of the skills necessary to warrant the success of maritime economic development initiatives are thus facilitated, such as South Africa's Operation Phakisa and the broader African Union's African Integrated Maritime Strategy.

The Institute plays a much-needed linking role between educational institutions and industry, with the goal of strengthening MET and research through cooperation and enabling coordination between education providers. Thus, the Institute is seen as a multi-stakeholder, multi-disciplinary institute, active in all aspects of the maritime field, including areas such as law, manufacturing and construction, sustainability, shipping, environment, harbours, and marine tourism. SAIMI also works together with academia and industry in marine and coastal sciences. SAIMI's objectives include to:

- Co-ordinate, promote and support the education, skills and research needs of the maritime sector,
- Increase the quality of teaching, learning and research in the maritime sector,
- Support professional development in the maritime sector,
- Facilitate international and African continental co-operation, and
- Broaden the range of education options to meet industry needs (SAIMI, 2016).

SAIMI's purpose, structure, and programmes aimed at achieving the above objectives are based on extensive stakeholder consultation. Their partners are the national Ministry of Transport, the national Ministry of Higher Education, the National Ministry of Science & Technology, NMMU, SAMSA, Transnet, and TETA (SAIMI, 2016).

Summary

In summary, this section has provided an overview of MET in South Africa by means, firstly, of presenting the country's maritime industry and its challenges, one being skills development and the scarcity of skills. In any country, educational institutions are at the forefront of bridging skills gaps and domesticating industry skills demands. This has been the case in South Africa's maritime industry. However, although the country has a well-developed maritime education and training system for an African country, its MET institutions remain hobbled by both internal and external factors. The government, through its institutions and maritime policies and strategies, such as

Operation Phakisa, realise the economic potential the country's maritime industry has to fight socio-economic issues, such as the slow economic growth and high level of unemployment, especially among the youth in the country.

As a result, key role players in the industry, such as the government and MET institutions, are working to address the maritime skills gaps in the country for skills development. Hence this section presented an overview of South Africa, its maritime industry, and its governance. It has also given an overview of MET in the country, from secondary to tertiary level. Furthermore, a private sector perspective in the form of in-house MET and the role of government has been given. In the next section, applying the funnel approach, KZN, the province for analysis, is focused on.

3.6 THE PROVINCE OF KWAZULU-NATAL

KwaZulu-Natal (KZN), which is the location of the study, its coastline and waters stretch hundreds of kilometres. In realising the objective of Operation Phakisa, one of the pillars supporting KZN's maritime policies and strategies is not only maritime infrastructure development and transformation but also developing of the maritime labour force in the province. This is achieved by means of skills development and sustainability through effective MET. The purpose of this section is to give an overview of KZN's maritime industry, its integrated maritime strategy, provincial government institutions supporting maritime skills development, and sustainability in the province. The section also looks at the role of provincial and local government and evaluates the provision of MET in the province.

3.6.1 KWAZULU-NATAL'S MARITIME INDUSTRY

It is estimated by the World Trade Organisation (WTO) that, through the international shipping industry, 90 percent of world's trade takes place. Transnet, which is the country's ports authority, estimates that, in South Africa, 80 percent of the country's trade with the rest of the world goes through the ports and respectively, the ports of Richards's Bay and Durban which are in KZN. Of that 80 percent handled, 60 percent is made up of the country's cargo tonnage (KZN Department of Economic Development, Tourism and Environmental Affairs /DEDTEA, 2013). According to (KZN DEDTEA, 2013) the province seeks to foster a strong and robust regional economy and

optimise the benefits, such as the province's location, its maritime industry and its being a gateway into South Africa and Southern Africa.

Amongst the four coastal provinces in South Africa, KZN benefits the most in that it has two ports that are of international standard, one being the busiest and fourth-largest port in the Southern Hemisphere (KZN DEDTEA, 2013). These ports are both dry bulk and container terminals, making KZN the only province in South Africa with both facilities. KZN's maritime industry includes numerous sectors such as freight and logistics, ancillary maritime support services, tourism and leisure, marine energy, fishing, aquaculture and mariculture. According to KZN DEDTEA (2013), as a result, this has presented unique challenges to the province in creating an integrated method or approach which effectively involving and engaging all stakeholders as varied as the private and public sector role-players (KZN DEDTEA, 2013).

Oil and gas exploration off KZN's coastline has recently begun, stretching from the south coast at Port Shepstone to the north coast at Kosi Bay. The oil and gas boom has presented many opportunities to the local and regional/provincial maritime industry (KZN DEDTEA, 2013) as well as its surrounding communities. KZN, amongst coastal provinces in South Africa, is the only province that has been presented with such opportunities and has taken an active role in addressing its current maritime skills needs, to take advantage. This is in the form of its 2013 KZN Integrated Maritime Strategy which was initiated by the KwaZulu-Natal Department of Economic Development and Tourism, for the province as a strategic sectoral development tool.

South Africa has devised an integrated maritime strategy for addressing issues related to its maritime industry. Some focus of this strategy has been on maritime workforce development. In the province of KZN, under the draft KZN Integrated Maritime Strategy (2013), MET is recognised as forming a crucial part of the strategy, and consultation with key industry role players is seen as essential. The main concern that the strategy identifies as central for the province in reaching its maritime ambitions is skills development through a well-developed and coordinated MET system in the province (KZN-Integrated-Maritime-Strategy, 2013). This may only be achieved by well-informed strategies that address issues by pinpointing factors leading to such issues. This may be achieved by taking a holistic perspective.

3.6.2 MARITIME EDUCATION AND TRAINING IN KWAZULU-NATAL

There are numerous providers of MET in KZN. These are both private and public institutions, respectively. As with the rest of the coastal provinces that have deep-rooted maritime traditions, such as the Western Cape and Eastern Cape provinces, KZN's MET provision spreads from secondary-schooling level to higher-education level. At secondary level, the role of ME in advancing maritime awareness has been identified, as has the role of the state in this respect. However, issues such as limited resources remain important challenges of ME at secondary level in KZN; this is also the case in South Africa. In addition, the private provision of MET through in-house training may be as a result of mismatch in the supply of maritime skills. However, this is also greatly influenced by the industry (maritime businesses) capacity in terms of size and resources.

When assessing MET at a higher-education level, a number of obstacles also come to the fore. Higher-education institutions such as secondary schools have not been immune to the challenge of resources, bearing in mind that MET is very cost intensive. Financial and human resources are limited for MET development and sustainability in South Africa, as the literature suggests. However, the underlying factors and the interlinking of these factors remain unknown. The role and interactions of MET institutions with the State (government), through its respective institutions, such as EMC and DEDTEA, in transforming the socio-economic landscape of the province through the maritime industry development remains unknown.

3.6.3 MARITIME SKILLS DEVELOPMENT AND SUSTAINABILITY IN KWAZULU-NATAL

The provincial government, like that of national, considers that it has a very significant role to play in supporting the maritime industry. It must do so by accelerating education and training. Provincial government believes that this may be accomplished through working closely together with the maritime industry to make sure that the right type of skills and numbers of recruits are being developed. Strong linkages must be built between industry, educational institutions, and government (KZN Integrated Maritime Strategy, 2013: 94). It is therefore essential to have a joint vision for the maritime industry amongst all stakeholders. Thus, political support through buy-ins would produce the necessary pressure required to influence international shipping companies.

Also, both local and international operators need to make positions available in their organisations for South African MET graduates to acquire technical and or practical training. This will help to avoid producing a mismatch in the demand and supply of maritime labour, such as that which was identified by (Kujwa, 1996).

According to the KZN DEDTEA (2013), for the province's maritime industry to thrive, there is a need for coordination of strategies and policies, plans developed by all key stakeholders in the industry, so as to comprehend the current gaps, and what is needed is closer cooperation and collaboration amongst the stakeholders with alike areas of responsibility and mandates . This will allow for the concentration of both human capital and resources, consolidating funding, and coordinating the implementation of essential interventions directed at ensuring that the province's maritime industry prospers (KZN DEDTEA, 2013:10). To date, the KZN Department of Education has also committed to a plan of expanding ME within the province. The next section takes a closer look at state institutions and departments supporting maritime skills development through MET development in KZN.

3.6.4. KWAZULU-NATAL'S INTEGRATED MARITIME STRATEGY

The Draft Integrated Maritime Strategy for the province was developed jointly with various key stakeholders in the province. These stakeholders include, but are not limited to, the KwaZulu-Natal Planning Commission, eThekweni Maritime Cluster, eThekweni Municipality, South African Maritime Safety Authority (SAMSA), and the Department of Transport. The strategy is seen as that which will shape the future of the maritime industry and such sectors in the province. The strategy entails acknowledging and addressing the disconnection amongst activities taking place at a regional/provincial and local level, considering what is required by policy. It further aims at enabling relationships amongst all role-players so to generate a conducive or in other words a favourable environment in which the extensive KZN maritime industry may prosper.

As a result, the existing economic activities in the maritime industry and the potential future activities such as oil and gas exploration in the province give rise to four areas underpinning the development of the Integrated Maritime Strategy. One is the “need to produce labour force through skills development, training and education” (KZN DEDTEA, 2013:11). It then becomes

imperative to understand the concerns found in education and training, in order to ensure the development of the industry through skills development.

3.6.5 STATE (GOVERNMENT) INSTITUTIONS SUPPORTING MARITIME SKILLS DEVELOPMENT AND SUSTAINABILITY IN KZN

3.6.5.1 The Role of Provincial Government in the Maritime Industry in KZN

Provincial government in South Africa is responsible for social services like education, health and social development; as well as economic functions like agriculture and roads. This also includes provincial governance and administration which entails the legislature, provincial treasury, local government and human settlements (South African National Treasury, 2014:94). This is to support the development of healthy communities and lay the foundations for faster economic growth in the provinces.

In ensuring favourable socio-economic conditions in the province of KZN, regional planning and development and trade and industrial promotion are seen as vital. Through the President's Coordinating Council (PCC) which is a statutory body established in terms of the Intergovernmental Relations Framework Act of 2005. Such brings together the three spheres of Government on matters of common interest and national importance, thereby strengthening cooperative government. Among other things, the forum looks at, are mechanisms for monitoring job creation and implementation of the New Growth Path (NGP) in all spheres of Government and a shared experiences in creating an environment for job creation in the provinces.

A matter of common interest and national importance for KZN is the maritime industry dubbed the 'blue economy'. Through the Operation Phakisa initiative launched by national government to assist in implementing the National Development Plan (NDP), with the overall goal of boosting economic growth and creating jobs in South Africa. The maritime industry has become vital in such, not only at national but also regional (provincial) and local level in the country. As a result, one of the key and in the forefront government departments mandated to support maritime skills development and sustainability in KZN is the provincial Department of Economic Development, Tourism and Environmental Affairs (DEDTEA).

3.6.5.1 (i) KZN Department of Economic Development, Tourism and Environmental Affairs (DEDTEA)

The KZN DEDTEA in the province oversees socio-economic transformation in the province. In doing so, it spearheads policy and strategic initiatives concentrated on promoting sustainable development and growth in the various sectors of the economy in KZN. To realise its objectives, the DEDTEA cooperates with numerous stakeholders and social partners, including both the private sector and civil society.

Both national and provincial legislative, policy, and strategic frameworks, such as the National Development Plan (NDP) and Operation Phakisa, to name a few, guide the operations of the institution. Some of the national legislations critical to the operations of this portfolio are the Constitution of the Republic of South Africa, particularly Schedule 6, which stipulates the competences of the provincial government on matters of economic development, and the Public Finance Management Act (PFMA), among another sector-specific Acts (DEDTEA, 2017).

DEDTEA thus plays a key role in the development of core industry areas in KZN, of which the maritime industry is one. The department commitment to the sustainable development of the province's maritime industry is evident in having a maritime unit within the institution. According to the KZN DEDTEA (2013), in provincial maritime industry, local government and a number of local committees and clusters have a strong influence, thus could play a key role in ensuring maritime promotion, awareness and skills development in the province.

3.6.5.2 The Role of Local Government in the Maritime Industry in KZN

Local government in South Africa, is the sphere of government consists of municipalities; A, B and C in which executive and legislative authority is vested in its Municipal Council. It is government closest to the people. Municipalities have the right to govern, on their own initiatives, their local government affairs of their communities, subject to national and provincial legislation, as provided for in the Constitution of the Republic of South Africa. This means that national or provincial government may not compromise or impede a municipality's ability or right to exercise its powers or perform its functions (Constitution of the Republic of South Africa, 1996). According to the Constitution of the republic of South Africa (1996) the objects of local government are:

- (a). To provide democratic and accountable government for local communities;
- (b). To ensure the provision of services to communities in a sustainable manner;
- (c). To promote social and economic development;
- (d). To promote a safe and healthy environment; and
- (e). To encourage the involvement of communities and community organisations in the matters of local government.

Municipalities in the four, of the nine provinces in South Africa which are coastal benefit immensely from the maritime industry. However, some municipalities, including those in the coast, in the country struggle to effectively achieve some of their objectives, such as for example safe and healthy environments and economic development also referred to as Local Economic Development (LED).

Safety and security is key in the maritime industry and because KZN is a coastal province and benefits immensely from two ports, one being the busiest and fourth-largest port in the Southern Hemisphere (KZN DEDTEA, 2013). These ports do not only have an economic advantage to the local municipalities they fall within but also pose a safety and health risk. As a result, according to South Africa's Draft Maritime Policy (2017), South Africa's Department of Transport together with local government;

...shall investigate and implement enforcement training for municipal law enforcement officers to expand their powers to enforce the provisions of the Merchant Shipping Act and the regulations pertaining to small vessels.

On the other hand because effective LED remains a key challenge for municipalities in South Africa which has been due to, but not limited to the lack of or slow LED. Challenges such as high levels of unemployment, especially in previously disadvantaged local communities such as rural and township areas remains one of the key stumbling blocks in achieving economic development at local government level. To address this, in provinces such as KZN, the maritime industry has been identified as a key component that can be used. This stems from national and provincial government policies such as Operation Phakisa and the NDP which aim at socio-economic transformation.

Municipalities such as eThekweni Municipality according to Coller, Maasdorp and Mavundla (2007), are highly dependent on the maritime industry and have the ability to compete internationally for their economic growth and well-being. Thus, the industry ought to be key in the local municipality's economic agendas, especially those along the coast in KZN, although municipalities do not have any direct control over many elements of the maritime industry in the province because Transnet, owns and operates the ports (South Africa's Draft Maritime Policy, 2017).

Irrespective of the limited municipal role relating directly to ports, local government is however a key stakeholder within the broader maritime industry in KZN. This is as a result of the municipalities are responsible for the provision of services, such as spatial and development planning, the maintenance and development of new roads, as well as making sure that the business environment is conducive to future growth. Hence municipalities are key stakeholders and in KZN's maritime economic centres such as Richards Bay and Durban, the local government is included within engagements between maritime stakeholders and within port-related committees (KZN DEDTEA, 2013).

Coller, Maasdorp and Mavundla (2007:54), identified that the "strategic issues facing the local maritime industry and the importance of the industry to both the local and the national economies demand that the industry move positively towards operating as a unified force". They were of the view that because the local maritime industry in Durban/eThekweni was substantial in size already, what was needed was a process which would ensure a state of greater unification and collective decision making as a result, felt that the creation of a Maritime Institute would be the required. Such an institution was seen as one which would have assisted at local government level in the further development, the promotion and sustainability of the maritime industry. To date the eThekweni Maritime Cluster (EMC) is such an institution and is the only government institute at local government level that is involved in the promotion, development and sustainability of maritime skills and the broader maritime industry.

Thus, the role of South Africa's local government in the maritime industry in their areas of influence, together with their respective port communities should be to promote the concept of Cleaner, Greener and Safer (CGS) ports environment while local institutions such as for example

EMC promotes the maritime industry because it has the potential to become a major industry in South Africa that generates large-scale employment and foreign exchange (South Africa's Department of Transport, 2017).

Coastal local government in provinces such KZN should thus try and play a key role in the maritime industry, this can be achieved, by means of aligning their policies such as the Intergrated Development Plans (IDPs) and LED strategies to national governments maritime initiative, Operation Phakisa. If this alignment is achieved, where all the three spheres of government from national, provincial to local government work in sync economic transformation can be a reality through Operation Phakisa initiative and the NDP.

3.6.5.2 (i) eThekwini Maritime Cluster

The eThekwini Maritime Cluster (EMC) is a government Section 21 company, named after KZN's municipality that is home to the provinces most vibrant maritime industry, was created to improve performance and competitiveness of the maritime industry in the province of KZN. As a non-profit institution, it is mandated to promote and support the province's maritime industry. It advocates and champions for the maritime industry through bridging the gap between industrial policy from government and the private sector, thereby unleashing the economic growth in the maritime industry.

The eThekwini Maritime Cluster which focuses on maritime skills development, enterprise development, ship building and repair, knowledge management, and industry promotion, has been financially supported by the province. In promoting and marketing areas such as Durban as a thriving port city, its work includes hosting workshops, conferences, and events to provide networking opportunities and to facilitate knowledge and port information-sharing, promoting maritime career awareness. Encouraging youngsters to consider a career within the sector and providing the necessary skills training for those who have already graduated, is vital for the industry. A very real shortage of critical skills and managerial knowledge in the near future is looming large on the horizon (eThekwini Municipality, 2011). The way to overcome this, according to eThekwini Municipality (2011), is through developing the City of Durban as a Centre of Excellence in MET. To achieve this, the eMC:

- Improves education and training for the maritime industry to enable talented people to enter the industry;
- Assists unemployed graduates to obtain experience in and of the maritime industry by coaching, mentoring, empowering, and training graduates during the graduate placement process; and
- Creates awareness among learners of career opportunities in the maritime sector and its requirements.

The role played coastal local government such as eThekweni Municipality and uMhlathuze Municipality through the EMC in KZN's maritime industry is similar to that of China's coastal local government in Guangdong province. Which sees the maritime industry as a new axis for their economic development informed by local circumstances and national government policy shift away from an export-led growth model (Yoshikawa, 2016). The EMC in KZN, as a maritime institute at local government level can be seen as that which aligns local government objectives such as economic development with national policies to address both local and national development imperatives. Operation Phakisa's role in addressing challenges such as slow economic growth and high unemployment is a national strategy that has been made possible and felt at local and provincial government level through institutions such as EMC and DEDTEA in KZN. Coastal provinces and local governments should see the Operation Phakisa initiative as an important opportunity for their development.

Summary

In summary, the literature in this chapter has identified that South Africa's maritime industry is broad, developing and the lifeblood of the country's economy. However, central to this is its issues pertaining to maritime skills gaps. The core value of MET institutions is to provide the supply of manpower per short-period courses through to post-graduate studies to the shipping and shipping-related industries (Demirel and Mehta, 2009). As a result, MET has taken centre stage, in addressing issues relating to the development of KZN's and the broader South African maritime industry.

The literature indicates that, on a secondary level and further education training (FET) level, the lack of resources, such as human capital – teaching staff/teachers, financial lacks in the form of funding maritime courses, and physical lacks, which include facilities, are principal stumbling blocks. All these obstacles pose a serious threat to South Africa's MET system.

At State (government) level, Kujawa (1996) acknowledged distortions, and is of the view that distortions caused by past policies may be overcome by adequately coordinated MET development which will result in the fulfilment of the needs of the employers and the maritime manpower needs of South Africa. The lack of coordinated MET in South Africa has weakened and continues to undermine the development of the country's MET system. Future-oriented strategies ought firstly to address past injustices and problems in MET; however, not at a cost to current and future opportunities. Government has placed too much emphasis on racial transformation and gender equity within the industry and the fulfilment of domestic needs. This has proved detrimental because:

- The people who are meant to be the beneficiaries of racial transformation and equity in the sector are either not taking advantage of such opportunities or are not even aware of the sector;
- The country has tried to enter the global economic community built on free international trade by looking after its own domestic needs. This has been an error in the understanding of globalisation;
- The country did not build on existing institutions and capitalise on existing key role players such as Safmarine; and
- Domestic maritime manpower consumption has not been well estimated (Ruggunan, 2010).

These factors have all contributed to the current state of South Africa's maritime workforce (Ruggunan, 2010). Nevertheless, the quandaries confounding MET are born of factors that are economic, social, technological and political in the environment (Alexandrov, 1999). The literature focusing on the subject matter suggests that investigating such complex difficulties which MET is experiencing at public higher education institutions through a holistic manner would prove fruitful.

3.7 CONCLUSION

South Africa's maritime industry has some characteristics of Western-developed maritime industries; it is also very broad and difficult to define. The country's industry, like many around the world, has been affected by globalisation, the shift of global labour markets, technological advancements, and regulatory measures on safety and security, which have all collectively affected MET systems. In this regard MET institutions as service providers to such an industry have been under pressure to produce labour for industry requiring very skilled labour. This skilled labour not only has to address the industry skills gap in South Africa but also to meet international standards of MET, which has been problematic for many METs in the developing world.

In addition, the role of the state in shaping the maritime labour markets, and the role of industry in MET have also put pressure on MET institutions. Finding a balance in supply and demand in the maritime labour markets, and the increasing maritime safety and security globally continues to place MET at the centre. Numerous factors, either under the control and influence or not of MET institutions, such as partnerships for cooperation and coordination with key stakeholders for the provision of MET, will lead either to success or failure.

This study sought to explore the challenges facing MET in public education institutions in KZN. In doing so, a holistic lens was best to effectively achieve such an undertaking. The researcher is of the view that, because the study endeavours to present a systems-thinking lens on the issue at hand, it is imperative that the concept of '*Systems Thinking*' firstly be looked at prior to presenting the methodology. There is a growing belief that Systems Thinking is an answer to the ever-increasing complexity of the environment in which we function and live (Maani and Maharaj, 2001). The next chapter scrutinises critical factors that influence the provision of MET.

CHAPTER FOUR

FACTORS INFLUENCING MARITIME EDUCATION AND TRAINING GLOBALLY

4.1 INTRODUCTION

The maritime industry is global. The shipping industry and related sectors within it, are possibly the most international of the world's boundless industries (IMO, 2016), but “also one of the most dangerous” (Ziarati, Demire and Albayrak, 2010: 9), resulting in a negative portrayal of the industry. Nonetheless, the industry affords a reliable, low-cost way of moving goods globally, making it for the most part an efficient, cost-effective means of international carriage for the majority of goods, thus enabling commerce and helping to create economic prosperity for countries.

Continued technological advancements in maritime industry and related sectors, not only ensure cost-effective, efficient means of moving goods, but also assure safety and security at ports and at sea. The regulatory framework created and asserted by IMO ensures that the world has a secure, safe, and efficient international maritime industry, upon which it depends. These regulatory interventions not only affect the maritime industry as a whole, they include the institutions that provide the skills and know-how to those who man the industry, which are MET institutions. A number of factors were identified in the previous section, affecting the provision of MET in various regions around the world. As a result, this section now aims to examine more closely those factors that influence MET globally.

4.2 INDUSTRY

The maritime industry in the 21st century has become concerned about MET because it plays a vital role in the success of the industry (Basak, 2017). In the 90s Kujawa (1996) expressed that the world was experiencing a shortage of qualified maritime personnel owing to the lack of funds for and changing government policies towards education training and development (ETD), as well as fluctuations in the shipping industry. Pearson (1993: 2) suggested that the demand for qualified seafarers worldwide would rise dramatically. At the same time, in the late 90s, the world witnessed

widespread employment of East European seafarers, and in the later decades, Far-Eastern/Asian seafarers. Even so, despite actions stemming from the post 2008 economic recession experienced, which led to the scrapping of older ships, and the cancellation of new building orders, the international shortage of seafarers continues to have a negative effect on the industry (Cross, 2010). Many other factors had led to this, one being the cost of labour according to Sampson (2004), who points out that:

“...as soon as a ‘new’ source of cheap labour is identified by fleet personnel managers, in the sector, there is a degree of flight from existing labour supply countries to newer ones, which have to start from scratch in terms of building up the very expensive training infrastructure required for adequate seafarer training. Given that the ‘industry’ response to poor levels of education and training has primarily taken the form of international regulation” (Sampson, 2004: 247-8).

The development and rise of human-factor-related regulations and standards of the IMO has time and again been the result of responses to and addressing maritime accidents (Schröder-Hinrichs, Hollnagel, Hofmann and Katari, 2013:243). According to Mori (2014), the best approach to addressing safety at sea and improving it has been by improving and developing global regulations that are adhered to by all countries involved in the maritime industry, maritime accidents having a major impact on the environment and industries. IMO measures cover all aspects of international shipping. This includes ship design, construction, equipment, manning, operation, and disposal, ensuring that this vital sector remains safe, environmentally sound, energy efficient, and secure. This makes shipping and other related sectors within the maritime industry an essential component of any programme for future sustainable global economic growth. Through the IMO, the organisation’s member states, civil society, and the shipping industry, work together to ensure a continued and strengthened contribution towards a green economy and to grow in a sustainable manner. The promotion of sustainable shipping and sustainable maritime development is one of the major priorities of IMO in the coming years.

According to the Mackinnon Partnership (2008), the future shifts in the maritime industry may be influenced by additional regulations in this area. This would consist of being able to address concerns about the environment, health, security, and pollution. Concerning safety within the industry, Berg (2013: 344) sums up that, “intensification of sea trade for last ten years causes the increasing of potential risk to the ship safety”. What this means is that MET provision must reflect

these extra managerial needs in the global maritime industry. The ever-changing world includes the maritime world. We have new, continuous, and increasing standards in safety and health; the environment, pollution and waste management; security, piracy; and also terrorism. However, there is a concern about the shrinking traditional experienced workforce while legislative requirements are increasing. This has resulted in private business allocating funds for training, and pushing for innovative training methods such as E-learning. This would remedy the situation of requiring experienced maritime personnel to abandon employers while studying (the Mackinnon partnership, 2008).

Energy efficiency, new technology and innovation, MET, maritime security, maritime traffic management, and the development of the maritime infrastructure: the development and implementation, through IMO, of global standards covering these and other issues will underpin IMO's commitment to provide the institutional framework necessary for a green and sustainable global maritime transportation system. Thus, advancement of borderless maritime trade has globalised the maritime industry. This has given rise to maritime accidents and incidents which at the end of the day institutions that serve the maritime industry such as MET institutions have had to pay attention to. In the global maritime industry, it is generally accepted that there are numerous factors contributing to the state of MET, globally.

4.3 INCIDENTS

The professionalism and competence of seafarers ensures safety of life at sea and the maritime environment. More than 80 percent of maritime incidents and accidents have been caused by Human Error (HE) (IMO, 2005; Ziarati, 2006; Ziarati, 2007). This is asserted by Gamil (2008:1) that, "several maritime disasters analyses have drawn attention to human errors as the main cause of maritime accidents". According to Berg (2013: 344), citing studies by Rothblum (2000), HE causes 84 to 88 percent of tanker accidents, 79 percent of towing vessel groundings, 89 to 96 percent of collisions, and 75 percent of explosions and fires. Berg (2013) alleges that these estimations are still valid. Gamil (2008) believes that such an analysis implies that people ashore, including MET institutions, share the responsibility: not only the crew and the Master were responsible. This is asserted by Alop (2004), who maintains that:

“MET institutions are directly responsible for the proper competence of Masters and duty officers and proper MET might constitute one of the most important risk reduction measures” (Alop, 2004:5).

To identify these incidents and accidents mentioned previously and their causes, it is imperative to consult some important literature, although not recent. (2004). Torkel (2004), identified that over 50 percent of shipping accidents around the globe were caused by 25 percent of the world fleet. The study further notes that just 7 percent of all accidents involved the top 25 percent of the safest ships. Another, by the University of Technology and Science/ NTNU (2005) in Norway, suggests that, by raising the quality of the world shipping vessels to a level equal with vessels in the safest 25 percent group, a 72 percent decline in shipping accidents may result. The study found that the most usual cause of accidents was HE, rather than technical issues (NTNU, 2005). In addition, it identified a culture of poor safety amongst smaller vessel owners who did not have the means in the form of resources regularly to apply the ILO requirements or the STCW. In this regard, Berg (2013) offers that:

“The total safety over ships operation cannot be achieved, but it is possible to obtain a high degree on it, the influence of human factors over maritime accidents is very difficult because on the one hand we find that an accident involves the interaction of individuals, equipment and environment, as well as unforeseen factors and on the other hand, human factors comprise operative human errors derived from personnel own qualifications, or from their physical, mental and personal conditions and situational errors derived from work environment design, management problems, or human-machine interface, amongst others hence being aware that risk is an inherent factor of maritime activity which cannot be totally removed and that errors are part of human experience, thus it is expected that elements such as good management policies, effective training and having suitable qualifications and experience, can reduce the occurrence of human errors” (Berg, 2013:345).

Berg (2013:345) stresses that the application of the International Safety Management Code (ISM) has performed a vital part in tackling this problem, through the education and training of the crew. Nonetheless, to some degree, fatalities may be averted by excluding, “other indirect causes including hardware, such as equipment systems”. While Manuel (2005) highlighted that the traditional maritime industry placed emphasis on gaining knowledge and skills, his study on

maritime education examined the nature of safety culture as related to attitudes and behaviour. Manuel (2005) comments that the attitude of human resources at all levels is worthy of consideration as a causal factor in accidents. He states that:

“These attitudes may be evidenced as behavioural pattern of wilful violations, complacency, destructive obedience and many other that cause or aggravate the contexts within which accidents thrive” (Manul, 2005: 69).

As a result, Manual (2005) proposes that insights attained from accidents assist MET to develop systems that contribute to the development of the correct attitudes and values, the affective domain. On the one hand, Chauvin *et al.* (2013) indicate that, for the most part, collisions at sea and in harbours are owing to decision errors: they highlight issues such as poor visibility (environmental factors) and misuse of instruments (MET factors), loss of situation awareness or deficit of attention (conditions of operators), deficits in inter-ship communications or Bridge Resource Management (personnel factors). Hence, both technology and MET in the maritime industry play a vital role in its development and sustainability.

On the other hand, Mori (2014) identifies that some maritime incidents are caused by lack of leadership, and the need to include such within MET. Mori (2014:23 - 29) cites a number of maritime disasters caused by lack of leadership, such as the Costa Concordia on 13 January 2012; the Dole America in November 1999; the Bow Mariner in February 2004; and the Green Lily in November 1997. This reflects the view that an important feature of shore-based officer training is leadership skills; this should form part of the STCW Convention for the future (Jeffery, 2007). Mori (2014) articulates that:

“Training for leadership skills has now been added to the requirements of STCW Convention 1978, as amended. The relevant amendments have introduced competence requirements for leadership and managerial skills at both the operational and management levels” (Mori, 2014:35).

It is suggested that success, safety, and quality are all interlinked; hence, leadership training may be understood as an investment of great value. Good leadership, therefore, is seen as decreasing risk, resulting in decreasing claims and adverse publicity from accidents (Wake, 2004). The International Maritime Organization (IMO), in this regard, states that:

“Participation in the course will have raised awareness of the elements of leadership and teamwork, it will be through exercising leadership, observing others, participating in and building teamwork in the working environment, learning from the more competent and experienced people on-board, that competence in learning will develop” (IMO, 2014: 24).

This promotes the idea that leadership skills are perhaps difficult to gain via short-term training programmes, according to Mori (2014). Mori (2014) pronounces that training for such skills is best undertaken from a long-term view. This would include a constant learning process through real-life on-shore or on-board working experience. Although MET institutions have established numerous models of leadership training, these current leadership models seem to have ample room for improvement. Mori (2014) also established that numerous MET experts believe that the existing leadership training approaches are insufficient for their envisioned purposes. Nonetheless, the history of safety in the maritime industry has been characterised by accidents, which are always followed regulatory responses (Schröder-Hinrichs, Baldauf, Hofmann and Kataria, 2013).

4.4 SAFETY AND SECURITY

According to Ziarati, Demire and Albayrak (2010), shipping is perhaps the most dangerous industry. Many maritime disasters analyses have drawn attention to human error as the focal cause of maritime accidents (Gamil, 2008). As mentioned, the history of maritime safety is characterised by maritime accidents, followed by regulatory responses Schröder-Hinrichs *et al.* (2013:243). It has always been recognised that the best way of improving safety at sea is by developing international regulations that are followed by all shipping nations. From the mid-19th century onwards a number of such treaties were adopted (IMO, 2016). In 1912 when the Titanic sank, this marked noticeable the start of a new era of international safety regulations in the maritime industry and ended the era of individual national governance of maritime safety. As a result, the Safety at Sea Convention of 1914 was the first international treaty related to safety at sea (International Conference on Safety at Sea, 1914). Nonetheless it took a while before, “the IMO was given the mandate to safeguard the further development of maritime safety and marine environmental protection standards on a global level” (Schröder-Hinrichs *et al.*, 2013:224).

To promote maritime safety more effectively, a number of States proposed that a international body that was permanent be established. Unfortunately it was not until the founding of the United Nations (UN) that this was realised (IMO, 2016). An international conference in Geneva in 1948, adopted a convention formally establishing IMO (previously the Inter-Governmental Maritime Consultative Organization/IMCO until 1982. In 1958 the IMO Convention entered into force and in 1959 the new organisation met for the first time. To date the aim of the IMO, as summarized by Article 1(a) of the Convention, as to:

“To provide machinery for cooperation among Governments in the field of governmental regulation and practices relating to technical matters of all kinds affecting shipping engaged in international trade; to encourage and facilitate the general adoption of the highest practicable standards in matters concerning maritime safety, efficiency of navigation and prevention and control of marine pollution from ships” (IMO, 2016).

The adopt a new version of the International Convention for the Safety of Life at Sea (SOLAS) was the first task of the IMO. Of all the treaties, this was the most important addressing maritime safety and was achieved in 1960. The IMO, during which the system of measuring the tonnage of ships was being revised, then focused its attention to matters such as the facilitation of international maritime traffic, the carriage of dangerous goods and load lines. However, while safety was and remains the organisations key responsibility, new problems of pollution and piracy, inter alia, started to emerge. What was of particular and great concern was the growth in the amount of oil being transported by sea and in the size of tankers transporting it.

In 1967, the Torrey Canyon disaster of in which 120,000 tonnes of oil was spilled, revealed the scale of the problem. As a specialised agency of the United Nations, IMO is the global standard-setting authority for the safety, security, and environmental performance of international shipping. Its main role is to create a regulatory framework for the shipping industry that is fair and effective, universally adopted, and universally implemented.

In 1978, the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) was signed in London, UK, and came into effect in 1984. In 1995, the STCW was then amended, and again in the year 2010. The STCW sets qualification standards for maritime personnel on sea-going merchant ships. The 1978 STCW established basic training

requirements for seafarers at an international level. This gave birth to the current internationalization of MET.

Prior to the STCW 1978, standards of training and certification were established by individual governments, and in most cases without reference to practices in other countries, despite the international nature of shipping. The STCW has greatly improved standards for seafarers and, for the first time, gave the IMO, self powers to be a ‘watchdog’ that checks government action, where it requires parties/its members to submit information detailing their compliance with the Convention. A major revision of the STCW Convention and Code in 2010 was completed with the adoption of the ‘Manila amendments to the STCW Convention and Code’. Ziarati, Demire and Albayrak (2010), point out that:

“The provisions concerning the need for governments to submit quality standard reports to the IMO, concerning their national training and certification systems, were only required to be met as recently as 2000” (Ziarati, Demire and Albayrak, 2010:8).

The 2000s brought an era of maritime security, with an entry coming into force in July 2004. This was a new and comprehensive security system for international shipping, including the International Ship and Port Facility Security (ISPS) Code, made mandatory under amendments to SOLAS adopted in 2002. In 2005, the IMO adopted amendments to the Convention for the Suppression of Unlawful Acts (SUA) Against the Safety of Maritime Navigation, 1988, and its related Protocol (the 2005 SUA Protocols). The Protocol has, among other things, introduced, “the right of a State Party to board a ship flying the flag of another State Party, when the requesting party has reasonable grounds to suspect that ship, or a person on board the ship is, has been, or is about to be involved in, the commission of an offence under the Convention” (IMO, 2016). As IMO instruments have entered into force and been implemented, developments in technology and/or lessons learned from accidents have led to changes and amendments being adopted (IMO, 2016).

In 2004, a study commissioned by the IMO mainly concentrating on the causes of accidents without a doubt indicated that standards had not been applied correctly. When the human factor (HF) issues were looked upon and studied meticulously, it was identified that were omissions in

the education and training in maritime programmes and courses received by the seafarers involved in accidents (Brady, 2008; Ziarati and Ziarati, 2010). The quality of MET is pivotal in the growth, safety, and security of the global maritime industry. Despite factors such as technological advances in the industry and MET institutional resources, MET has tended to compromise quality, which leads to accidents and other human error in the maritime industry. The maritime industry has also considered the Human Factor (HF), “as a main contributing factor to accidents, in common with other industrial sectors” (Schröder-Hinrichs *et al.*, 2013:224). However, Berg (2013:344) affirms that, “regulations and systems have not achieved the desired effects in averting maritime accidents which are a result of human errors and account for 80 percent of those occurring worldwide.”

Thus, according to (Gamil, 2008:2), “the maritime industry needs to upgrade their human resources to properly implement international legislation and keep pace with advanced technologies on board vessels as well as in their design and operation.” According to Baylon and Santos (2011:34), “it is pivotal that seafarers be well-educated and trained, manage risks, be able to follow orders, solve problems, and must be emotionally happy and psychologically stable to ensure secure, safe, clean and efficient operations for safety of life at sea”. The role of the MET is central to boosting sea safety (Davy and Noh, 2011) and security.

4.5 TECHNOLOGY

The effects of technology in the maritime industry are well documented, as in the impact of new technology used on board MET-supported ships (Mazzarino and Maggi, 2000). The maritime industry, with many other industries, has not been invulnerable to the influence of technological advancements resulting in new technology. Such advances have had an overwhelming effect on reforms in the shipping industry, including employment shifts and patterns as well as MET systems (Bonnin and Woods, 2002).

In 1991, the Joint Maritime Commission, according to ILO (2001), cited in Bonnin and Woods (2002:40), acknowledged that the increase of new technologies in the maritime industry has had a major influence on plummeting employment at sea. In relation to technology, Knapper and Cropley (1991) had identified that those individuals employed in industries characterised by fast-

changing technology and advancements, such as the maritime industry in this case, to remain relevant and employable in the future, will need to invest in funding their lifelong learning. A greater role is played by technology in this regard (Bloor *et al.*, 2000 and Grey, 2003).

In the context of achieving safety in the maritime industry, Mazzarino and Maggi (2000) observed that the development of new technologies stressed the need for quality standards to be applied within MET institutions. Such has a ripple effect on the industry. Couper (2000) argues that the use of technology has reduced the size of a ship's crew, promoting a concomitant low morale among seafarers. To date this, according to Caesar, Cahoon and Fei (2014) has undermined strategies directed at improving retention. This might lead to a decision to leave work on-board a vessel, pursuing landside opportunities. Thus the provision of MET is systematic, involving a number of factors influencing one another's outcomes. For example, although technological advancements have resulted in reduced crew sizes, it has also increased the cost of MET provision. However, the human element is always seen as the most vital of these factors.

Seafarers and port operators must be trained on how to manage and operate a ship equipped with the latest innovations of automation. New technologies change the perception of education and training, the way people think, how people communicate, and the students' demands (Gamil, 2008:10). Information technology (IT) is a term commonly used to cover the range of technologies used for the transfer of information, in particular per computers, digital electronics, and telecommunications (Crystal, 1990). As technology improves on ships and for port operation, so too must the MET rise to the challenge in its institutions. Cweilewica and Lisoski (2012), in this regard, stress the necessity of reducing the cost of MET brought about by technology. These researchers see this as necessary for maintaining a sizeable number of MET students in Polish MET institutions.

Technology has been identified as important for major development within the maritime industry, specifically in the shipping-industry sector. A hindrance to maritime countries is either (i) not staying abreast of technology, introducing technological advancements to the country's maritime activities, or (ii) not upskilling maritime sector professionals to use new technology within the sector, creating skills shortages (United Nations Conference on Trade and

Development/UNCTAD, 2009). Technology has played a vital role in the development of the maritime industry over the past century, yet has not been felt more in the shipping and related industry than over the past three decades.

The rapid development in the field of maritime technology has thus had a strong influence on the maritime industry. As technological developments continue, Robinson (2007) surmises that this has created an enabling environment for innovation in global shipping. Such developments, however, have demanded capitalising on potential. This will by most standards, require new ways of thinking, working, and a new framework from which to view the world. Technology has not been a key factor in maritime accidents; however, its use and application has played and will continue to play a crucial role in the provision of MET systems.

Development cannot be achieved in the maritime industry by reflecting only on current procedures, such as internal processes. Rather, there ought to be a wider outlook in examining best ways of taking action, so as to determine the needed standard in applying technology and the role MET institutions can play in this regard. Thus, the role of globalisation, maritime safety and security issues, and technological advances, according to Basan, Hanzu and Arsenie (2007), necessitates the presence of maritime-related technology such as IT, *inter alia*, in the respective MET programmes. From the 90s, ships and port design have rapidly changed.

Between 1995 and the present date, the maritime industry has undergone a swift evolution, notably in the design of vessels and the equipment used on board, specifically the propulsion systems and navigation. One incredibly vital advance has been automation in operating a ship, for example, the latest vessels, especially fuel and container carrying ships, are gradually becoming automated. This has resulted in two issues, the first being the inadequacy of existing human resources on ship influenced by seafarers' education and training. If any aspects of automation cease to work due to failure, the crew, in most cases, are not trained to use substitute systems, and thus counter problems effectively (IMO Maritime Safety Committee/MSC 82, 2006; Ziarati, 2006 cited in Ziarati, Demire and Albayrak, 2010:17). The second issue, as pronounced by the IMO MSC, is specifically that:

“The human operators seldom understand all the characteristics of automatic systems and these systems' weaknesses and limitations which have now been found to be the main causes of accidents.

These reports concluded that there is a need to improve the content of all maritime training and that the knowledge, skills and understanding of automation should be included in the basic training” (Ziarati, Demire and Albayrak, 2010:17).

Technological advances, such as the introduction of IT into navigational equipment, and ship-operation-supporting systems such as AIS (Automated Identification System), ECDIS (Electronic Chart Display Information System), IBS (Integrated Bridge System) or the introduction of an e-Navigation system, require inclusion of maritime-related IT technologies in respective MET programmes (Basan, Hanzu and Arsenie, 2007). An example of this is the new requirements for Chinese MET, which considers new technologies on board ships, the rate of growth of the shipping industry, tougher standards on maritime pollution prevention and safety, further functions of the human factor in technical operations, and flaws identified in the original conventions (Shickeng, 2009). Shickeng (2009: 2-3) essentially notes this trend as a “specialization, higher level maritime operations and wider coverage of knowledge and technologies of competency”.

On the one hand, these advanced technologies Shickeng (2009: 3) identifies include cutting-edge navigation tools, specialization and, “professionalization of transport technologies and pollution prevention technologies that are to be incorporated into seafarers competency standards.” On the other hand, Fazal (2010:32) maintains that, “as more information technologies are infused into the maritime environment it is becoming vital for today’s mariners be information competent”. Technology advancements in industry and new STCW requirements call for constant MET curriculum redesign. Not only must MET institutions restructure their curriculum design; they must also have the necessary resources for acquiring new training technologies to complement changes in curriculum. An example of this is new technologies such as the “Fast Time Simulation (FTS) which is a game engine room software which has a great potential for teaching and learning in the maritime training environment and for use on board of ships for development of prediction tools for maneuvering of ships and for training of safety and security elements” (Gluch, Kirchhoff and Felsenstein, 2010:20). Gluch, Kirchhoff and Felsenstein (2010), however, have no doubt that such advances will increase the number of hours devoted to education and training, not only for the theoretical education in the classroom, but also for the extensive use of simulators for familiarization and skills-enhancement training.

Sea training on board a ship plays a key role in the education and training of cadets; and such is mandatory for all seafarers of different types and ranks. However, Holland (1997) commented that these on-board training opportunities on vessels offered by companies in shipping had been drastically decreased. This is owing to commercial pressure in recent years and increasing levels of automation, making the nature and the quality of training on board significantly change for the worse.

The new methodology and technology in MET have, for example, a significant influence on the Chinese MET system and institutions. One of the key influencing factors is the wide utilization of multi-media for MET instruction, including distance education (DE) via Internet and email. Thus, computer-based training (CBT) and the use of simulators also play a prominent role in MET. The use of a radar and ARPA simulator for training was made mandatory by STCW95 (Chen, 2000:30). The new maritime technology impacts on the safe operation and the more efficient maintenance of ships. IT provides data to support decision-making on ships and ports around the world. Thus, the full advantage of the latest IT developments in the shipping sector lies in the fact that the use of IT can increase the efficiency of shipping operations. IT can concomitantly reduce the time spent on labour-intensive work, therefore ensuring the safer navigation and operation of ships. However, such technological advancements also present problems for MET institutions around the world because of the cost implications attached to technology. No training may be run effectively without the presence of all the necessary technical means of education: unfortunately, the training of seafarers is one of the most expensive (Alexandrov, 1999:4). However, Horck (2004) expresses that:

“...the industry should be focusing more on the human element rather than spending lot of money on bridge layout and increased automation” (Horck, 2004: 16).

Horck (2004) believes that the human contribution to the maritime industry plays a crucial role not only on board ships, but also in all shipping activities, directly influencing safety and security. Thus, MET institutions must therefore become effective agents for the proper handling of advanced technologies (Lobrigo and Pawlik: 2014). Stan and Buzbuchi (2009: 353) aver that:

“...the role and function of the new simulators as part of the teaching process form the technological aspect of MET and quality cannot be obtained without new teaching methods and training procedures, where IT and simulators occupy an outstanding place”.

However, for example in the UK, the introduction of new technology, both on board ships and vessels and in port operations, has created skills gaps in IT (Beer and Meethan, 2007). The unavailability of high-quality training simulators within Scotland threatens its MET systems. However, the issues of the role of technology on MET go beyond software upgrades, relating also to increasing hardware space. MET institutions in Scotland and around the world must upgrade training simulators to be aligned with technological advances such as those brought about by Global Maritime Distress and Safety Systems (the Mackinnon Partnership, 2008). The intense use of simulators is strongly advised by STCW. Simulators entail having well-designed scenarios, very experienced instructors, and adequate equipment. However, not all MET institutions have these sophisticated bridge and engine-room simulators. Those that have, sometimes have limited access to them (Ziarati *et al.*, 2012). Gamil (2008) asserts that the advancement of technology in the maritime industry results in the need for upgrading MET instructors' skills and knowledge; thus MET teachers are imperative to the development of education and training. Gamil (2008) further states that, however:

“Attracting, upgrading and the retention of competent MET instructors will raise the skills of future human resources; this is a challenge in the present circumstances” (Gamil, 2008: 2).

Gamil (2008) also mentioned dissatisfaction by stakeholders with the current competency level of MET instructors (Gamil, 2008). Higher education institutions providing MET worldwide are responding to these requirements. In this regard, Zairati *et al.* (2012) alleges that:

“Europe needs to fully embrace by what is meant to create a MET system that is fit for purpose. Not all seafaring officers need to be university graduates and at the other end of spectrum we need seafarers with higher qualification beyond university diploma and degrees” (Ziarati *et al.*, 2012:5).

Challenges to MET providers and those who use their services is not limited to regulations, technology, and the shortage of seafarers in Europe, but also to the quality of MET (Ziarati *et al.*, 2012). Quality is related to trends in the maritime industry, according to Fan Cun and Wei (2002). In their view, for the maritime industry to meet the trends of larger and faster ships, there must be

an increase in technology such as automation and the ever-increasing emphasis on professionalism and management in the quality of operators of ship and ports. Those within the industry must be equipped with the best skills in operating new ship-based technology, safety management systems, and computers. They must possess an inherent will for self-development to be equal to the dynamism of the technological, economic and regulatory aspects of the industry (Fan Cun and Wei, 2002: 73).

Therefore, in the maritime industry, ships and equipment are merely as good as the individuals using them. As a result, the focus has also been on the standards of MET of the individuals. Since the 1980s the IMO has progressively addressed in its work the role played by people partaking in shipping (Gamil, 2008). Continuous amendments to the International Convention on STCW demand constant improvement of MET. The rapid advances of high-tech new ships and the extensive application of IT in shipping operations require the operators, equally on board and at MET institutions, to be appropriately well trained in computing methods. However, technology in teaching and learning requires high cost and enormous investment. Be this as it may, technology facilitates the ease of transferring knowledge and sustainable improvement in MET (Khan, 2014). Such ease of transferring knowledge may be achieved, for example, per the introduction of E-learning by the STCW to improve MET and its quality. This is asserted by (Ziarati and Ziarati, 2012), who believes that, for distance access to material that can improve safety at sea, technological platforms in MET such as E-learning could be developed and make learning more user-centred. To date, E-learning platforms are being increasingly adopted by MET institutions as well as shipping companies, globally, to “provide courses and programmes to learners outside their local boundaries” (Fisher and Muirhead, 2005: 154).

The new technology allows and encourages MET institutions to use virtual and real simulation systems which the STCW strongly advises should be used to capacity. However, such use compels MET institutions to have sufficient equipment, very experienced teachers who are instructors, and well-designed training scenarios (Ziarati and Ziarati, 2012). These researchers assert that “it is recognised that not all MET institutions have sophisticated bridge and Engine-room simulators and those that do have some have limited access to them” (Ziarati and Ziarati, 2012:12).

State-of-the-art technology, such as laboratory and simulation equipment, require a high capital

input (Muirhead, 2004:141), and this is beyond the reach of many countries in Africa. Thus, there is an uneven distribution of resources such as technology, for example, amongst MET institutions around the world, especially in developed and developing countries. This poses great challenges for the MET institutions to adhere to the STCW. This situation also negatively affects the process of domesticating the local maritime industry in an effective and efficient manner.

4.6 QUALITY

The shipping industry requires very high analytical skills, advanced qualifications, and a balance between physical and mental abilities and competencies. Human resources are critical to the efficiency of this industry. The industry has the heavy responsibility of ensuring the safety of life and property, and the protection of the environment, combining these factors with an aptitude for shipping and other activities associated with shipping (Gamil, 2008). For global quality purposes MET “institutions offer courses to ‘cadets’ that provide them with a basic education designed to enable them to qualify, subject to successful examination, for the certificates of competency required by junior officers in conjunction with the stipulations of STCW regulations” (Sampson, 2004:251).

As a result, quality MET is receiving much attention globally, and for many countries, achieving MET support is essential to their effective maritime development and for developing the sectors within it (Maringa, 2015).

Quality MET is defined by the IMO in accordance with the STCW in two parts, the first being ‘training assessment’ and the other ‘quality standards’. The International Maritime Organization (IMO) thus defines ‘training assessment’ as:

“Each Party shall ensure that all training and assessment of seafarers for certification under the Convention is: structured in accordance with written programmes, including such methods and media of delivery, procedures, and course material as are necessary to achieve the prescribed standard of competence; and conducted, monitored, evaluated and supported by persons qualified in accordance with paragraphs 4, 5 and 6” (IMO, 2010: 14).

And ‘quality standards’ as:

“Each Party shall ensure that the education and training objectives and related standards of

competence to be achieved are clearly defined and that the levels of knowledge, understanding and skills appropriate to the examinations and assessments required under the Convention are identified. The objectives and related quality standards may be specified separately for different courses and training programmes and shall cover the administration of the certification system” (IMO, 2010: 21).

To reiterate, the quality of MET has been identified as one of the factors that directly affect safety and security at sea. Hence Gamil (2008) stresses that MET is a vital component of the maritime industry chain. As a result, MET instructors are essential to the development of its education and training. According to Manuel (2005), “New entrants have to be educated and trained to industry accepted level and people already in the field have to have their knowledge updated with changing times, knowledge and innovation. It no different in the maritime sector...” (Manuel, 2005:1).

A shortage of seafarers has resulted in a deficiency of instructors who are teaching staff. Attracting instructors and the careers existing for them are additional “vital factors to take into account in ensuring that quality MET will be available in the years to come” (Cross, 2010:1). The shortage of appropriately experienced, educated, and trained MET teachers already becoming a major concern within the maritime industry (Cross, 2010). This issue was reported by Menon (1986), who noted that developing states had, over the years, struggled with the lack of adequately trained, limited, and qualified MET staff. To remedy this problem, some countries recruit expatriates; however, this is not sustainable as a result of the high cost of, for example, remuneration packages, allowances, inter alia (Mabuti, 2013). The researcher points out that:

“Experienced seafarers without academic qualification cannot be utilized to train in MET institutions since they lack the academic, pedagogic and didactic skills” (Mabuti, 2013:11).

A MET instructor is qualified to teach several shipboard-related subjects to students on competency courses Gamil (2008:2). Thus, the fundamental precondition for the instructor is appropriate shipboard experience (Zade, 1997). This issue is also noted by (Ziarati and Ziarati, 2012), that many examiners, using the example of Europe, have not worked as seamen for a substantial number of years. Cross (2010:4), emphasises that:

“It is very beneficial like any professional education that the teaching staff has some experience in the field he or she is supposed to teach apart from a good theoretical background having had the own hands on experiences is important”.

MET institutions are directly responsible for the proper competence of seagoing and shore-based maritime human resources. Appropriate MET will add to vital risk-reduction measures, given that ships and equipment are only as good as the individuals operating them. Consideration has also been focused on the standards of education and training of the personnel within the industry (Gamil, 2008:1). For example, the lack of training instructors in countries of Eastern Africa, such as Kenya, Tanzania, and Ghana compromises the quality of MET, and threatens the region’s maritime industry safety and security, respectively. Cross (2010:1) thus reflects that lower standards of competence are becoming a reality. This is because educational standards are low, thanks to outdated educational programmes, and the increase of short teaching programmes that are becoming even shorter.

In countries such as the Netherlands, in order to provide proper upgraded programmes for MET teaching staff. This is a new online modular, e-learning based staff development programme has been introduced, which when completed, will result in MSc degrees in MET (Cross, 2010). Constantly augmenting the competency of the MET staff will raise the skills of future seafarers (Gamil, 2008). The shortage of seafarers automatically results in the shortage of teaching staff. Hence, if there are those keen to change careers from sea-going to shore-based vocations, quality employment conditions such as salaries, are a concern. Once this has been addressed, the teaching competence and capacity of the former seafarers ought to be assessed, and, where needed, upgraded and updated (Cross, 2010). Thus, the Netherlands, as an established maritime nation, has a MET system with a rich maritime history and culture as well as an excellent reputation. This good standing has been somewhat as a result of the high standards required of the human resources, or the teaching staff (Cross, 2010).

As the global demand for quality human resources in the maritime industry rises, it is now recognised that the absence of appropriately experienced and qualified MET staff compromises the competencies of existing and further qualified human resources within the maritime industry.

For seafarers in countries such as the Netherlands, according to Cross (2010), there are ad hoc remedies that are sought to overcome and remedy issues relating to the existing shortage of qualified teaching staff. Thus, a good deal of personal expertise is necessary to offer qualitative teaching programmes. MET staff, such as teachers or instructors are demanded. Apart from the basic academic qualifications required as entry requirements in the Netherlands, one must possess a competence certificate in an engineering discipline or nautical studies as a minimum requirement (Cross, 2010:5). Gamil (2008) expresses that:

“MET institutions need to have, in addition to at least the minimum teaching facilities and simulator installations, high quality instructors, supervisors and assessors” (Gamil, 2008:1).

In this regard, although the maritime industry and sectors within share similarities with other industries, the maritime industry is unique in many respects. It is truly an international industry; education and training to the same standard has always been a challenge (Manuel, 2005). As a result, Gamil states that:

“The need to upgrade global MET has arisen from the consequences of the imperfect match of objectives and realities between MET and the advanced development of the shipping industry” (Gamil, 2008:5).

However, improving MET quality is not only a response to safety or security, but also, in Gamil’s opinion (2008) in the face of new technological advancements in the maritime industry and legislative challenges, MET institutions must constantly adapt. Furthermore, Zade and Pourzanjani (2004) confirm that by:

“Improving MET quality will help to increase the value of ship officers and ex-ship officers in the maritime labour market and increase the potential international mobility of them; moreover, it will make the shipping industry safer, more environment-friendly and more efficient” (Zade and Pourzanjani, 2004:17).

The improvement of MET also goes beyond upgrading MET technology and personnel therein. This is based on the view of Richter (2016), who observed that a selected number of Filipino seafarers were not aware of the importance of certification stipulated and demanded by international shipping companies. As a result, they had evaded the necessary training because they considered its cost too high and a loss of work time. Internationally, the issue of the high cost of

training in MET is not new. Wainaina (1989) asserted the necessity for constant training of maritime professionals but criticised the high costs associated with such a process.

4.7 INTERNATIONALIZATION

The internationalization of MET takes many forms. This may include the impact the STCW has on MET, the partnerships brought about by such, the role of countries in this regard, and the lack of attractiveness of maritime careers such as seafaring. Chong Ju (2011), for example, acknowledges this internationalization and identifies STCW as an international factor. Its latest amendments will affect the Fast East region countries more because they supply a large number of sea-going maritime labour, about 37 percent of the ratings and 30 percent of the officers worldwide.

The imbalance in the seafaring labour market requires more initiatives to increase the number of seafarers worldwide. The decline of student enrolment in MET centres should be addressed to sustain their existence and support the maritime industry's labour demand. In countries in which the number of seafarers has been declining, MET centres may be fortified by internationalizing study programmes to potentially attract foreign students (Lobrigo and Pawlik, 2014:12). The global shifts in the maritime industry have put further pressure on resource-strained MET institutions to source MET teaching staff from other countries, because of the inability to attract and retain domestic staff (Mackinnon Partnership, 2008). Thus, in the age of globalisation, institutions of higher education should introduce innovative strategies adapted to their changing environments (Green and Hardman, 2014). The reason for this is that higher education is a fast-growing service industry which is constantly exposed to globalisation trends (O'Neill and Palmer, 2004).

The internationalization approach for MET institutions is seen in today's world as essential to MET sustainability (Lobrigo and Pawlik, 2014). Higher education programmes for students of maritime transportation and engineering follow a course model, according to STCW Convention of the IMO. This implies that core subjects or major courses of the curricula should generally be uniform across the board, worldwide. To Lobrigo and Pawlik (2014), theoretically, this similarity

of the general curricula should facilitate faculty and student exchanges in MET programmes at international level. The researchers point out that multinational crewing is common and a seafarer educated in an international environment can acquire intercultural competence which is necessary in the seafaring profession. Furthermore, the maritime industry is an essential part of the world economy. The diminishing seafaring aspirants such as in Western Europe can be damaging to a number of economies. Hence, internationalization of MET programmes can be one answer to the current shortage in the number of seafarers relative to the growth of the world's maritime industry.

As a result, Lobrigo and Pawlik (2014) remark that there are lessons that may be learned from empirical research on internationalization of higher education which may be relevant to MET programmes. O'Connor, Farnsworth and Utley (2014), reflecting on internationalization of education, have drawn the following conclusions regarding prerequisites for a greater chance of successful strategy implementation:

- Administrative support is critical to successfully internationalizing curricula, with high support, there is a likelihood of high success however, with low support, there is low success;
- Institution setting has a major influence on an institution's success in internationalizing programmes and curriculums;
- Positive leadership support can overcome some of the obstacles presented by locations that lack diversity;
- Faculty attitudes about internationalization can have a positive influence on internationalization, but will probably not overcome poor administrative support; and
- Faculty with significant international experience will be more actively involved in related college programmes and activities.

Issues of educational internationalization concern integration, operation, communication, resource, people, change and culture (Jiang and Carpenter, 2013). These issues are well-rooted in the internal structure of an educational institution reflecting capability and commitment to internationalization strategy implementation. Such an undertaking is not free of challenges which require strong internal organizational cohesion (Lobrigo and Pawlik, 2014:7). These issues and

challenges are, for example, the need for resources such as funds for simulators or other related equipment, the need for qualified MET lecturers, which touches on capacity, and the maritime culture that informs awareness for maritime careers in areas such as Africa. The internationalization of MET brings both benefits and challenges for MET institutions around the world.

Several factors are in play in this regard, such as, for example, location, which to a great degree influences a country's maritime culture. MET institutions as found in Western Europe have seen dwindling numbers of student intake. MET institutions are found in Nigeria with high numbers of student intake but limited by institutional capacity, the result of the internationalization of MET. According to Lobrigo and Pawlik (2014:7), internationalization of MET programmes necessarily requires adjustments to comply with an overall internationalization strategy, industry demands, and student market expectations. Such adjustments cannot be established without a strong management approach. Programme curricula may have to be adjusted; and strong administrative support will be necessary in the implementation of internationalization strategy of MET programmes.

Another research on internationalization of higher education in Taiwan points to twelve factors that indicate effective internationalization efforts by international faculties and students:

- Institutional commitments,
- Strategic planning,
- Funding,
- Institutional policy and guidelines,
- Organizational infrastructure and resources,
- Academic offerings and curriculum,
- Internet presence,
- Faculty and faculty development,
- International students and scholars, study abroad, campus life, and
- Performance evaluation and accountability (Chin and Ching, 2009).

Linham (2012) reiterates Altbach and Knight's (2007) enumeration of internationalization modes, some of which are already in use in MET. These are cross-border supply. Linham's mode may include distance education (E-learning) and franchising of courses or degrees. An example of these modes is the provision of MET in Scotland. This mode does not necessarily require the physical movement of the educational consumer or provider. Support from the partner university such as received by Turkey's MET is Linham's (2012) mode, in which an education institution puts itself into an internationalization context. The partner universities support the joint programmes by sending staff to help teach, assuring and enhancing the programmes to ensure appropriate quality. Such internationalization strategies have proved greatly beneficial and successful for countries in Asia and the Middle East, for example, Turkey's international MET partnerships which are aimed at developing, designing and funding MET in the country. Internationalization of study programmes supports the national interest of a country (Lobrigo and Pawlik, 2014).

To add to the challenges of the internationalization of MET, Mthuli (2014) identified that one of the concerns of public higher education institutions offering MET in South Africa was the country's immigration policy. Institutions lacked local lecturers with relevant qualifications; hence the institutions looked abroad. However, the country's immigration policies and its lengthy processes frustrated potential well-qualified international lecturers willing to come to South Africa (Mthuli, 2014). According to Lobrigo and Pawlik (2014) an immigration policy is important in a country's support for its educational institutions. An internationalization strategy, hence educational internationalization and immigration policy ought to be well synchronized to optimize the benefit to national interests. This has not been well achieved in the drive for educational internationalization in countries such as Australia; for example, there has been a failure to maintain and establish prompt consistency with long-term skills shortage goals, according to Shams and Gide (2012).

The internationalization modes introduced by Altbach and Knight (2007) can be practically applied within MET programmes, according to (Lobrigo and Pawlik, 2014). However, Lobrigo and Pawlik (2014:12) identify that funding is indeed one of the usual hurdles in an educational internationalization, which can be significantly addressed by relevant national policy and scholarship organizations. For example, in Kenya, because of its MET institutions not meeting

international regulatory requirement, those students desiring to attain MET certificates which are recognized internationally have had to seek education and training abroad, according to Musa (2000:19); however, noting that this was expensive, hence few students are attracted to this idea. This is, however, one of many challenges that come with the internationalization of MET, especially for institutions in the developing world with limited resources. This leads to countries such as Kenya, in this regard, establishing legal frameworks to develop their MET system (Mabuti, 2013).

Asian countries such as China, Japan, the Philippines, and South Korea are internationalizing their MET institutions. A good example of this is China. Dong (2014) intimates that shipping services' fields were ignored and more emphasis was placed on crew training (seafaring) by the traditional Chinese MET institutions. For those who were keen to be exceptional in maritime services sectors such as in finance, the Shanghai Advanced Institute of International Shipping (SAIIS) was developed to assist in such service offerings.

In the year 2012, a Master's programme was introduced which focused on Shipping and Finance with an initial phase which recruited 30 students by December 2013; more programmes anticipated to be released in the future. For ensuring quality and high standards, the Shanghai Advanced Institute of International Shipping recruits its teachers from well-recognised and accredited institutions such as the Cass Business School and the University of Cambridge in the UK (Shanghai Maritime University, 2013).

In addition, disciplines, for example, maritime archaeology, water sports, and or hydrographic surveying, are uncommon in the country. Wang (2011) observes that a limited number of educational and training institutions are aware of the adverse issues, such a lack of maritime human capital. They have therefore begun to create certain kinds of maritime majors, not only to meet the skills demands of the domestic market, but most importantly, of the international maritime markets. An example of such institutions is one that introduced a maritime programme focused on yacht design and production. This will provide prospective students with skills and knowledge ranging from yachting, manufacturing, materials, engineering systems, to production, technology, and design (Wang, 2011).

China in the past was faced by numerous challenges to its MET. The international standards and new maritime technology, and new educational methodologies had a serious impact on the traditional way of education in Chinese higher MET institutions (Biwu, 2000). According to Biwu (2000), studying new developments in Chinese higher MET under the requirements of new international legislation, in particular STCW 95 on Chinese ocean shipping and its own development, found that there was revision of curricula and programmes, quality of teachers, replacement of old and out-of-date equipment for training, by new and up-to-date training equipment; however, the main problem lay in the field of English teaching.

Today China prides itself on its MET. The Shanghai Maritime University prides itself on “‘quality seafarers’, referring to excellence in seamanship, good experiences on board ships; English language, up-to-date computing systems/operations, interpersonal communication, commitment, ship management skills and professional virtues” (Shicheng, 2009: 5). This, according to Shanghai Maritime University, has been achieved by strategies of, for example, the adoption of ‘innovative’ and ‘customer-oriented’ MET, and adhering to a ‘quality first’ principle.

However, Shicheng (2009) identified that numerous shipping operations, mainly high-level shipping operations, were being handled in other areas of the globe, rather than in China. As a response to such, the Chinese government decided to forge a fully functional shipping industry, aiming to match her macro economy. This was achieved by building Shanghai into a global shipping and financial centre. The government renders Shanghai more positive policies by means of which to develop ship management, maritime financial operations, and maritime information services and ship brokerage. It has been foreseen that developing Shanghai as a global shipping centre would advance the total ability of the Chinese shipping industry; therefore the Chinese MET system, particularly SMU, has been offered many new opportunities (Shicheng, 2009).

Internationalization of MET programmes requires a holistic approach, both internally and externally. Internally, MET centres must have a clear organizational policy putting the internationalization initiatives forward on the agenda. Externally, MET centres must engage strategic collaboration, and network with partner universities and institutions abroad to facilitate the implementation of relevant tactics. Such tactics may include cross-border supply, consumption

abroad, commercial presence, and the presence of international people within the internationalization context of split-site education, localization of human capital, support from the partner university, and degree-awarding agreement (Lobrigo and Pawlik, 2014:13).

The internationalization initiative of Bruas for the MET study programme considers internal integration by having it aligned with the relevant agenda of the institution. This is essential in eliminating the hurdles of necessarily adjusting the study programme curricula and changing the medium of instruction of the study courses to meet the demands of the international student market. While external collaboration and network with MET centres abroad is still in a significant process of being established, engaging academic foundations such as the DAAD makes it possible already to have a certain level of international exchanges of lecturers and students. As at any MET centre, Bruas must resolve the financing issues involved for the internationalization initiatives to work. While the financing issues may be challenging, and must be studied further, exploring sources of scholarships and bursaries is an indispensable part of MET programme internationalization.

4.8 IMAGE

It is generally acknowledged that the maritime industry has an image issue. Jensen, Bergqvist, Hjella and Lekakou (2013) comment that media outlet personnel seem only trained to report on negative news. In other words there is an increasing stream of mostly negative publicity about seafaring. The image held by the general public of the maritime industry is focused on reports of sinking ferries, shipping accidents causing pollution, and hijackings (Jensen *et al.*, 2013). The maritime industry is not only made up of shipping. There are other supporting sectors such as finance and law and other clusters. Conversely, the shipping industry in general, has an image problem. It does not receive the media attention it needs (Jensen, Bergqvist, Hjella and Lekakou, 2013). Jensen *et al.* (2013: 1) explain that it is of utmost importance to understand the image that the shipping industry has among young people to be able effectively to promote careers in shipping, “to develop shipping as an attractive labour market, and to develop attractive educational programs.” On the other hand, Cross (2010:2) expresses that “the outdated perception of the profession is heard amongst youngsters, that they do not want to be away from home for ten to twelve months”.

There is thus the need to create an image of the maritime profession in which career possibilities are not seen as being restricted to work at sea, if such is achieved this can perhaps increase the attractiveness of MET to the youth (Lobrigo and Pawlik, 2012). In spite of this, the maritime labour supply condition limits opportunities ashore, as ship's officers are at present more needed at sea. An impression must be created that pursuing a MET does not restrict the professional to a sea career. The field can also be attractive to young people if they have the knowledge that there are relevant opportunities ashore after attaining seafaring experience, according to Lobrigo and Pawlik (2012). Thus, there are numerous causes for poor retention in the maritime industry, for example, among seafarers, the key factors are identified by Mack (2007) and Mitroussi (2008). These researchers indicate that ship's officers (junior seafarers-level) who hold sea-going jobs which are in most demand move to shore-based jobs. Such motives are further expanded by Barnett *et al.* (2006), which are:

“A lack of opportunities for career progression at sea, the need for young officers to start or build a family, the sudden emergence of landside opportunities and poor working conditions on-board (influenced by increased workload, stress, loneliness, isolation and cultural diversities)” (Caesar, Cahoon and Fei, 2014:16).

However, Caesar, Cahoon and Fei (2014), in their study looking to synthesise factors that considerably influence seafarer retention, identify:

(a) **Poor HR practices of employers.** For example, based on ethnic background or geographic origin, employers in the shipping industry tend to stratify their employees. This, to a great extent, influences staff promotion on board ships, with some nationalities having superiority over others (Lane, 2002 and Wu, 2004);

(b) **Generational issues.** For example, between the younger and older generations there are variances in the level of prospects in pursuing a maritime vocation, with specific reference to the seafaring industry (Cahoon and Haugstetter, 2008). This is asserted by Mack (2007), who reflects that many of the older generation seafarers point out that they were attracted into seafaring by the aspiration for adventure. This was owing to tales they heard told to them by their forefathers about foreign lands. However, Horck (2010) believes that, to date, ship-owners cannot rely upon this element of adventure which has humorously transformed into a biased phenomenon for retaining

crew. Gone are the times when seafaring was seen as a life-time profession: the ambition of the younger cohort of seafarers differs from their predecessors. As a result, the need for maritime employers to seriously examine such factors and address them is essential to decreasing the early exit of seafarers to land (Caesar, Cahoon and Fei, 2014);

(c) ***Increased demand from landside.*** There are countless shore-based positions that seafarers hold as they move onshore from the offshore (sea-going) sector of the maritime industry (Barnett *et al.*, 2006).

Caesar, Cahoon and Fei (2014) assert that:

“The increased demand for the expertise of ship officers and other categories of seafarers among landside employers is given further impetus by the relatively high remuneration rates being offered for the positions” (Caesar, Cahoon and Fei, 2014:6).

(d) ***Peculiar nature of seafaring career.*** The shipping environment, when at sea, is not conducive to marital/family relationships. For this reason it is problematic to retain seafarers to work on board ship (Thomas *et al.*, 2003; De Silva *et al.*, 2011). The parting from spouse/partner and family is cited as the most common reason for seeking a shore-based job Barnett *et al.* (2006). This promotes Forsyth’s (1990) view that what expressly influences seafarers’ decision to reduce years spent at sea, is having a partner and/or family; their home life dictates satisfaction with a job at sea.

At MET institutional level, Jensen *et al.*’s study (2013) examined the image of shipping among upper secondary school pupils in Sweden, Norway, and Greece. The study found that young people, generally, have a positive image of the shipping industry; however, this was stronger in Norway than in Greece and Sweden. According to Jensen *et al.* (2013), such knowledge gained from their study is pivotal because constructive strategies derived from the research can assist in promoting careers in the shipping industry, and adapting shipping to educational programmes. The future supply of maritime personnel with the necessary industry-specific qualifications is of particular concern in the shipping industry (Bakka, 2007; Grewal and Haugstetter, 2007; Bakka, 2008; Ng, Koo and Ho, 2009). Cross (2010) notes that:

“Sometimes multi - cultural crew and the overall decreasing esteem of the profession makes it difficult in the western countries, to continue to interest the new generations” (Cross, 2010:2).

To attract youth, various strategies have been created and launched in the maritime industry over the years (Cross, 2010). According to Urkmez (2005), cited in Ziarati, Demire and Albayrak (2010:9), an argument for rising the number of non-EU seafarers of different ranks on European flag ships is that the youth in developed countries do not find the seafaring vocation attractive. There is a poor image of a seafaring career, according to Cross (2010), who finds it that in Western countries people are sufficiently wealthy not to go to sea if there is no financial need to do so. According to Cross (2010:3), these “circumstances are related to western oriented societies, there is no doubt that in maritime developing countries these situations and attitudes will also develop, as the standard of living, in that country, rises.” This is pointed out by Lobrigo and Pawlik (2012) in Brazil, who add that “the importance of financial and economic factors validates the speculation that the seafaring career might lose its attractiveness as soon as the wage level declines, or as soon as any shore-based profession becomes more lucrative” (Lobrigo and Pawlik, 2012:16).

Improving the image of seafarers and their retention requires multiple approaches, according to Caesar, Cahoon and Fei (2014). Funding of training and skills development, and improving of welfare and working conditions are the most common approaches, as well as mapping out a long-term career plan for seafarers (Watchkeeper, 2003; Wiseman, 2004; Bajpae, 2005; Holder, 2005; and Horck, 2005).

To develop a sustainable maritime human resources, scholars such as Zade (2003) have long maintained that what needs to be dealt with globally, is the evolving societal perception directed at maritime vocations such as seafaring by the youth. In highlighting this, countries in both the developed and developing world, including Kenya, embarked on intensive awareness campaigns among stakeholders such as high schools and the public in general, to shift negative beliefs about the maritime profession, and make it attractive (Mabuti, 2013).

4.9 ATTRACTIVENESS

A number of factors arise from the youth of today being little interested in maritime jobs (Walczak, 2008). The image of the maritime industry and its retention processes has a direct influence on the

attractiveness of MET. As a result, if the future supply of MET graduates is to match the development and ongoing industrial maritime requirements, one needs in this regard to have an understanding of why students decide to or not enrol for MET. Dinwoodie (2000) states that it is imperative that we know how important they perceive employment considerations when making their decisions.

On the one hand, the UK government and the private sector have responded in several ways to the issues of attracting youth into the maritime industry, in several ways. These include career awareness programmes directed at bolstering the number of people entering the maritime industry, especially the youth. This has taken the form of increasing the awareness of careers at sea, and widening access to training opportunities (SAMSA, 2011). On the other hand, the Filipino shipping companies are improving their employment conditions, and the general image of the maritime industry, to influence more prospective MET students to pursue a career in seafaring and other related maritime-related vocations (Richter, 2016).

However, the Philippines is not like other countries, because of the geographical location of the country. The Philippines comprises approximately 7,100 islands, therefore maritime activities such as fishing, and transport are part of the everyday lives of many Filipinos. Hence the trend of following a maritime vocation is higher than in countries that do not have such extensive access to the sea (Baylon and Santos, 2011). Thus, location also plays a crucial element in the attractiveness of maritime careers.

Empirical researches on profiles, motivation, and expectations of participants in MET programmes can give insight into student market potential (Cross, 2010: 6). With the growth of institutions of both higher education and others offering MET programmes, the structures of the demand and the characteristics of both students and MET institutions remains are under-researched (Pallis and Ng, 2011). Pallis and Ng (2011) aver that:

“Empirical studies investigating the significance of different incentives in decisions to embark on maritime education have remained scarce” (Pallis and Ng, 2011: 370).

Jensen, Bergqvist, Hjella and Lekakou (2013) point out that:

“It is well known that a positive image of an industry tends to attract the attention of young talented people regarding choice of industry for their future career” (Jensen, Bergqvist, Hjella and Lekakou, 2013: 2).

Therefore, according to Barnet *et al.* (2006, cited in Jensen *et al.*, 2013: 17), “the maritime system (‘vocational’ approaches as opposed to more ‘academic’ approaches) is also identified as an attraction.” Cross (2010: 3) asserts that, “one of the prominent problems in many MET systems is non-functionality and unnecessary work, procedures, activities what the new generations do not like hence often extremely traditional education forms and content are very de-motivating for our young generations”. Veenstra (2002), in his paper on the scenario of nautical education in the Netherlands, argues that policies concerning MET programmes should prioritise development selection of a research agenda for the maritime sector, offering more reliable data on supply and demand of maritime training courses, a holistic approach to teaching, flexible and simplified entry to different educational levels, and creation of a better image of the maritime profession and of employment relations. According to Sullivan (1999), as psychological and economic contracts between employer and employee continue to evolve, various factors and changes taking places are also pivotal in order to fully capture the essence of today’s careers.

Moreover, Veenstra (2002:4) emphasises that continuity of maritime education as a goal may be brought about by knowledge awareness within the whole maritime sector. Knowledge awareness requires institutional structural changes which imply that MET centres must be more active in “discussion platforms, involving responsible bodies in promoting change in current educational structures, creating new links between maritime personnel and teaching staff, and initiate recurrent surveys of current teaching material and course demand and supply” (Veenstra, 2002:4). Parker, Arthur and Inkson (2004), cited in Mack (2007: 348), allege that: “the concept of intelligent careers address three fundamental ways of knowing careers: knowing why, knowing how, and knowing whom. Knowing why contends that personal values and motivators impact an individual’s careers choice, knowing how is based on the underlying assumption that skills and expertise are important components to understanding career behaviours and knowing whom attends to the various relationships that affect career decisions.”

In Britain, a study by Dinwoodie (2000) explored the perceptions of students pursuing Maritime Business courses in the country. The study found that the students were attracted not by the traditional maritime prospect of careers such as deck officers (seafaring), but rather by the more relaxed, safer, and less stressful maritime careers such as shipbroking, which was most popular career choice. Dinwoodie (2000) further notes that one challenge present in the maritime industry is finding new methods in which more youth may be exposed to a broader set of sources of information relating to other maritime careers rather than seafaring. This would include the maritime business, exposing it to children of the earliest age possible, so as to help the youth to form underlying vocation interests which could be developed and activated into positive academic career choices in later life.

In Europe, maritime education is placed centre stage owing to the shortage of appropriately qualified, well-trained, maritime manpower, which is a core problem that must be addressed (CEU, 2009, cited in Pallis, Ilias and Papachriston, 2013). In Greece, Pallis, Ilias and Papachristou (2013), studied the sociological and economic characteristics of young people who decide to pursue a vocation associated with the sea. The study was part of a four-year data series survey conducted at the both the Greek Merchant Marine Academies (MMA) and a number of universities offering maritime degrees. It specifically examined sources of information available for students who were deciding on enrolment and desired career paths. The study aimed to see whether sources of information on career paths affected the demand for maritime personnel, both ‘sea-going and shore based’. The study wished to generate knowledge by means of assessing the effectiveness of existing maritime promotional campaigns in influencing the choice of students to ‘go maritime.’

The study of Pallis, Ilias and Papachriston (2013) found that the 2008 economic crisis had affected the behaviour of students enrolling for maritime studies. Young Greeks were choosing safer and more stable careers, and the maritime sector offered this to them. What the study also found was the different behaviour of students from the MMA which offered mostly sea-going vocations and those enrolled for shore-based vocations. Unlike other shore-based vocations, MMA sea-going programmes were seen as more attractive and became the preference for students. This differs from the immediate past, when such preferences were driven by not having a ‘choice,’ or by the country’s maritime reputation, and the association with the country’s tradition. According to Pallis,

Illias and Papachiston (2013: 17-18), this “implies the presence of institutionalism and path dependency, with perspective acting as a major decision-maker.”

Location also played a crucial role. When a great pool of students came from towns associated with shipping, it was found that it was less common for students to enrol at MMA if they had had working experience. Students from universities offering maritime (mostly shore-based) vocations, found that prior to and directly after the economic crisis, maritime degrees were already a first choice for half the students. A correlation was identified between family income and family’s shipping background. It was also found that students continued to come from middle- and upper-class income groups, and that their parents were positive and supportive of their children being associated with the maritime world. The study of Pallis, Illias and Papachiston (2013: 18) concluded by stating that, “students opt for enrolment at the particular programme without the industry being a major ‘push factor’, they do not dream to work in a non-maritime related sector of the economy.” Their findings are furthermore in line with Paton’s (2007) view that family, individual or class position may be influential when pupils make future educational and career vocational plans. However, when it comes to the final selection, the decision may also be influenced by other factors, such as peer pressure.

Another study by Pallis and Ng (2011) sought to reveal the profiles, motivation, and expectations of undergraduate students enrolled for maritime business and management programmes in three universities in Europe and Asia. One of the three universities was in China and the other two in Greece, which has a strong maritime tradition and “a dependency of its balance of payments on income generated in shipping activities” (Pallis and Ng, 2011: 372).

The findings of Pallis and Ng’s (2011) study are in line with that of Pallis, Illias and Papachiston (2013) that students pursuing maritime programmes come from middle to upper income families; students come from above-average educated families, and where their hometown or family was associated with the maritime industry. Although these factors were recurrent, they were not deterministic. With regard to expectations, all students in the Pallis and Ng (2011) study felt that their enrolled programmes fulfilled their first expectations.

In countries such as the Philippines, for example, location, and expectations informed by economic well-being, are key factors to consider. This is asserted by Richter (2016) who observed that:

“Most maritime jobs offer an attractive remuneration compared to jobs on shore which is why many Filipinos choose employment at sea although it means being away from their homes and families. Particularly in provincial areas, male children are often encouraged by their parents to pursue a seafaring career. Later with a job abroad, they are able to raise the living standard of their families through remitting part of the income home” (Richter, 2016:12).

Again, with regard to student expectations, according to Pallis and Ng (2011: 388), “the ability to increase student professional competence and skills, the provision of updated information and courses taught by well-qualified staff serve as the most important criteria” in transferring job-related skills to students, and building their understanding and knowledge of the maritime sector. Another key finding of the study is that, because of the institutions’ good networks within the maritime industry, visiting lecturers from within the maritime industry were employed part-time to deliver maritime related workshops, courses and to lectures students (Pallis and Ng, 2011). The links between maritime educational institutions in Greece are of utmost importance, and day-to-day practical maritime issues were brought directly into the classroom by specialists in their field. This kind of teaching should be what is expected by students, to ensure that value and expectations are linked (Pallis and Ng, 2011).

This scenario is also the case in China: experts within the industry have current workaday knowledge which they take into the classroom. They have experience and knowledge of currently technological advances; and everyday problems experienced in the industry are used in the lecture situation to train students. Pallis and Ng (2011) believe that this strategy is essential, given that student perceptions of the quality of the teaching staff are linked to the reputation of the programme or institution concerned.

According to Pallis and Ng (2011: 388), “a significant number of undergraduate students who decide to pursue a maritime program purely due to its relative ease of admission (when compared to some traditional disciplines) obtain good grades and thus smooth graduation.” Decisions to continue their studies at post-graduate level tend to be highly influenced by either family members, friends and or colleagues, while strategic decisions are based on factors such as a programme’s

practice-orientation nature, opportunities for internships and training, and also expected higher earnings, also play a role.

Undergraduates mostly choose programmes based on their ‘practice/ occupational-oriented’ nature. Furthermore, publicly accessible information and friends and colleagues who are working, or within the industry, or who are already on the programme, provide information to the prospective student about the industry (Pallis and Ng, 2011). In their concluding remarks, Pallis and Ng (2011: 389) explain that a study that looks at users’ viewpoints of maritime education gives a much clearer “understanding of the professionalization process of the maritime industries”, and also noting that “most current research on maritime education focuses on the change of the business environment and the emerging needs of the industries, while apart from a few...student’s demands are under-researched.”

A survey in 2011 by Lobrigo and Pawlik (2012) from Brazil’s maritime academy intended to obtain information on ways in which MET and the broader profession could be promoted. Also factors which should be emphasised upon to attract the youth into the maritime industry; how long ship’s officers may be expected to pursue a career at sea; and finally what motivates seafarers to remain longer in their career.

The study found that, Brazil in promoting maritime careers as a State whose maritime industry is substantially growing, the State needs to exert greater effort in attracting more youth to the sea-going maritime profession. Lobrigo and Pawlik (2012) highlight that there is tremendous encouragement from families, which is also linked to economic and financial motives; and these factors may be accentuated in promoting maritime careers. Furthermore, campaign and advertising efforts using the Internet, as well as the use of visits to schools and trade fairs, seems to be ineffective or just underutilised. The study further showed that none of the students were made aware of maritime careers by any shipping or other maritime companies.

Lobrigo and Pawlik (2012) points out that:

“this situation calls for active participation of shipping business stakeholders to participate in promoting a maritime career to young people in the future. Companies support maritime education and training in Brazil by giving possibilities for sea experience to students and apprenticeship

programmes; however, there is no strong incentive for industry business players to invest in cadetship programmes and special training for students”.

Lastly Lobrigo and Pawlik (2012), points out that this is attributed to the high bargaining power of the seafaring labour force owing to supply scarcity, because the lack of or limited promotion of maritime careers to prospective MET students might also have contributed to fewer youth being aware of opportunities in the industry and being attracted to it. Although MET provision is limited in Brazil, prospective MET students can seek MET from neighboring States in Latin America.

In Taiwan, Guo, Liang and Ye (2007) specifically studied the influence models of seafaring, and the factors influencing seafarer's choices amongst Taiwanese navigation students, and found that navigation students consider factors such as the specific nature of seafaring, pay, personal interests, and advice from families and friends, when making career choices. In Taiwan in general, marine graduates avoid careers in seafaring; and it is very difficult for the shipping industry to recruit a sufficient number of national ship's officers. Navigation students' intentions to enter seafaring are both indirectly and directly affected by a number of objective and subjective factors (Guo, Liang and Ye (2007). In comparison, as is the case in South Africa post 1994, the Thai government has paid little attention to this situation, in responding to ship-owners' requests for a sufficient supply of seafarers. The solution has been to allow shipowners to recruit foreign seafarers (Guo, Liang and Ye, 2007).

Guo, Liang and Ye (2007) also found that it is not easy for new personnel to enter the seafaring industry in Taiwan, even if they have strong intentions to work on board ship. According to Chen (1998), this is because “the average passing rates of the national seafaring examination were 36.38 percent and 33.56 percent, respectively, for joining junior deck officers and junior officers from 1990 to 1997 in Taiwan” (Guo, Liang and Ye, 2007: 406). For navigation graduates it has also become more difficult, post 2004. In concluding, Guo, Liang and Ye (2007) suggested that the incentive of pay has the least impact on navigation students, although there is an attraction of high pay in a seafaring career. According to Guo, Liang and Ye (2007: 19), seafaring information from a social context suggests a positive aspect of seafaring and should be given importance so as to attract more students to enter seafaring.

Jensen *et al.* (2013) found that a dimension such as a reward was complex and covered more than expected. This is explained in the study, that when it comes to young people, factors such as opportunity for career advancement and experiencing interesting places are seen as equivalent to perceptions of salary in their concept of 'reward'. Furthermore, the Greek study showed that 'ships as a place of work and living' was an important factor, followed by 'rewards.' In the other samples from other countries, the same was identified for the Norwegian pupils, while the Swedish sample ranked 'rewards' as the most important dimension for their choice, followed by 'ships as a place of work and living.' According to Jensen *et al.* (2013: 26),

“...the results of this study can be used as a base for describing and explaining the image that young people have of the shipping industry, such knowledge is fundamental for deriving and developing constructive strategies for promoting careers in shipping, for adapting shipping to the expectations of young people, and for the development of creative and relevant educational programs”.

Ng, Koo and Pallis (2011) conducted a study which examined student motivations and sources of information before enrolling for postgraduate maritime programmes in six Asian and European universities. Graduates enrolled for highly specialized sub-themes, for example maritime law, or ship finance, etc., were excluded from their study. The study set out to understand the extent to which the shipping industry or other exigencies act as driving forces towards enrolment in maritime programmes; as well as to measure postgraduate students' evaluation of maritime postgraduate programmes offered at their respective institutions. The study of Ng, Koo and Pallis (2011) found that peers in the shipping world have a limited influence on prospective students enrolling in maritime programmes. According to O'Neil (2003), cited in Ng, Koo and Pallis, 2011: 364), “the endorsed sophisticated business models in all shipping sectors, the integration of maritime transport systems in complex supply chains, and technological developments require people with more than monolithic, experience-gained, technical and business knowledge.”

In the Philippines and China, respectively, cadets and redundant seafarers receive much inhumane treatment as well as exploitation at the hands of crewing agencies; in the case of the Philippines, mostly at Rizal Park in Manila, in order to secure on-board jobs Zhao and Amante (2005). This is also asserted by Parlak and Yildirim (2011) who found that in Turkey, in the course of searching

for jobs on board ship many aspirant seafarers are exploited by tremendously influential crewing companies (called simsars). To Caesar, Cahoon and Fei (2014), the trend is that people (cadets/MET students and other seafarers already in the industry) find it problematic to obtain jobs on board ship. They are also faced with many challenges on board, after acquiring jobs. These conditions may add exponentially to the decision of seafarers departing their jobs at sea to follow landside opportunities.

Kalvitien, Bartusevicine and Sencila (2011) claim that it is of utmost importance that MET be explained to young people by MET institutions. The institutions must elucidate the merits of the maritime profession. Counselling by MET institutions would be affective in improving the prospective student numbers within MET. In researching a potential student market for MET institutions, it is imperative to consider the economic attractiveness of the seafaring career in the targeted market (Lobrigo and Pawlik, 2012). Such economic attractiveness covers expected salary vis-à-vis national GDP, as well as employment security.

Several MET centres are, however, established already in principal seafarer-supplying countries. In this case, it is equally important to have a well-defined comparative advantage in terms of the added values to pursue nautical education abroad. Another potential student market for internationalized MET programmes is countries with study placement deficit through lack of MET centres whilst there is a high demand for maritime professionals. An example of this is Brazil, in which there are currently only two maritime colleges. The country has a growing demand for seafarers owing to rapid expansion in offshore explorations and in domestic shipping (Lobrigo and Pawlik, 2012). Another such country is Nigeria, in which demand for MET is high, however, institutions lack capacity. Thus, MET institutions are perhaps well positioned to adapt to the new challenges of making a career in the maritime sector. This begins with seafaring being made more attractive (Zade, 2003). There is also an effective means of motivating more youth to take up a career in seafaring and other maritime-related vocations, through:

“Cutting the period spent at sea down to 4 – 6 consecutive months, improving the living conditions of the crew on board through, for example; enhanced which are beyond the minimum requirements set by the standard, increasing the compensation including further social benefits exceeding international norms such as family insurance, strengthening the effective planning of seafarer’s

career paths to ensure a better transition to an employment on shore, and enhancing the training centers with high-tech equipment and computer-based training (CBT) and simulation systems to achieve higher educational quality and practical relevance” (Baylon and Santos, 2011 cited on Richter, 2016: 12).

Thus, promoting maritime careers to the youth and to those that have the potential to become seafarers or any other profession in the industry, ought to be a continuous undertaking, especially in countries with developing maritime industries. There ought to be intensified exhausting of all media outlet such as news papers, television, the internet etc. especially also in developing countries or countries with a non-maritime culture, but with high youth unemployment. The maritime industry has vast employment opportunities. There ought also to be a strengthening of sea-career commitment of seafarers. There should be a closer consideration of the primary motivations of seafarers, and action on enhancing the image of the seafaring profession so to ensure a stable and sustainable labour market conditions in the industry. To Lobrigo and Pawlik (2012), maritime career empowerment is projected to be part of the solution mix, which would target creating a better understanding of career paths ashore for seafarers with long sea careers.

There is no one variable that solely influences the attractiveness of MET; policymakers and other stakeholders in the maritime industry need to realise this. Context can be a starting point, although the ‘love for the sea’, for example, in countries such as the UK, as identified by Dinwoodie (2000), may be the initial attraction for studying MET. Having a family maritime culture as identified by Pallis and Ng (2011) is another positive factor. However, other variables are in play, such as course reputation, social and economic experiences influencing choices, as well as location and available resources such as lecture facilities (Dinwoodie, 2000). Hence, context can greatly influence the dominance of one variable over others.

Research into the maritime industry focuses mostly on the business and operations aspects in the sector (Ng, 2011). There is also growing literature on aspects touching on the human factor in the maritime industry, examining issues such as gender, diversity, culture; health, safety and security; and vocational choices informed by image and attractiveness of the maritime industry. Thus MET institutions play and continue to play a vital role in shaping the global maritime industry. With the

dwindling number of persons showing interest in the maritime industry, MET institutions can be vital stakeholders in attracting prospective maritime students, and improving the image of the maritime industry.

4.10 RESOURCES

The provision of MET is a complex process influenced by various factors such as the industry, both domestically and internationally. Global industry issues such as maritime incidents, safety and security and technological advancements prompt MET institutions to create strategies to remedy the effects of these factors. The availability of resources becomes vital in effective and efficient domestication of the maritime industry. As a result, resources such as finance, human, and physical resources are pivotal; they play a crucial role in MET institutions, both in developing and developed countries.

The advances of technology in the global maritime industry, and the increasing concerns regarding safety and security, the availability of these resources, and imbalances in their distribution has prompted governments to play a key role in this regard, especially in the form of funding. Literature in the previous section, reflects that, on the one hand, regions such as Africa and the Far East, because of the internationalization of MET, are threatened by the lack of resources. These refer to teaching facilities, simulators, and teaching staff. This has a negative effect in terms of implementing the STCW requirements and increasing student intake. On the other hand, in regions such Europe where MET institutions are well resourced, industry issues such as the poor image of the industry have had an effect on the attractiveness of MET.

The insufficiency of resources is a very serious problem for MET institutions. Fuazudeen (2011) announced that MET institutions in Kenya lacked both properly qualified instructors and assessors. This was coupled with not having enough simulation equipment as well as infrastructure for practical training, for example, there is a paucity of berths (training ship) for students. Mabuti (2013) found that what remains a challenge for MET in Kenya is the shortage of cadet berths. According to Fuazudeen (2011), such issues leading to challenges are key obstacles to achieving the training and assessments from the STCW, as stipulated by its Code. Thus, if these challenges

continue to exist, they stand to slow down the implementation process of the STCW and the growth of MET in the country.

MET institutions, such as those found in Kenya and the rest of the world, especially in developing countries, should therefore strive to invest in resources, both human and technological, that facilitate MET with a competent maritime labour market (Mabuti, 2013: 9). These issues prompt governments to play a role in this regard, ensuring the maintaining of the quality of MET certification and attractiveness.

4.11 THE STATE (GOVERNMENT)

The States involvement in MET goes back centuries. The maritime industry, for States that have access to the sea or inland waterways, plays an economic and security role. In today's world, the political motivation for MET involvement includes the contribution of internationalization of higher education to national security, stability, and peace (Qiang, 2003). According to Manuel, (2005) the notion of national sovereignty frequently obstructs legislation at international level. The IMO is unable to suggest guidelines and set standards, making and enforcing legislation. Nevertheless, the enforcing of the legislation is reliant on member states' commitment to doing so. Although this is not always realised, with many nations having diverse interests; even where benefits converge, conclusions are often delayed by numerous governmental and bureaucratic barriers (Manuel, 2005).

Economic motivation considers development of human capital necessary for a nation to sustain international competitiveness, especially in key maritime industrial sectors of a country's economy. Since the maritime sector is an important part of world economy, the diminishing number of seafaring aspirants can eventually damage many economies. The maritime industry must supply a significant share of the world fleet or seafaring labour. In the 90s, McConville, Glen and Dowden (2000) pointed out that, while maritime fleets of some countries expanded, their number of seafarers declined. This can be inferred from a dropping number of enrollees in maritime schools, and an increasing age profile of seafarers. Such a phenomenon has had a detrimental ripple effect on these countries' maritime labour markets. According to Fisher and

Muirhead (2005), however, MET institutions will continue to evolve through their quality assurance systems that are self-monitored. Similarly, Er *et al.* (2001: 6) posits that:

“Quality assurance of a MET institutions becomes much more complicated when safety, environment and quality management criteria need to be integrated into the existing dynamic processes of a training institution while defining the knowledge, understanding, skills and competence” (Er *et al.*, 2001: 69).

MET institutions are required to carry out their programmes through quality standards located within the framework of the national quality standards system. The fundamental factor in addressing the needs of the shipping companies and other parties in today’s maritime world is through the assessment of students, and the overall quality assurance of the education process therein (Lobrigo and Pawlik, 2012). In the case of MET programmes, internationalization, as a quality assurance criterion, requires international collaboration of maritime schools and entry into foreign student markets (Lobrigo and Pawlik, 2014). The design of MET programmes and its curriculum is largely the responsibility of MET institutions in consultation with and supervised by state national ministerial departments. These include the SAMSA which is a body specifically assigned with such responsibility, under the Department of Transport in South Africa. Hence the state plays an active role in MET provision: this is not unique to South Africa.

Sampson (2004) considering the regulations and conduct of education and training, found that in the Philippines the Commission on Higher Education (CHED) holds this function. the CHED heads an inter-agency committee known as the ‘Technical Panel for Maritime Education’ (TPME). In MET institutions the TPME is involved in curricular development. Thus, the Filipino government plays a central role in shaping MET in the Philippines. This is evident in ensuring compliance with STWC. In 2014, the government, through its maritime agencies CHED and MARINA, terminated the accreditation of MET institutions not meeting the STCW minimum standards. In 2014, according to Galvez *et al.* (2016) this resulted in the number of enrollees under CHED-accredited institutions dropping from 263,357 to 167,840.

In other areas of Asia, such as Hong Kong, the maritime industry is a huge asset to its economy. Vocations such as seafaring, such as a sea-going career, are recognised as important to the overall prosperity of the state. As such, some experience is valuable for working in the shore-based

maritime industry (Lewarn, 2009). According to Lewarn (2009), the Hong Kong government, has boosted the supply of domestic qualified personnel working in its maritime industry with sea-going experience. In 2004, the government, with the Hong Kong Maritime Industry Council's full backing, developed the Sea-going Training Incentive Scheme. In Singapore the state and its respective bodies play a key role in MET. Part of the National Singapore Polytechnic, which was formally governed by the Education Department, is the Maritime Academy. Sampson (2004) notes that the shipping division of the Maritime and Port Authority (MPA) moderates the maritime courses in the country, undertaking tasks to enforce STCW.

In Western countries such as the UK, colleges offer MET officially under the authority of the Department for Education and Employment (DFEE). The DFEE is now known as the Department for Education and Skills (DfES). The Scottish Executive, the Merchant Navy Training Board (MNTB), and the Maritime Coastguard Agency (MCA) both work closely with this institution in not only determining standards but also developing curricula for MET (Sampson, 2004). According to Sampson (2004), the government approach to the country's maritime industry is unique. The government has approached the industry by conducting an enquiry into action required by government to support the industry. As a result, in the UK, a MET support scheme (SMarT) was developed by an amalgamating of the Government Assistance for Training (GAFT) scheme and the Development of Certificated Seafarers (DOCS). This scheme was instigated by the state in initiating the country's strategy for reviving the country's shipping industry (Lewarn, 2009). The scheme, which affords financial assistance to MET providers for the training of officers and ratings is administered by the UK Department for Transport through the MCA (MCA, 2008: 57).

In Germany, another Western country, the federal government of the country, in order to sustain and develop its maritime skills, established a Maritime Alliance (MA) between the federal coastal states, the trade unions, and the Association of German Ship-owners (AGS) (European Union, 2007). According to ASA (2008: 116-117), the MA subsidy is for those from Germany. It covers their wage-related ancillary costs, but is also open to people who are from the EU and employed on German merchant ships. Furthermore, there is a financial contribution for MET, especially for training of seafarers, which incorporates a financial commitment on the part of the AGS.

In Ireland, in response to the maritime skills shortage issue, the Irish government has adopted an approach which encourages seafarer training (Lewarn, 2009). There is support which is financial for both the MET institution and the student whilst ashore and at sea. Not all European governments contribute to the on-board component of training, however, some, such as the UK, Germany, Portugal, and Greece are prepared to do so (Krishnan, 2008). In Ireland a statutory government agency known as the Irish Maritime Development Office (IMDO) was established in 1999, with the mandate to develop the maritime sector of the country; and also to coordinate and oversee seafarer development, including MET (Lewarn, 2009). However, Lewarn (2009) remarks that the state was aware that what was difficult was attracting young people to the industry, and not encouraging shipping companies to undertake training. Thus, the state maintained that there ought to be no financial penalties or commitments involving seafarer training on the country's tonnage tax regime.

The literature review conducted shows that the government plays an active role in not only the maritime industry, but also in MET. This include states such as the United Kingdom, China, Germany, and Ireland, to mention a few. A range of strategies was deployed, from assisting students in the form of finance, to industry awareness and attraction, to assisting the MET providers – the institutions of education and training, and even industry employers such as shipping companies. The assistance strategies adopted by states differ depending upon the purpose to be achieved. Some strategies are simple while others are complex (Lewarn, 2009). Thus, governments around the world, through their institutions created for cooperation and coordination in the maritime industry, are central to shaping MET.

Through state maritime policies and regulations, strategies are created to achieve countries' maritime ambitions, MET and its institutions forming the pillars of this process. However, there are a number of differences among states, such as the availability of resources, unwarranted costs in the provision of MET, wasteful processes, and the lack of mutual synergies of the numerous agencies involved (Richter, 2016). Partnerships in the maritime industry amongst the stakeholders are needed and have been created to address the challenges. These include safety and security associated with labour skills and demands and supply in the global maritime industry.

4.12 PARTNERSHIPS

Ensuring the highest standards of competence in the global maritime industry with its ever-growing challenges, the STCW Convention has established a comprehensive set of regulations placing responsibilities on all stakeholders in the industry, such as maritime administrations, employers and training institutions. For these challenges to be addressed, this would involve all these stakeholders working together in partnership. The success of the maritime industry does not lie with MET institutions only, but also with the cooperation between other stakeholders such as government, and shipping companies (Basak, 2017). Hence, partnerships are seen as the only effective way of addressing the global maritime industry problems.

An example of this is the cause taken up by the IMOs of addressing the shortage in seafarers by collaborating with several international agencies to inspire states and industry to take concerted action. The collaborating bodies include the BIMCO and the International Transport Workers' Federation. The global advocacy campaign is intended to mobilise governments and private enterprise to attend to the problem and develop localised innovative solutions. Thus, partnerships have not been limited to addressing the shortage of seafarers, but to have tried to find solutions to address the imbalance of MET provision.

In Poland Szozda and Masny (2008), reported that when Poland joined the EU in 2004, this brought the country into the European MET network, a very good and flexible network. Although, Poland's MET institutions have a significant number of students, the country was prepared to double the number of students (in higher and secondary school level) through partnership. This was its long-term solution to the problem of shortage of seafarers in the country. Szozda and Masny (2008) stressed that insufficient funds are the main limitation in maritime partnerships. To continue, and to thrive, organisational and financial participation by stakeholders such as ship owners, is desirable to achieve the desired goals.

According to Ziarati, Demire and Albayrak (2010:10), the innovative concepts of MET, a shift from knowledge-based to competency-based training, and the need for constant professional updating and recertification have brought MET institutions out from under the shadows of the maritime administration and industry; now they must assume an equal partnership rather than

simply react to others' demands. Maritime institutions across the globe must implement their programme content effectively and efficiently, in line with international regulations, such as the requirements of the STCW and the contents of the IMO Model Course. To proactively support the efforts by the IMO and national agencies such as the South African Maritime Safety Authority (SAMSA) in the case of South Africa, and the European Maritime Safety Agency (EMSA) in the case of European countries, agencies should improve standards of facilities and equipment. This refers to such as requirements as simulation, as well as quality of teaching staff. The requirements found in Section A-I/12 of the STCW Code which is particularly dedicated to the use of simulators, requires simulators used for assessing competence or training to comply with the Code. The use of such simulation technology in STCW implementation is somewhat new, nonetheless, "MET institutions are becoming proactive in their applications" (Ziarati, Demire and Albayrak, 2010:10).

MET institutions in developing countries such those found in Africa, are, however, in utmost need of partnerships for MET provision. Resources constraints often threaten the MET quality and the ability to supply domestic and global maritime labour demands. Having all the necessary resources that support MET, which includes facilities such as classrooms, laboratories, simulation technology, audio and visual aids, and computer-based training programmes, to mention a few, remains a challenge. With the advance of technology, MET institutions cannot keep pace, because of the cost inherent in technology. Sampson (2004) commented that resources were not evenly distributed across MET institutions around the world, citing his study between Singapore, Philippines United Kingdom. The uneven distribution of MET resources has thus contributed to partnerships for MET around the world. Maritime nations agree that partnerships are essential in assisting a sector to move in the same direction. The United Kingdom is therefore focusing on partnerships between their government and trade unions, to formally commit to training (Lewarn, 2009).

Wu, Lai and Cheng (2006) asserted that international participation in MET would be greatly helpful to the development and spread of the new professionalism in China, if international shipping companies and agencies can play a more positive role in participating in China's MET systems. To further stress the importance of resources in MET provision, cadets, during their MET study need to spend time at sea undertaking a structured, hands-on, on-the-job training, under the

guidance of senior serving officers on board a ship, according to Sampson (2004). Where berths aboard vessels that are working are inaccessible, students (cadets) may spend their ‘sea-time’ aboard a training ship owned and run by the MET institution in which they are enrolled. The ownership of training vessels is expensive and can be an unreachable target for MET providers in developing countries such as those found in Africa. SAMSA (2011) mentioned that South Africa has only one training vessel and is dependent on foreign ships to offer placement for cadets from South Africa. Mthuli (2014), in his study of the state of MET in Durban, South Africa, found that MET public higher education institutions aware of the limited training on board South Africa’s only training vessel had to partner with foreign ships for cadet placements. In countries such as South Korea in the late 1980s and early 90s, MET institutions, with the assistance of government, invested in owning their own training vessels. However, because of limited capacity, South Korea had also to venture into partnership with private enterprises for shipboard training.

Sampson (2004) conjectures that such arrangements present advantages and disadvantages. Cadets aboard training ships may have better access to computer-based training programmes, lectures and libraries. On the other hand, they are unlikely to experience cargo-handling operations, and may not gain experience of current practices in seamanship, learning rather outdated habits instead (Sampson, 2004:252). In the case of South Korea, there were the following problems apropos of shipboard training by private enterprises:

- It was impossible to conduct efficient and systematic training under a unified curriculum;
- Safety measures for shipboard training were not sufficient (Japan International Cooperation Agency/JICA, 2002:1-2).

In this situation, according to JICA (2002), the Korean government gave high priority to the construction of seven training vessels in fishery and maritime schools, planning to carry this out in 1987 as a part of the project by the Asian Development Bank (ADB) “Marine Sciences Education Project in the Republic of Korea”. However, since costs overran expectation, incurred by an increase in the construction costs of vessels after 1988, the Korean government requested an ODA loan from the Japanese government. As a result, ADB financed the structure of training

vessels and the installation of a part of their facilities. Japan's ODA loan financed other facilities and equipment necessary for shipboard training JICA (2002:1-2).

Countries working together and learning from each other is the EU's strategy on MET (Albayrak and Ziarati, 2009). The European Maritime Safety Agency (EMSA) is ensuring that the Philippines Maritime Education and Training complies with STCW Convention and Code as amended. From 2006 to 2013, EMSA made a series of audit inspections as part of the regular reassessment, as well as follow-up inspections, and found a number of serious deficiencies. As a result, Republic Act No. 10635 made and approved on March 2014, has given Maritime Industry Authority (MARINA) the authority to pursue close monitoring of the MET systems (Ritual, 2015).

Several new Master's programmes in the Netherlands have and are being instigated, both by the Maritime Institute Willem Barentsz (MIWB) and other METs in Europe. MIWB collaborative arrangements with other organisations, are, together with other Dutch and European universities, concentrating on nautical and engineering sciences, transport and logistics, but also MET-unique programmes (Cross, 2010). The collaboration through the working together of academic and research institutions, relevant government authorities and industry associations is an essential part of finding solutions and resolving the unfavourable seafaring labour market conditions according to Lobrigo and Pawlik (2012). However, such partnerships also have spillover effects, in which partnering MET institutions benefit through knowledge-resources sharing. In Turkey, prominent MET partnerships between organisations such as MarEdu, TUDEV, M'AIDER in the country and with those in Europe such as Lloyd's Register of Shipping, the Strathclyde University, and so forth, make MET more accessible and/or seafaring more attractive to young people in European countries and also Turkey (Ziarati, Demire and Albayrak, 2010).

Partnerships are growing in MET, especially in Asian countries such as China. On 24 March 2010, a Memorandum of Understanding was signed between Shanghai Jiao Tong University and the Baltic Exchange on developing highly professional personnel in the maritime brokerage and maritime finance. The aim was the providing of qualified and competent individuals for the setting up of the Shanghai International Shipping Center through the "International Experiences, Chinese Requirements, Real Case Study and Bilingual Teaching" model (Shanghai Jiaotong University,

2010). Furthermore, in pursuit of providing highly competent shipping finance personnel, on 25 November 2011, the Dalian Maritime University collaborated with Far East Horizon Company to develop maritime financial talents at Master's level (Dalian Maritime University, 2013). This was because the boom of China's maritime industry domestically and abroad made it difficult for higher education MET institutions focused on maritime services to meet the increasing demands for highly competent shipping human resources. Such resources were required to be both of good quality and quantity. As a result the government, through its various maritime institutions, encouraged more maritime business in the industry to train their own maritime services. This resulted in the School-Enterprise Joint model, better known as the School-Enterprise Joint for Maritime Services' Education (Wang, 2011).

Maritime industry partnerships are important developmental mechanisms for the industry. Partnerships for MET are paving the way for many developing countries in Africa and East Asia to help grow domestic maritime manpower. An example of such is the Nigerian Seafarers Development Programme, (NSDP), a project of the Federal Ministry of Transport, with the Academy of Maritime Education and Training, (AMET) in India, which involves a three-year training programme on seafaring. Also, the role of international organisations such as the UN, is fostering the successful development of MET, and calling for investment and cooperation in MET mandated by the AU between its member states. African countries now understand that the maritime labour market gap has economic implications for their countries. There are opportunities to expand their provision of MET as borne out by new maritime opportunities.

In Scotland, an industry-driven country, a partnership between Glasgow College of Nautical Studies and industry, which is Scottish enterprise-inspired, has created a Diploma in Ship Management, designed and piloted by the MET institution in the country. The Mackinnon partnership (2008) states that the programme is competitively priced, as is assessed distant learning via an E-learning platform. Such may be seen as evidence that the relationship between the maritime industry and MET institution is healthy in the country. This is further backed by coordination amongst key maritime stakeholders of shore-based activities, through creating MET programmes that fill the gap in the roles that were traditionally conducted by experienced merchant navy officers (Mackinnon Partnership, 2008). The Mackinnon Partnership (2008) believes that

there is a need to market and position (in terms of programmes delivery) some newly developed MET programmes. This is because it is difficult to obtain satisfactory students numbers to offer feasible training courses. Thus, MET partnerships also have a role to play in maritime career empowerment because the industry has a bad image and its MET programmes are not well marketed to attract youth to the industry when vocation is under consideration.

Maritime career empowerment to Lobrigo and Pawlik (2012) is making and ensuring that the image of the MET as well as the profession is enticing to the youth by emphasising the wide range of opportunities to be found post a sea-going job. However, such empowerment necessitates the involvement of the shipping companies and as well as MET institutions. The reason for this is that:

- Shipping companies contribute to maritime career empowerment by implementing a dynamic career movement for ship officers from sea to shore, and from shore to sea; and
- MET institutions contribute to such empowerment by ensuring that the curriculum include courses that aim to develop competences of future ship's officers to be successful shore-based professionals as well (Lobrigo and Pawlik, 2012).

Again, Lobrigo and Pawlik (2012) point out that maritime career empowerment initiatives ought to be well communicated to the youth, more than ever to school-leavers, to attract more prospective ship's officers with a clear understanding of the importance of sea-going careers for a promising shore-based maritime career. Thus, maritime career empowerment is not the responsibility of government or the private sector only; rather, it is a collaborative partnership between all stakeholders such as MET institutions, maritime industry businesses, government, and other agencies.

Partnerships are also valuable in developing Africa's MET. This has been echoed by the African Union Maritime Charter, and has been the case between African states and other states in the West and East, but not among other African states. This was noted by Musa (2000), who observed the differences in the education and training policies of East African countries such as Kenya, Tanzania, and Mozambique, and typically on the aspect of competition among the institutions.

This is despite the re-establishment of the East Africa Co-operation and the encouragement from the International Maritime Organization – regional cooperation in MET issues is formidable.

Partnerships for MET means obtaining support from the government and all other stakeholders. If there is lack of proper backing from these authorities in recognising the importance of an MET system and institution, this leads to failure. This has been the case in East Africa, according to Musa (2000), who maintains that matters related to MET have not been taken seriously at ministerial level. MET has also not been considered a priority in the government's National Development Plans.

Summary

The literature above has presented the state of MET globally, offering critical factors that shape its provision in both first- and third-world countries. To reiterate, according to Er *et al.* (2001), MET is defined as:

“A set of independent processes such as teaching, learning, researching and resources including human, material and information that function harmoniously to achieve specified educational objectives in the means of ensuring marine safety and the protection of environment” (Er *et al.*, 2001:70).

The essence of MET is to supply manpower to the shipping industry and other related or supporting sectors/clusters. MET is spread across a number of training institutions which provide short-period courses to post-graduate studies (Demirel and Mehta, 2009). However, when there is a gap in the MET process, for instance, lack of resources (such as materials – adequate and up-to-date training simulator or human competent instructors) effective MET cannot be achieved. This is the case in many countries of the developing world, as identified in the literature. The commonly agreed-upon guiding principles for an effective MET must include but are not limited to the following:

- Application of international recognised standards, including STCW;
- Cooperation with accrediting, awarding, and licensing authorities, as well as MET institutions, worldwide;
- Meeting local requirements;
- Close cooperation with the shipping industry to meet their requirements;

- Adopting new education and training technologies into MET;
- Updating programmes to cover new requirements and technologies applicable to shipping industry;
- Providing continuous education for industrial updating;
- Covering all stages of MET to achieve continuous education; and
- Balancing and matching academic studies and on-board training, taking into consideration licensing authorities (Demirel and Mehta, 2009: 1).

The literature has shown that all countries involved in the provision of MET at all levels have factors both internal and external which present both obstacles and opportunities for them. These factors at MET institutional and state level shape the provision of MET, globally. Gamil (2008) asserts that:

“The industry needs capable people with an aptitude for shipping and other activities associated with shipping; therefore, MET is a very important link in the chain of the shipping industry. MET institutions need to have, in addition to at least the minimum teaching facilities and simulator installations, high quality instructors, supervisors and assessors” (Gamil, 2008:1).

Thus, through such strategies, MET institutions and states continue to assist the provision of MET in their respective countries. The figure below, Figure 3.1, presents the critical factors influencing the complexity of MET, globally.

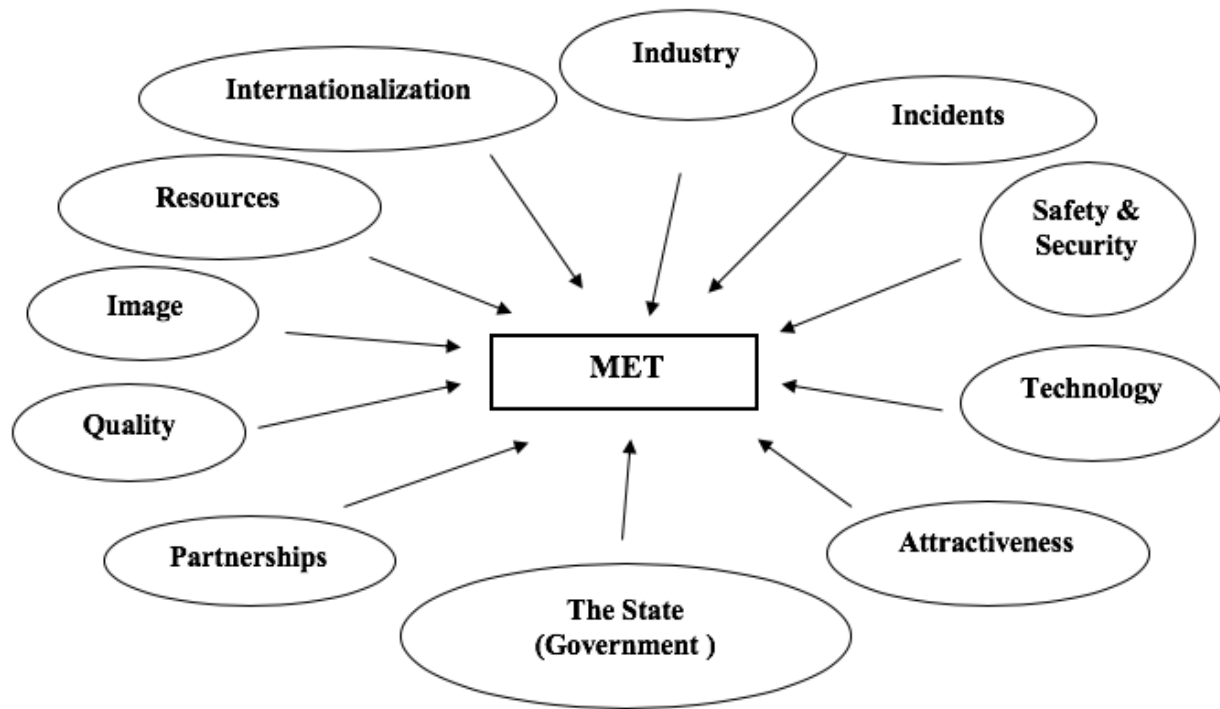


Figure 4.1: Critical factors influencing the complexity of MET

The figure above, Figure 4.1, has presented the key factors that influence the MET, globally. The literature has shown that the provision of MET, worldwide, is influenced by numerous factors and involves multiple stakeholders. The diagram below presents core stakeholders involved in the provision of MET.

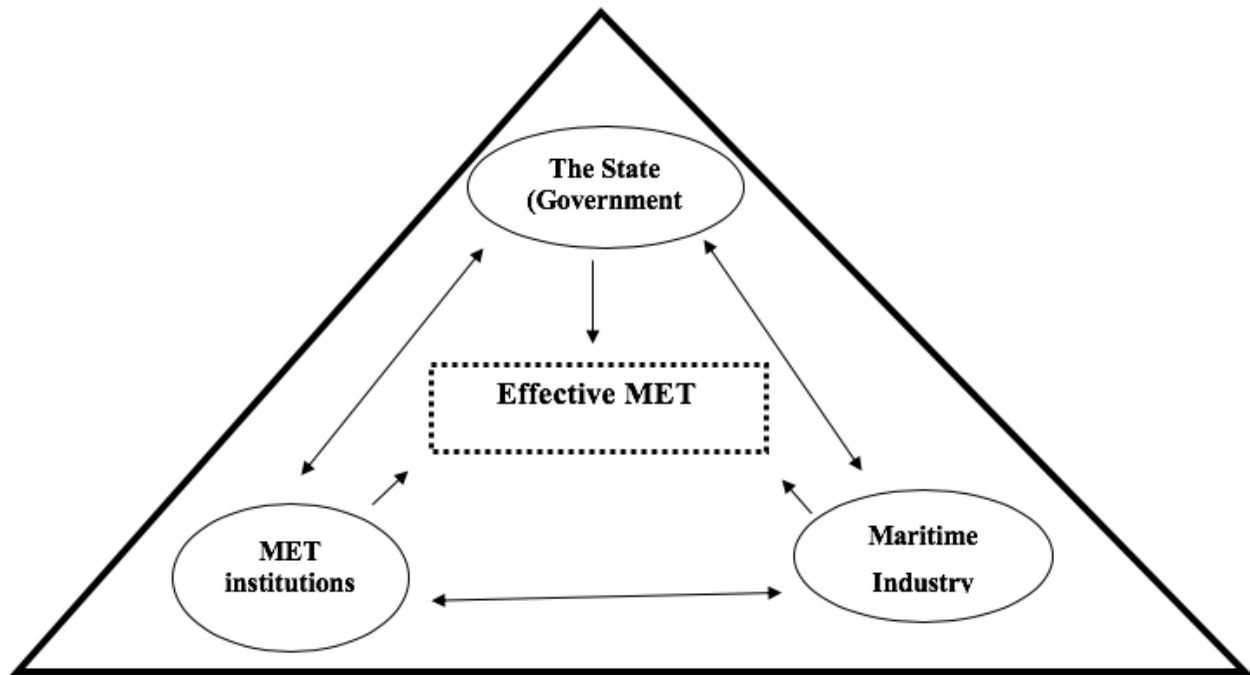


Figure 4.2: Key stakeholders in effective MET

The provision of MET is complex. The MET process beyond the institutions that provide it, involves various stakeholders. These are predominantly industry and the state. Such stakeholders make up the overall system governing MET. For MET to be effective under this system, these stakeholders ought to recognise one another, collectively working to address the challenges that emerge from the system. Issues such as safety and security, environmental concerns relating to pollution, which stem from education and training of maritime personnel both sea and shore based, remains a concern in the maritime world. As a result, MET stands as the focal point of debate in the maritime industry in the 21st century. However, through partnerships that foster cooperation and collaboration, the provision of MET can be effective in addressing 21st century maritime issues.

4.13 CHALLENGES FACING MET GLOBALLY

The need for MET to meet the STCW cannot be underestimated, because the global demand for maritime labour is determined by the shipping companies, including supply being influenced by compliance with standards required by the latter (Richter, 2016). Yet many MET institutions, mostly in the ‘developing’ world still fail to meet the ‘minimum’ requirement of STCW 2010. In the Philippines, half of the MET higher education institutions did not comply with the European requirements when an audit was carried out by the European Maritime Safety Association (EMSA) (Richter, 2016). Achieving the educational quality for and beyond the minimum regulative requirements of STCW 2010 may occur by improving technological equipment of training centres and by offering seminars to supplement academic training, including costly computer-based training systems and simulators (Baylon and Santos, 2011).

To achieve effective and better quality of the MET institutions, financial resources are required. This has been the case for the Philippines. According to Baylon and Santos (2011), investments may be drawn from tight linkages between MET institutions, shipping companies, and the manning agencies. In countries in which government sees the maritime industry’s ability to bridge the unemployment gap, government too can fund MET to address its employment policies challenges. Since the shipping companies face challenges to meet their demand for maritime labour, in countries such as the Philippines and the UK, they are encouraged to support the MET sector through investments as well as the exchange of information on their prospects towards MET education (Baylon and Santos, 2011). All of this, however, cannot be achieved without a synergy amongst these stakeholders.

In pursuit of improving MET quality and addressing maritime skills gaps, the new maritime course curriculum presents an opportunity for MET institutions to seek funding from various entities private or public, that support MET, for upgrading their facilities and teaching equipment (Richter, 2016). Therefore, it is essential that the various stakeholders in the MET sector increase their cooperation and coordination so as to create an attractive investment climate. Such investment may come in the form of training upgrades and facilities, and adaptation to new technologies and innovation (Richter, 2016).

Moreover, in acknowledging that government plays a vital role in shaping MET, its regulating government agencies, as with the Philippines, must continue ensuring that the MET institutions comply with STCW 2010. This is because of fast-technological advancements in the maritime industry which will result in standards rising with the application of these new technologies onboard in the future. Should this be the case, the MET sector in the Philippines can be expected to flourish further, according to Galvez *et al.* (2016), in fact anywhere in the world may be positively affected.

Thus, there are numerous factors that influence the provision of MET. The extent of the influence of these factors has presented barriers for most MET institutions in the various regions of the globe. Some of these checks are:

- Lack of stakeholder synergies;
- Negative image;
- Lack of awareness;
- Lack of resources (financial, human, and physical);
- Rapid technological advancements;
- Attracting, retaining, and retraining; and
- Non-regulatory compliance.

Although in traditional maritime countries young people are aware of the maritime industry and the careers within, they are less likely to enter the sector. This has been a hurdle for both government and MET institutions in countries such as the United Kingdom (Gekara, 2009). According to Lobrigo and Pawlik (2014:1), MET institutions in Western Europe have experienced a dwindling number of enrollees in nautical studies programmes that lead to a professional qualification as seafarer and eventually, as merchant marine officers. As a result of the decreasing number of students pursuing MET, the global maritime industry has witnessed the aging of its current labour force. The lack of awareness, the weak image of the maritime industry, and working in isolation by MET institutions, have contributed to the problem (SAMSA, 2008). Thus, MET institutions are also directly affected by global labour markets. Making MET relevant in higher education is a worthwhile investment with very high returns (Deng, 2012).

4.14 CONCLUSION

In conclusion, and drawing up a collective, themed summary of maritime education and training in the identified countries, a number of factors have emerged. Purposeful involvement by shipping companies, and the acknowledgement of technological advancements in the industry, drive the need for strong MET for both shore and sea-going maritime labour. Furthermore, on-the-job maritime programmes form an essential part of a comprehensive efficient, effective, and sustainable MET. Maritime infrastructure, teaching and research must be heavily invested in, to improve MET. From an overall conceptual understanding and analysis, hardy maritime stakeholder partnerships and industry awareness are likely to deliver success. This is derived from a realistic, decisive, and focus-based maritime policy, and a firm and clear understanding of global economic shifts that have a ripple effect on the maritime sector. Maritime awareness and careers within and the push for youth to consider the sector when making future vocational plans/choices as presented above is of paramount importance. As a result, the next, chapter, Chapter Five, presents the theoretical framework which this study adopted so as to guide and enable it to reach its objectives.

CHAPTER FIVE

THEORETICAL FRAMEWORK:

A SYSTEMS THINKING EXPLORATION

5.1 INTRODUCTION

Any problem affecting society can be seen from numerous theoretical perspectives (Fox, Martin and Green, 2007). A Systems Thinking theoretical framework is used to understanding the issue related to this study. Over the centuries humans have presented various ways to help understand the world they live in and the problems that emanate from it. As a result, one of the ways in which humans have developed in understanding the complexity of institutions and the world has been through Systems Thinking. This study endeavours to present a Systems Thinking exploration of the challenges facing MET in public higher education institutions in KwaZulu-Natal (KZN) by taking a closer look at the internal and external factors of influence.

Before doing the exploration, it is imperative that an explanation of Systems Thinking is first given. This chapter looks at Systems Thinking as a tool of exploration in understanding the complexity related to the challenges facing MET in public higher education institutions in KZN. It firstly looks at what is Systems Thinking, it goes further by looking at its methodology of enquiry Systems Dynamics and Causal Loop Diagramming. This is followed by its methodological contemplations and criticisms. The chapter concludes by providing the complexity between the maritime industry and MET and why exploring challenges facing MET at public higher education institutions in KZN using a Systems Thinking approach was deemed necessary and best fitting.

5.2 WHAT IS SYSTEMS THINKING?

Kay and Foster (1999) defined Systems Thinking as the study of objects as wholes and fusing all the pertinent data concerning an object, to have a sense of it. Likewise, McNamara (1999) states to help us observe the world in which we live in from a broad viewpoint that includes patterns, structures, and events; rather than just concentrating on the events themselves, Systems Thinking can be utilized. Arnold and Wade (2015) assert that:

“Systems Thinking is widely believed to be critical in handling the complexity facing the world in the coming decades; however, it still resides in the educational margins” (Arnold and Wade, 2015: 669).

Systems Thinking as an approach evolved from Systems theory (Pourdehnad, Wexler and Wilson, 2011:3). The field of Systems theory is one of the major breakthroughs in understanding the complex world of organizations. Systems Thinking is the practice of holistic thinking, based on Systems theory (Mulej *et al.*, 2003: 71). How we understand organizations and change has been greatly influenced by Systems Theory. As a result, Systems theory identifies and analyses the links amongst various elements in a system and has been an essential area of study for decades (Mathews and Jones, 2007).

One intellectual thread of Systems theory is the field of Systems Thinking. The application of Systems theory is called Systems Analysis. One of the major tools of Systems Analysis is Systems Thinking. Systems Thinking as a tool is a method of understanding how things which can be regarded as “systems”, influence one another while being embedded in larger systems which exert an influence on them as well. Checkland (1999) states that Systems Thinking is:

“An epistemology which, when applied to human activity is based upon the four basic ideas: emergence, hierarchy, communication, and control as characteristics of systems. When applied to natural or designed systems the crucial characteristic is the emergent properties of the whole” (Checkland, 1999: 318).

Systems theory notion studies arrangements or structures from the viewpoint of the entire system, its numerous subsystems and the recurring patterns in the relationships between the subsystems. It is a tool for assisting individuals to view and get insight on systems from a broader perspective. This includes identifying overall patterns, structures and cycles in systems, rather than seeing only vague events emanating from a single system’s behaviour in isolation from all other related systems. This all-encompassing observation can help individuals to swiftly identify the real roots of problematic issues and to understand where and how to go about in addressing them.

MET institutions is one example, which services not only domestic but also a global industry that is internationally regulated. Thus, MET institutions are affected by internal and external

factors/agents of change that are systematically connected and influencing one another on a domestic and international scale. Therefore, Systems Thinking can be used to interpret the dynamics inherent in the provision of MET in this regard and challenges therein. To show the connectivity of these factors, Sampson (2004) identifies that:

“A vessel may be owned in one country, technically managed in another, have its crew supplied by several others, trade internationally and be registered in any one of a number of nations operating open registers. As such, the industry provides us with a fascinating example of how a truly global industry operates, and no more so than when considering issues of labour markets and the regulation of standards of education and training” (Sampson, 2004:245).

External factors in this context may include global regulation of MET, the scope and diversity of the maritime industry, technological advances in the industry and training, image of the industry and the ageing of industry professionals. Changes in the characteristics of institutions may foretell something of their own behaviour, as well as their effects on policy (Guy-Peters, 2000), such is the case with regards to MET institutions globally. The globalization of the maritime industry has caused the globalization of MET through standardized MET brought about by international regulations. The formation of the IMO, under the UN, is one instance of the constant change in MET policy which has come about due to systematic globalization of MET and related challenges. Although “Systems Thinking” as such has recently been gaining popularity as a novel approach to problem solving, evidence of its fundamental principles of interconnectedness, unity, and holism can be found in a number of ancient spiritual and religious texts and philosophies according to Reynolds and Holwell (2010:8-9) cited in Singh (2015: 9):

“Systems Thinking in terms of promoting holistic views...can be traced back to the ancient spiritual traditions of Hinduism (e.g., through ancient texts like the Upanishads and Bhagavad Gita), Buddhism (oral traditions of the Dhama), Taoism (basis of acupuncture and holistic medicine), Sufi Islam (in translations of the Kashf al-Mahjub of Hujwiri and the Risala of Qushayri), ancient Greek philosophy (particularly Heracles and Aristotle), as well as being prevalent through the oral traditions of many indigenous tribal spiritual traditions which have existed for tens of thousands of years”.

Singh (2015) is of the view that the philosophies of the Systems Thinking tradition have persisted over time.

“What is apparent is that these principles are being transferred from the philosophical and religious domains to become the foundation of a variety of Systems Thinking tools and methodologies which are now being applied to a myriad of social contexts, issues and problems, with largely positive results” (Singh, 2015: 59).

The essence on including the above quotes then, is not only to indicate the sustained usefulness of the principles underlying the Systems Thinking approach, but rather to also attract attention to the possibility and usefulness of applying such ancient principles to the problems and complex issues that we are faced with in the here-and-now, and in doing so, to provide a means of testing the relevance and strength of the Systems Thinking approaches for dealing with modern day complexity and turbulence.

Thus, whichever a Systems Thinking tool or method is utilized, while being utilized for its perceived strengths, it is also being tested to reveal its underlying weakness or weaknesses in the very same process. This should be an aim of every application of any Systems Thinking tool so as to ensure that these tools are adapted continuously to deal with the ever-changing nature of the world in which we are embedded, thus ensuring their continued validity and robustness. Hunt, Timoshkina, Baudains, and Bishop (2012: 324) define systems as:

“...a collection of discrete entities within real or conceptual boundaries that are linked by interrelationships and function as a whole”.

Inherent in this definition, Singh (2015) is of the view that the recognition of systems as being not only products of the real, physical world, but as a means of conceptually representing the world as well. Also, explicit in this definition, is the idea that systems are made up of elements or agents that while being separate from each other, still interact with one another in a manner that creates the feedback influences which underlie and sustain such systems (Singh, 2015). Within the ambit of the Systems Thinking philosophies, these interconnected networks of feedback influences are referred to as the system’s “structure” according to Singh (2015) because this lends itself to one of the fundamental principles in understanding social systems which is the belief that the structure of the system determines its overall behaviour.

The above definition also emphasizes “interrelationships” which is a pivotal aspect of the Systems Thinking approach. Not only is it about recognizing the embeddedness of various systems within other systems, but it is more significantly about recognizing the effect they have on each other (Reynolds and Holwell, 2010). This requires one to step back from the details of an issue in order to identify the effect such details have on each other; a perception which can only be uncovered by looking at the bigger picture, as facilitated by Systems Thinking. For this reason, Systems Thinking represents a shift in mind-set from a preoccupation with the details of a problem issue to a more holistic examination of the various feedback influences that contribute to the complexities and continued existence of such problem issues (Senge, 1990). Thus Reynolds (2012) emphasises that Systems Thinking is gaining popularity in the field of evaluation mainly to assess complex interventions. However, Systems Thinking is more like a notion that crosses many disciplines and fields and is understood in various diverse ways (Cabrera, 2006:10).

“Systems Thinking literature in scholarly journals is small but developing, scholarly Systems Thinking cuts across the physical, natural, and social sciences, as well as in fields as diverse as the military-industrial complex, education, human development and business” (Cabrera, 2006:29).

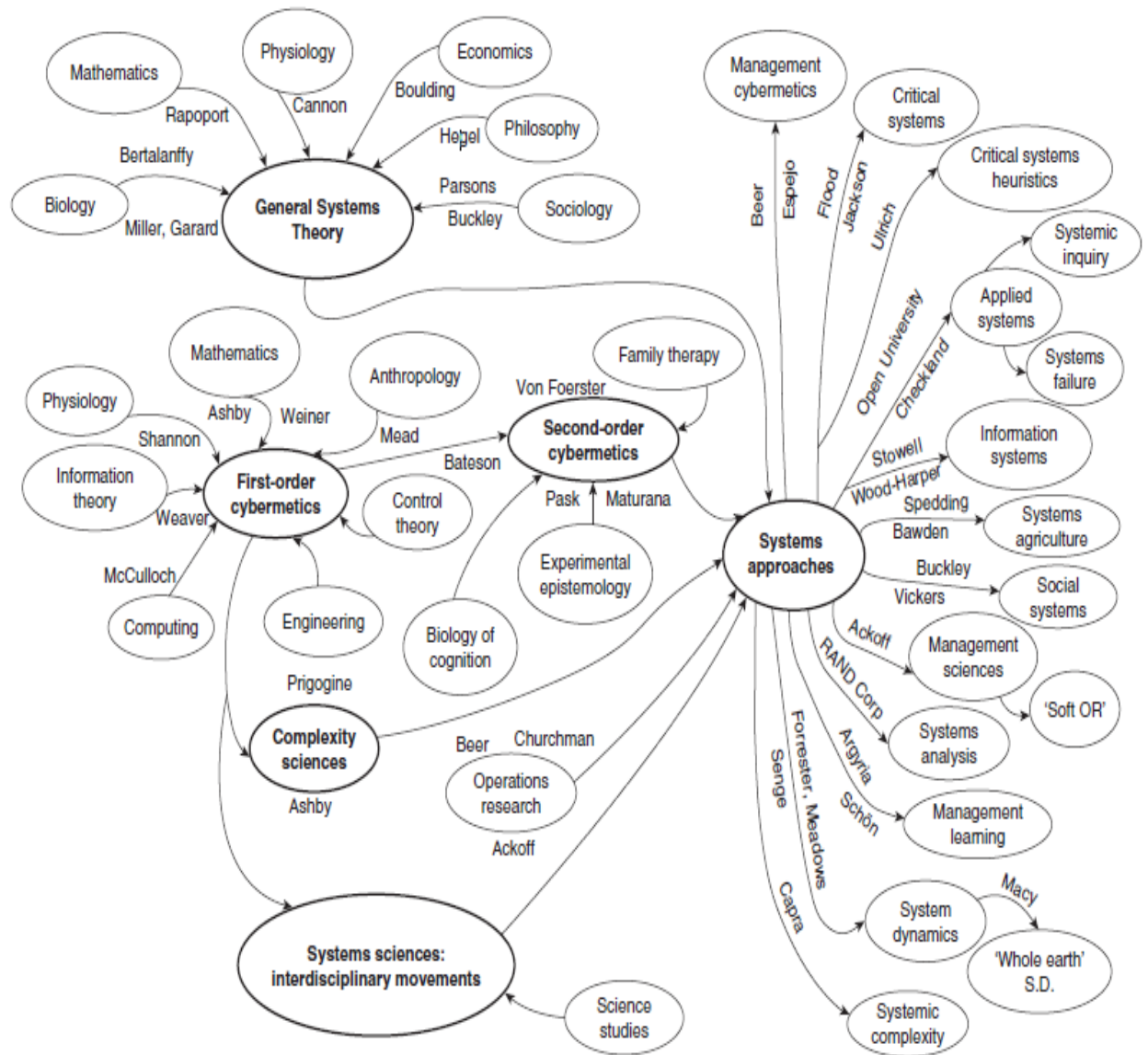


Figure 5.1: A model of different influences that have shaped contemporary systems approaches

Source: Ison (2008: 144).

Figure 5.1 provides a description of some of the inspirations that have given rise to current systems approaches. Nonetheless other historical accounts can be found in Checkland (1981), Flood (1999; 2001; and 2006); Francois (1997); Jackson (2000) or on Principia Cybernetica (2006).

5.2.2 Systems Dynamics

Systems Dynamics (SD) can be regarded as methodology rooted in the Systems Thinking philosophy; a philosophy that is becoming increasingly popular due to its effectiveness in making sense of real-world complexity (Singh, 2015). Thus, “it is a powerful tool in the creation of feedback theories” (Luna-Reyes and Andersen, 2003:271). Systems thinkers try to understand problematic situations in their entirety by not only examining the explicit real-world manifestations of problematic situations, but by delving deeper according to Singh (2015). It is proposed that a deeper investigation of the structure of a system will reveal hidden feedbacks that nourish the problematic situation, hence ensuring its continued existence (Rodrigues and Bowers, 1996; Scholl, 2001).

SD was originally created by Forrester and it focuses on causal mechanisms to offer two ways of understanding (a) why social systems behave over time in the way they do and (b) how different policies can change that dynamic behaviour (Forrester, 1994a; 1994b; 1994c). Simply zeroing into a particular aspect of a problematic situation and attempting to deal with the explicit symptoms, may bring temporary relief, but in the long run, such symptoms may reappear in a more extreme form (Forrester, 1994a, 1994b). The corrective actions instituted may even bring about unintended consequences (Forrester, 1994b) which plunge the system into greater disharmony, or fail to improve its performance to the degree desired by the policymakers. Therefore, systems change represents a concerted effort to delve deeply into the root causes of a problematic situation, in order to bring about positive systems-wide change through the utilization and application of particular actions, policies or infrastructures (Hirsch *et al.*, 2007).

In the above regard, system thinkers are tasked with a mammoth task in attempting to understand a problematic situation in its entirety, especially since it is often the easier route of viewing problematic situations as fragmented pieces which can be easily “handled” that is more often utilized by those in the business world (Singh, 2015). Thus, as Senge (1990) asserts, Systems Thinking encourages those engaging in it to avoid the tendency to dissect problem situations into their constituent parts and to move away from the silo mentalities and narrow perspectives often utilized in, and encouraged by organisations. Inherent in this philosophy is the call to focus on

and deal with the feedbacks that underlie problematic situations, instead of attempting to cure the symptoms arising from such feedbacks alone (Singh, 2015).

Essentially, SD examines the structure of a system to identify the information flows comprising and underlying that particular system, with consideration of the fact that it is both the structure of the system, together with its information flows that determines the overall behaviour of that system (Forrester, 1994c). It has been used to understand and deal with the constantly evolving complexity inherent in a diverse range of systems including environmental, political, organizational, medical and engineering-related systems (Hjorth and Bagheri, 2006).

While SD is the Systems Thinking tool that shall be utilized for this study. The whole array of Systems Thinking tools are aimed at understanding a problematic situation in a holistic manner, thus negating the deficiencies of a fragmented view. These Systems Thinking tools go further by recognizing that the perceptions of a problematic situation do not lie with a single stakeholder, or group of stakeholders, but rather that greater understanding emerges from the collective perception of a problematic situation which can only emerge through the active engagement and discussion among all relevant stakeholders (Singh, 2015). The figure below portrays a graphic relationship between Systems Thinking and System Dynamics.

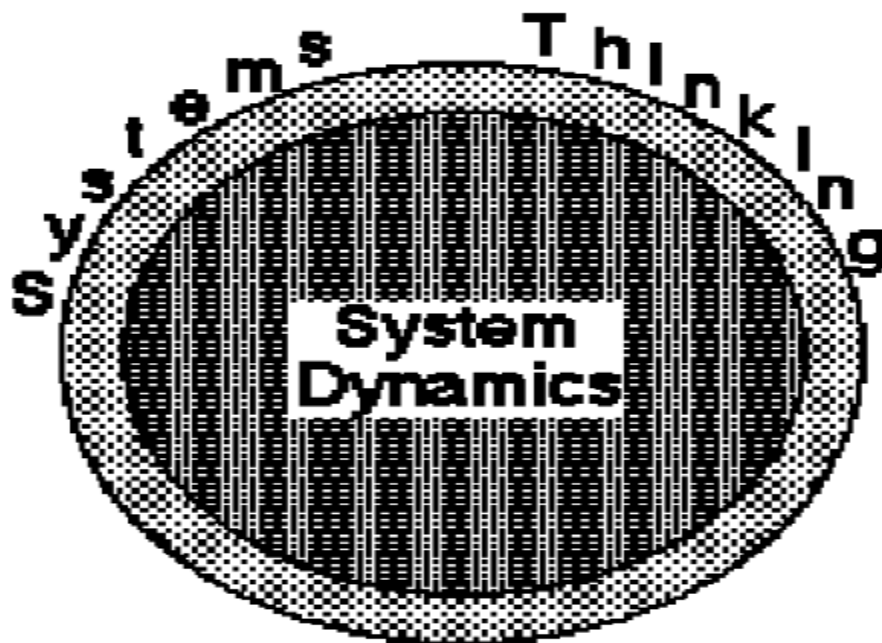


Figure 5.2: The Relationship between Systems Thinking and System Dynamics

Source: Richmond (2000).

5.2.2. (i) A Qualitative System Dynamics (SD)

Qualitative SD relies mainly on the identification of problem issues, and the examination thereof via a process of graphical description in the form of Causal Loop Diagrams (CLDs) or stock-flow diagrams, or a combination of both (Singh, 2015). Therefore, the emphasis moves away from the quantification of variables perceived as contributory to the problem issue and the subsequent simulations of the computer based model (Wolstenholme, 1985; Wolstenholme, 1999).

SD was originally a purely computer-based art as its main premise was to utilize the power of emerging technology in the form of computer simulations in order to understand and analyse complex socio-economic issues (Wolstenholme, 1999: 422). Stock-flow diagrams were initially developed to be merely a graphical representation and manner of organizing and housing the model equations for ease of access at later stages of the simulations. CLDs were introduced to make the feedback relationships between the elements of the model explicit and understandable. Initially, CLDs were constructed after the computer simulations to demonstrate identified feedbacks, but in recent times, the SD process often begins with construction of such CLDs in order to infer or hypothesize feedbacks and to infer the mode of behaviour, or the behaviour of the system over time (Homer and Oliva, 2001: 347).

As the merit and power of investigating problem issues via the use of CLDs became more apparent, more support was given for the sole use of these graphical representations in the structuring and solving of problems, without the use of computer mapping and modelling (Singh, 2015). According to Singh (2015) this led to the development of a branch of SD thereafter referred to as Qualitative SD which espoused the benefits of utilizing the qualitative or graphical aspects of the SD process without moving into the quantification and simulation stages.

This development also promoted the use of CLDs as a key facet of recent approaches to organisational learning which become known as “Systems Thinking” (Wolstenholme, 1999: 422). The central tenet here being the use of such diagrams to infer the behaviour over time of the system

being investigated, rather than calculate such behaviour (as was and still is the case with quantitative approaches to SD). This was, and is, especially beneficial to people who may be more inclined in the art of inference, rather than calculation (Singh, 2015). Currently, SD software programs such as WinWord, iThink or Vensim, etc. allow for the construction of stock-flow diagrams which can then be supplemented with the necessary equations and parameters (Schuster, 2003; Singh, 2015).

5.2.2. (ii) Applying a qualitative approach to SD

To generate feedback models, SD depends much on quantitative data, nonetheless what can also play a key role at all levels of the modelling process is qualitative data and its analysis techniques (Luna-Reyes and Andersen, 2003). Luna-Reyes and Andersen (2003) are hence of the view that:

“Data gathering techniques such as interviews and focus groups and qualitative data analysis techniques such as ground theory methodology and ethnographic decision models could have a strong, critical role in rigorous system dynamics efforts” (Luna-Reyes and Andersen, 2003:271).

SD models are usually mathematical representations of problems in classical literature of SD modelling according to Reyes and Andersen (2003), although they do acknowledge and recognize that a majority of information available to the modeller is not numerical but rather qualitative. This is asserted by Forrester (1975) and other authors in the field such as Rander (1980); Richardson and Pugh (1981); Roberts *et al.* (1983); Wolstenholme (1990); Sterman (2000); and recently Singh (2015). Thus, the question seems not to be whether or not to use qualitative data, but rather how and when to use it (Reyes and Andersen, 2003). Nevertheless, the qualitative aspects of the SD methodology thus consist of the representation of the problem issue in graphical form either in the form of CLDs or stock-flow diagrams, or in some cases both (Singh, 2015). However, this may be considered by some as not engaging the full capabilities of the SD methodology and tools, but an emphasis on the qualitative aspects of the process has its own unique merits (Wolstenholme, 1985, Wolstenholme, 1999).

The entire SD process from conceptualization and boundary identification of a problem issue to policy implementation based on the learning from the simulations provides an extremely powerful

tool for those aiming to look for long-term solutions with the least negative real-world consequences (Singh, 2015). However, the simulation and parameter estimation phases of the SD process are highly technical requiring mathematical equations and a high degree of mathematical understanding on the part of the modellers, as well as their audience, although some SD proponents would argue otherwise (Morecroft, 2007; Sterman, 2000). Often it is assumed that if the modellers can run and understand the simulations that they will automatically be able to communicate their findings to their audience which this is not always the case according to Singh (2015) because the bigger boundary to understanding the learning coming out of the repeated simulations is the mental capacity of the audience itself. Wolstenholme (1999) believed that:

“...managers fall into distinct qualitative and quantitative ability groupings and the non-quantitative audience is much larger than the quantitative” (Wolstenholme, 1999: 423).

SD is not a very well-known methodology, especially in South Africa (Singh, 2015). Nevertheless, the application of a qualitative approach to it, which Singh (2015) applies in understanding the sustainability of non-profit organizations has its merits. Because there are various methodological tools that can be utilized in Systems theory and eventually Systems Thinking and in this case SD provides a methodology that is inherently both qualitative and quantitative in nature (Schuster, 2003). It recognizes that peoples’ perceptions of a problematic situation are often faulty, in the sense that it is impossible for a single person to know all aspects of a problematic situation fully (Singh, 2015). SD proposes that the perceptions and understandings that are held by individuals cannot fully grasp the wide array of information flows and feedbacks inherent in a problematic situation. This is often termed “bounded rationality” indicating that the human mind and its mental models (or its ways of perceiving the world) are severely limited in understanding large degrees of complexity (Simon, 1990: 6), such as the complexity evident in problematic situations.

Engagement with the stakeholders involved in such problematic situations, through for example interviews or group sessions, is aimed at fleshing out each of the stakeholders’ perceptions of the problematic situation and once this is done, these disparate perceptions are collated in the form of feedback loop diagrams or stock and flow diagrams (Singh, 2015). These are basically visual representations of the problematic situation displaying explicitly the information or feedbacks underlying the problematic situation according to Singh (2015). She points out that it is this aspect

of the SD process that is thus decidedly qualitative in nature as it is the views, opinions and perceptions of each of the stakeholders that will give rise to the visual representations of the problem situation. It may be that the picture of the problematic situation that emerges is very different and more revealing than each of the stakeholder's perceptions alone, thus indicating one of the many strengths of this approach (Singh, 2015).

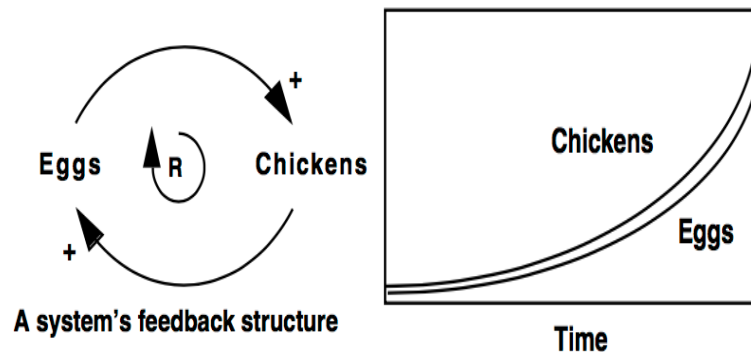


Figure 5.3: CLD and depiction of behaviour over time

Source: Savory Center (2005), cited from North (2005).

In the diagram above, the CLD on the left shows how when the number of eggs increase, this leads to an increase in the number of chickens. This larger number of chickens then allows for an increase in the number of eggs. The graph on the right reflects the exponential increase of eggs over time, indicating how a CLD can be used to infer the behaviour of variables over time. In this example, the reinforcing loop is used to infer exponential increases in the number of eggs over a period.

5.2.2. (iii) The explanation of the Causal Loop Diagram (CLD)

CLDs comprise of variables which can be seen as: actions, things, or feelings linked by causal connections in the form of arrows with a polarity either a + or a – sign and delays with the sign (/). Thus collectively, these either create positive and/or negative feedback loops that portray the circles of cause and effect. To enable an understanding of the findings with regard to CLDs, the following example is presented:

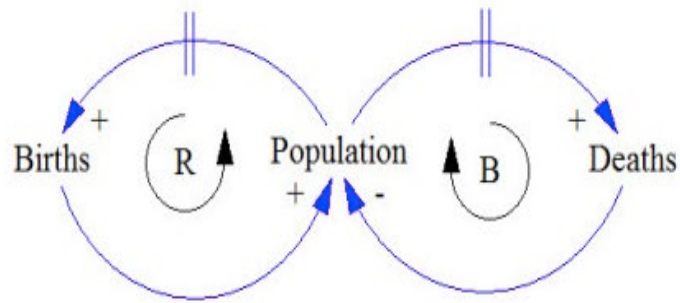


Figure 5.4: CLD of the relationship between birth rate, death rate and population growth
Source: Sterman (2000:138)

A set of relationships where a variable leads to a change in another variable is presented in the above figure which is called a feedback loop. To read a feedback loop, one generally chooses a variable to start with and arbitrarily chooses a direction, which is either more or less. Figure 5.3 depicted a systems feedback structure between eggs and chickens. This was a simple feedback diagram and hence had one loop. The example above (Figure 5.4) takes it further by a feedback loop when multiple variables are at play. Table 5.1 below explains the notations used in these loops in more detail and at the same time explains the CLD.

Table 5.1: The explanation of the CLD language

CLD Symbol	Explanation
→	Arrow used to show/represent causal link direction.
+	Placed next to an arrow when two variables or more in the same direction, more leading to more, lesser leads to less meaning that the causal relationship has a positive or reinforcing relationship.
–	Placed next to an arrow when the variables move in the opposite direction, more leads to lesser, or lesser leads to more meaning that the relationship is bi-directional or in negative nature.
R	This is a Reinforcing feedback loop sign and it is used when one variable reinforces itself for example, a bigger population leads to more births which increases the population even further because more births today leads to more births in the further. Note: <i>If this were the only Feedback Loop in the Population system and people did not die, then we would see exponential growth in the number of people.</i>
B	This is a Balancing feedback loop sign and it is used when a variable balances itself for example. More deaths today leads to fewer deaths in the future. This is because more deaths today will cause the population to fall, which means less people will be around to die later. Note: <i>Since more leads to less or less leads to more – the original change is balanced by a change in the opposite direction.</i>
//	Used on causal links between variables which represents a Time Delay . It is found in situations in which there is a time lapse before the influence of one variable can be felt by another variable. For example it takes time for an individual to be of age, to have a child which means there is thus a delay between population and births.

Source: Compiled by author using information from (Sterman, 2000; Richmond, 2005)

Inferring the behaviour of the system over time allows stakeholders to be aware of the future state of the system, to develop strategies to deal with such future states. Nevertheless, there are a number

of both quantitative and qualitative software tools for modelling (Schuster, 2003). A firm grasp of the understanding required to build and simulate a full SD model has become relatively easier with the advent and continuing development of several software packages such as iThink, Vensim, etc. according to Singh (2015). According to Schuster (2003), when making CLDs without any further mathematical modelling intentions which is quantitative, the use of software tools such as WinWord (Microsoft) is preferable. However, for beginners and those unaccustomed to thinking in stocks, flows, equations and numbers, the process of constructing a model, simulating it, understanding what the model is “saying” and making the subsequent policy and model adjustments to produce better system behaviour over time can be daunting, difficult and time-consuming (Singh, 2015).

Since the researcher was not well grounded in SD and that the “*the blend of skills for expert modelling competence is difficult to find...*” (Wolstenholme, 1999: 425), a qualitative SD process that relies more on diagramming rather than the arduous construction, simulation and understanding of computer models was seen as more suited to a non-SD inclined researcher and audience, especially if the time to develop their quantitative SD skills and subsequent computer models, is limited. Nonetheless, the move towards a more qualitative approach has been an attempt by SD practitioners to increase the utilization and relevance of SD, especially among those wanting to utilize the methodology and tools to understand and solve organizational problems (Wolstenholme, 1993: 925). Thus, policy decisions based on a partial understanding of system structure and feedback influences (as that emerging from the qualitative approach to SD), may not incorporate a full understanding of the dynamics of the system over time, but will nevertheless produce better policy decisions than those based on no understanding of feedback structures at all (Singh, 2015).

5.2.3 Causal Loop Diagramming as a tool for Systems Thinking

Systems Thinking practitioners make sense of an issue by making use of fundamental Systems Thinking tools, one of which is causal loop diagramming (CLDs). Making this study qualitatively based, CLDs are qualitative tools (Schuster, 2003) which were used, that are graphical representations of the issue being explored which were based on an awareness of the elements comprising the system as being fundamentally interconnected and in continuous interaction with

one another (Singh, 2015). CLDs are easy to understand and common in System Dynamics (Schuster, 2003). CLDs are utilized in the initial stages of the SD process to assist stakeholders to make their perceptions and beliefs regarding their issue of concern explicit, to generate meaningful discussion pertaining to the problem issue (Singh, 2015).

The tools generated by proponents of Systems Thinking are many, but most of them aim at generating a graphic or visual representation of the issue being investigated which fosters a holistic understanding of how the underlying structure of the system gives rise to its overall behaviour. Thereafter, points in the system can be identified which can be adapted, improved or corrected to allow for more effective or productive system behaviours to emerge (Hjorth and Bagheri, 2006). For this reason, Chapman (1998) declares the ability of Systems Thinking to reveal the component elements of a system or issue, and the manner in which they interact as being at the centre of the recent gravitation toward a systemic manner of perceiving the world. Chapman (1998: 237) adds to the above definition by stating that the elements that comprise a system “*function together for a common objective*”.

The tendency of a Systems Thinking approach to examine phenomena in a holistic fashion is vastly different from the prevailing scientific tendency to understand phenomena by breaking them up into their constituent pieces and examining the parts in isolation (Hjorth & Bagheri, 2006). Recognizing how the elements that comprise a system interact through the use of such tools, enables not only a holistic understanding of the issue being investigated, but also enables those engaging in such investigations to understand why previous policies or interventions that were applied may not have produced the results originally anticipated, or may have had no impact within the system (Hirsch, Levine and Miller, 2007).

The Systems Thinking assertion of viewing phenomena in a more holistic fashion may present a more difficult task for problem solvers and stakeholders as it requires a commitment to uncovering the deeper issues feeding a problem situation. It also calls upon the courage to move away from the more commonly accepted fragmented approach to problem solving. However, this approach, while presenting a more simplified approach to problem solving, is becoming less and less suited to dealing with the complexity inherent in social systems. As Gharajedaghi (2006) asserts:

“But, somehow, something is missing with the way we think about our lives. What has become the dominant language of our time produces only a partial understanding of our reality and relates only to parts of our being, not the whole of it. We need a holistic language, a language of systems, which will enable us to see through chaos and understand complexity” (Gharajedaghi, 2006: 26).

Thus, Systems Thinking is proposed as a more beneficial lens through which to view, analyse and understand the social world and the social and natural systems embedded in it (Hjorth & Bagheri, 2006). However, Singh (2015) is of view that the importance of a reductionist approach should not be ignored as, thus far, it has made important contributions to the fields of science, technology and medicine. With the globalization of the maritime industry and safety and security regulatory measures therein, MET systems have become connected to global systems. In this way, both holistic and reductionist ways of viewing the world have their own unique contributions to make in the understanding of phenomena, with system thinking’s holistic approach more suited to social systems which demonstrate complexity, non-linearity and causal ambiguity (Singh, 2015).

5.2.4 Methodological Contemplations and Criticisms

Since the 1980s the qualitative aspect of SD modelling has gain ground but with much criticism because amongst other things, the lack of simulation because SD had long been based on building quantitative simulated models in problem solving (Coyle, 2009). Although Coyle (2009) points out that those that have advocated and been active in qualitative aspect of SD modelling have decades of experience in quantified modelling and remain active in the art.

Nonetheless, to date, there are qualitative (or meaning-related) aspects and quantitative (or numerical) aspects in many of the stages that are defined in the literature as definitely “quantitative” or “qualitative” (Singh, 2015). In that though one methodological issue to consider with regards to the distinction between qualitative and quantitative SD is that although many authors propose and adopt an either-or approach in terms of alignment to the merits of either a qualitative or a quantitative approach, qualitative and quantitative SD methodologies are not totally divorced from one another (Singh, 2015). Coyle (2009) is of the view that the qualitative aspect of modelling like its quantitative part is useful in its own right. Below is a table indicating the qualitative and quantitative aspects of the various stages of a conventional SD methodology:

Table 5.2: The overlapping of qualitative and quantitative aspects in the SD methodology

Stage of the SD process	Description	Nature of the process
Problem articulation/Problem definition	Involves engagement with stakeholders & relevant data to define & articulate the actual problem being encountered.	Qualitative
System conceptualization/Creation of the Dynamic hypothesis	Probing deeper into the causative factors of the problem situation & identification of the feedback relationships between such factors.	Qualitative
Model formulation/model representation	Conversion of the above information into stock and flow computer-based models which are then repeatedly simulated	Qualitative & Quantitative
Testing/evaluation of the computer model	Subjecting the computer model to tests to determine its robustness or validity	Qualitative and/or quantitative
Policy formulation	Using the discoveries from the repeated simulations to craft policies for better improved system performance	Qualitative & Quantitative

Source: Singh (2015: 71-72)

The problem articulation stage is perceived as being qualitative in nature because the defining of what the “problem” is, is often done by the SD practitioner in tandem with the stakeholders (Singh, 2015). She further points out that this information could be derived from typically qualitative data gathering tools such as interviews, focus group sessions, open-ended questionnaires, etc. This may also be facilitated through investigation of key documents, policies, archival data and any other source that provides valuable information pertaining to the problem situation (Singh, 2015). Information gathering for the construction of CLDs, stock-flow diagrams and the subsequent

computer simulations usually relies on a combination of these approaches to get the most accurate, in-depth picture of the problem situation as is possible according to Singh (2015).

While they may have not been directly involved in the construction of the CLDs, it was a choice made by the researcher to employ the use of such diagrams to generate the findings and recommendations, instead of the computer simulations which may have been too complicated for the participants to understand. This is not to say that people cannot be taught to understand feedback relationships, stocks and flows, nonlinearities and time delays (Sterman, 2002: 511), but rather that it requires much time, training and practice. Nevertheless, Luna-Reyen and Andersen (2003) express that:

“Qualitative data collection and analysis, when done properly, are ways of bringing formality and rigor into the modeling process. They add richness and details that numbers cannot provide. They also allow for insights about the mental models of experts in the field and the variety of individuals’ understanding about meanings and connections and uncover the complexity of real world systems through detailed stories and descriptions” (Luna-Reyen and Andersen, 2003: 286).

5.3 THE COMPLEX RELATIONSHIPS BETWEEN THE MARITIME INDUSTRY AND MET

The global maritime industry is a derived demand of world economic development brought about by international trade liberalization resulting in globalization (Sag, Ziarati, Ozkaynak, Yıldırım, 2008). Within this complexity, the global maritime industry is thus a tremendous means of ensuring that economic resources are moved, thus making it a key enabler of global economic development. Such facilitation involves a vast supply chain of people from multi-educational disciplines working together directly and indirectly in the facilitation of economic development worldwide. Because the maritime industry is one which is extremely globalized, it forms the backbone of international trade, and it is estimated that 90 percent of all world trade is seaborne (Fuazudeen, 2008; Shicheng, 2009; Eler, Calamubuhay, Bernas and Magramo, 2009).

The industry is regulated, owned, managed, financed and supplied with labour on an international basis (Sampson, 2004:245). As a result, globalization has surfaced as one of the most influential

socio-economic and political forces shaping the world today (Ziarati, Demirel, Lahiry and Ziarati, 2011). As a result, the world has witnessed the continued growth of the global maritime sector, especially in the shipping and shipping related activities (BRICS Maritime Trade Report, 2013). Globalization and international trade is dependent on the maritime industry and as a result MET has taken centre stage.

In further looking at the complexity, in the past two decades or so the world has witnessed a global shift in maritime labour force both in the supply and demand sides (Ruggunan, 2008). When the 2008 economic crisis hit the global maritime industry, according to Shickeng (2009) for example, those that had left seafaring in mostly Eastern European countries went back to their sea-going jobs because of the economic situation in their countries. Many ex-seafarers from Asian countries such as India and Korea, who had served on-shore, now re-joined ships (Shickeng, 2009).

Furthermore, in the midst of the global economic downturn many ship-owners cancelled ship building due to the crisis and also because of the International Maritime Organizations (IMO) regulations which resulted in more and more old and single-hull ships being phased out resulting in many seafarers losing their jobs (Shickeng, 2009). The IMO is a specialized agency of the United Nations (UN) and is the global standard-setting authority for the security, safety and environmental performance of international shipping. Its key role is to build a regulatory framework for the shipping industry that is universally adopted, fair, universally implemented and effective (IMO, 2017).

During the 2008 recession, the maritime economy's demand for senior officers continued to grow, but the demand for Ratings decreased (Shickeng, 2009). This demand was fuelled by the belief by shipping companies that quality seafarers were of utmost importance for the future development of the shipping industry and that the quality of the human resources was a competitive factor in the long-term development (Shickeng, 2009). Nonetheless, the future development of the shipping industry through quality human resources primarily also depends on education and training institutions such as those found in higher education.

In addition, the high-profile of shipping incidents and accidents relating to pollution towards the end of the twentieth and early twenty first centuries, have resulted in a continued political concern with the standards of MET, in which ship owners, managers and MET institutions and states and their respective institutions have had to address through various policies and strategies. This is asserted by Sampson (2004), who is of the view that:

“Mutual insurance companies (known as P&I clubs in this sector) have also been active in the insertion of pressure on the maritime industry to improve its accident and incident rates and take greater steps to decrease the part of the ‘human element’ in causing disasters and mishaps” (Sampson, 2004: 247).

This is because close examination of casualty analyses sanctioned by the IMO in 2004, especially concentrating on accidents and their causes, indicated that in the global maritime industry, MET standards were not applied correctly and when the human factor issues were studied carefully, there were omissions in the education and training in maritime programmes received by the seafarers involved in accidents (Brady, 2008; Ziarati and Ziarati, 2010).

Since over 90 percent of world’s trade is seaborne, the safety of life at sea, and the preservation and sustainability of marine environments, depends on the competence and professionalization of seafarers (Albayrak and Ziarati, 2012). However, the growth of the maritime industry and the shift in maritime labour markets has presented challenges for MET in both developed and developing countries. The introduction of regulation has meant that MET institutions no longer operate in isolation and thus have to adhere to international MET standards enforced by institutions such as the IMO, which push for safety and security at sea through globally standardized MET.

Human error (HE) is responsible for eighty percent of accidents and incidents at sea (Albayrak and Ziarati, 2012). Thus, as the producers of maritime man power, MET institutions are the life blood of the maritime industry and international trade depends on the millions of tons of cargo imported and exported in ports and shipped around the world. Nonetheless, factors brought about by globalization have forced MET institutions to operate on the same level regardless of the different development paths they have gone through in the different regions of the world. This may

it be in the United States of America, Kenya, Greece, Philippines, United Kingdom, Brazil, Japan, Nigeria and or the United Emirates.

5.4 EXPLORING CHALLENGES FACING MET USING A SYSTEMS THINKING APPROACH

As Systems Thinking is more like a notion that crosses many disciplines and fields and is understood in various diverse ways (Cabrera, 2006:10), its use in the developing world such as South Africa, has been useful in explaining systemic complexity (Setianto, 2014), in the tourism industry in Vietnam for example (Mai and Bosch 2010) and forest management in Indonesia (Purnomo and Mendoza 2011). Literature on the maritime industry tends to place emphasis on the early development, chronological history, the description of facilities and services and thus it is not built on sufficient literature of broader historical social context, of provision MET in relation to demand, of cost effectiveness, and of such awkward negative issues (Kennerly, 2002:20).

However to date, there is growing global literature on MET, its provision and impact on the maritime industry. Thus a Systems Thinking lens can be utilized to better understand the provision of MET from a broad viewpoint which would be useful in identifying events such as maritime incidents. Therefore, Systems Thinking can be used to identify the root causes of complex problems, to describe the interrelations among environmental, economic, and socio-demographic sub-systems and to determine the intervention leverage points and can thus be a powerful tool (Mai and Bosch, 2010).

The world is ever changing and development is a continuous process which demands adaptation as has been the case in the maritime industry. MET has a great impact on competence and skills of maritime human resources, as a result constant efforts need to be prepared by all MET stakeholders including MET institutions to respond to any maritime industry needs. For this reason, MET institutions as one stakeholder ought be the central agent and be in concomitant with all the other stakeholders to attain these needs (Gamil, 2008).

Organisations such as MET institutions need to understand that they operate in environments that are characterised by continuous change and for this reason they ought to be adequately flexible to adapt to those changes for survival (Nkuna, 2013). Nkuna then argues that:

“The greater the variability of the external environment the less structured the organisation should be, though these environmental changes in organisations can emerge in different modes, which can be; technological, economic and/or political” (Nkuna, 2013: 5).

Many people from various backgrounds such as practitioners in evaluation, education, business and public health, faced with different issues and problems are drawn to Systems Thinking because they perceive the need to change how they, or others think (Cabrera, Colosi and Lobdell, 2008). Nonetheless, the motives for the attractiveness and use of Systems Thinking according to Cabrera, Colosi and Lobdell (2008) are extensive. According to Arnold and Wade (2015), as States become ever more interconnected, globalization grows our social systems in complex new ways. Technological advancement in industries such the maritime industry spawns system after system, each increasing in interdependence on other systems that have come before. Arnold and Wade (2015) assert that:

“International trade ties nations together in powerful economic feedback loops, policy changes in one nation inevitably cause ripple-effects in another, systems, if ever they were separated, are indomitably moving towards interconnectedness as we hurtle into a globalized future. All of these systems feed into each other to produce extremely complex, unpredictable effects. Or, do they?” (Arnold and Wade, 2015: 670).

The development of a MET system is a complex activity influenced by rapidly advancing maritime technology, safety and security regulation on MET and the influence of international trade brought about by globalization. With the use of a skill set called Systems Thinking, one can hope to better understand the deep roots of these complex behaviours in the provision of MET in order to better forecast issues and eventually, understand their outcomes and/or influences. Thus with the exponential growth and complexity of systems in the maritime industry, there comes a growing need for systems thinkers to tackle these complex problems facing MET provision. Arnold and Wade are of the view that:

“Now, more than ever, systems thinkers are needed to prepare for an increasingly complex, globalized, system of systems future in which everything from Canadian logging to Middle-Eastern oil drilling to Australian diamond mining will produce ripple effects throughout the globe” (Arnold and Wade, 2015:670).

Since Systems Thinking is not ‘a science’ as has been proposed, there is no need for empirical research about it according to Cabrera (2006:29). Nonetheless, it is probable and beneficial to develop scientific knowledge about how people and institutions use Systems Thinking, where they might have difficulties understanding systems or their surrounding environment(s), and the like (Cabrera, 2006).

A way of thinking that is gaining popularity around the globe is Systems Thinking because of its inclination to study issues or a problem situation in a holistic manner (Stermann, 2006). Many circles have adapted Systems Thinking since World War Two (WWII) and in its current form it has been used to provide different perspectives to understanding the world (including organizations or institutions) and our very conception of its nature (Pourdehnad, Wexler and Wilson, 2011:3). According to Singh (2015:4) popular approaches in the social sciences, “tend to focus on issues in isolation, reducing a problem to its constituent parts and analysing the parts separately”. Through a Systems exploration, this study endeavours to identify the challenges facing MET in public higher education institutions in KZN by identifying factors influencing the provision of MET in these institutions. Setianto (2014) supports this by stating that:

“Systems Thinking is an awareness of an organization as a complex, integrated system whose parts are connected with each other in some way” (Setianto, 2014: 26).

As a result, when a change in one part occurs, it will affect other parts, instantly or gradually (Tedeschi *et al.*, 2011). MET institutions operate in a system plagued with various forces influenced their very assistance and behavior. These can be found both internal and external and, in their control, and beyond their control. The maritime industry is not an island, it is a true international industry which connects all. As a result, MET influences the quality the labour force of the industry and it is for this reason that the IMO established the common standards for example seafarers’ education and training (Ziarati and Ziarati, 2012). This process is systemic in nature because many of the accidents and incidents at sea and ashore in harbours are because of factors influencing education and training, or poor delivery of existing standards as well as disregard for current standards and regulations. Thus, aspects such as the legal aspects and technological aspects as Mindykowski, Charchalis, Przybylowski and Weintrit (2013:575) observes, creates a space and

necessity for progress of MET.

MET is a vertically integrated production system (Yamamoto, 2002). It covers elements such as learning, the resources and technology used therein, the organization, the fundamental assessments and evaluation; making MET one form of vocational education and training that is characterized by others (Boahin and Hofman, 2012), driven by numerous factors such as the global economy, industry, restructuring and policy governmental initiatives, etc. (Mindykowski *et al.*, 2013). While the world labour markets keep on changing as a result of the progress of human development in science and technology (Boahin and Hofman, 2012), this has led to the change in tastes and preferences, which causes a continual adaptation in Vocational Education and Training (VET) teaching and learning (Mindykowski *et al.*, 2013). In this place, it ought to be thus observed that VET, and in this case MET is developed also as a result of the changes within this international system, necessitating standards, like STCW Convention acknowledged by most of the world governments making MET a global integrated system.

There have undoubtedly been many studies on the challenges facing the maritime public higher education institutional systems globally over the past years which have yielded interesting and helpful information. It is not to say these studies which have examined particular MET phenomena have not been beneficial. However, studies adopting a Systems thinking framework, especially in the African and South African contexts are conspicuous by their absence, thus highlighting the dire need for studies utilizing such an approach.

Systems thinking is not a provider of automatic solutions to the maritime industry's woes, but it can provide a more holistic understanding of the MET as a whole by bringing the myriad of factors and variables that influence it into the forefront of discussion and pontification. This very act of forcing stakeholders to not think about such issues in a fragmented manner, opens the possibility of enhancing understanding of a more holistic nature; discourse moves from being about apparent shortcomings to understanding of the interconnections and inter-relationships between the variety of factors that actually give rise to shortcomings, thus drawing attention to why linear, simplistic solutions very rarely solve the problem indefinitely.

For this reason, and together with the variety of discussions interspersed throughout this study,

Systems thinking was seen to be a worthwhile approach for exploring the challenges facing MET in public higher education institutions in KZN. This was further highlighted in the Systems thinking model on page 206 which revealed many more factors than would have been originally conceived as influencing MET. Not only did this approach provide a much more holistic picture than would have been garnered by a study not utilizing such a Systems thinking approach, but the model itself also provided insights into the feedbacks at play between the variety of factors revealed by the study. In this way it enabled the researcher to paint a picture of the issue that was not only very detailed but also with a lot of depth to those truly knowledgeable with regard to Systems thinking in general and qualitative System Dynamics in particular. Thus, in the absence of the Systems thinking lens, the outcomes of such a study would have been an understanding that was fragmented, static and unrealistic as it would not truly encompass the vast variety of factors pivotal in the challenges facing MET in public higher education institutions in KZN.

5.5 CONCLUSION

As early as the 1950s, the need to develop the skill to comprehend complex systems and is well documented (Plate, 2010). This chapter examined the theoretical framework employed in this study. Systems Thinking as an approach and a tool, was explained. The Qualitative SD methodology served as a guiding framework for the way the data was analysed, with specific emphasis on exploring the challenges facing MET in public higher education institutions in KZN. It is crucial for any MET institution, to continually respond to the international and national legislation in this regard. Thus, MET institutions are objects which are parts or elements of the broader maritime systems 'attributes' which form properties of objects and the relationship which links the objects (Setianto, 2014). This taken together, according to Hall and Fagen (1956) defines 'a system'. Skyttner (2001) states that when a hitch arises within this trinity, it creates problems, not only from an organizational and practical aspect but also intermingling with the social and political aspects. The next chapter presents the research methodology that was adopted by the study in order to reach its objectives.

CHAPTER SIX

RESEARCH METHODOLOGY

6.1 INTRODUCTION

This main aim of the study was to explore the challenges facing MET in public higher education institutions in KwaZulu-Natal (KZN), South Africa. As a result, this chapter presents the research philosophy underpinning this study. It further presents the research methodology the researcher applied to assist in reaching the study's objectives. The researcher presents justification for the adopted philosophy, research strategies and techniques employed therein. A research methodology chapter is pivotal because in it the researcher's strengths in applying research strategies are shown. Further it can be understood to be a blueprint or road map the researcher follows to uncover new knowledge. Below is a detailed account of the research methodology followed in this study starting with a definition of research.

6.2 WHAT IS RESEARCH?

According to Davis (2014: 7), research is a process or activity that follows certain logical steps. Research is a systematic process of collecting, analysing, interpreting and presenting data to produce new knowledge and/or to add to existing knowledge about phenomena. Nonetheless, research is generally about generating knowledge or adding knowledge to assist in knowing. In this regard, Jurgen Habermas gives three distinct ways of generating knowledge based on what he calls cognitive interests, which differ from individual to individual (Du Plooy-Cilliers, 2014). According to Du Plooy-Cilliers (2014), cognitive interests are namely, technical, practical and emancipatory and "the word 'cognitive' refers to the mental processes of knowing things." Habermas believed that there were three ways of knowing, depending on what you want to know, and he further identified three cognitive interests which closely correspond to three common research paradigms. These are given in the table below:

Table 6.1: Habermas’ three Cognitive Interests

Empirical-analytical	The <i>empirical-analytical</i> sciences are empirical and technical, and their aim is to find (cause and effect) relationships hence this type of science is closely related to positivism.
Historical-hermeneutic	The <i>historical-hermeneutic</i> (or hermeneutic-phenomenological) sciences are practical, and their aim is in-depth understating of phenomenon hence this type of science is related to Interpretivism.
Critically oriented	The <i>critically oriented</i> sciences are emancipator and related to critical realism hence it aims to empower people through knowledge.

Source: Du Plooy-Cilliers (2014:21).

The cognitive interest of the researcher ultimately influences:

“...the aims or goals of research, or the reasons for doing research; what are considered worthwhile phenomena for research; what research methods should be used; and what is considered knowledge” (Du Plooy-Cilliers, 2014:21).

The researcher believes in *historical-hermeneutic* way of knowing the challenges facing MET at public higher education institutions in KZN using a Systems Thinking lens, thus the researcher wanted to get an in-depth understating of this phenomenon, rather than to find cause and effects nor to empower through knowledge.

6.2.1 Type of Research

In academia, research is basically broken down into two categories, which are basic/pure research and applied research which leads to different purposes, requiring different levels of control and precision (Davis, 2014). Babbie (2008) distinction of pure and applied research is the motivation of application and understanding. On the one hand, Davis (2014) defined pure research as studies that are conducted to add to existing knowledge. Very little such enquiries are conducted this way for the sake of generating knowledge and it is mostly used to formulate theories. Thus, it is unlikely to be conducted by a scholar during their earlier stages of their academic career. On the other hand, Kumar (2011) defined it as being focused on:

“...the development, examination, verification and refinement of research methods, procedure or techniques or tools that form the body of research methodology” (Kumar, 2011:10).

While Davis (2014) sees it as a great challenge in the social sciences especially when conducting a qualitative enquiry, he defines applied research as:

“An investigation to investigate practical issues in order to find solutions that can be implemented in practice” (Davis, 2014:75).

This study is exploratory in nature and seeks to attain new insight because the factors that lead to challenges facing MET in public higher education institutions in KZN are unknown. This thus is an applied research study seeking to find practical solutions to the challenges facing MET at public higher education institutions in KZN.

6.2.2 Research Aim

All enquiries have a purpose of direction and this is generally known as an aim (Davis, 2014). Babbie (2008) calls it a research purpose. Davis (2014) is of the view that as researchers, one of the many challenges we come across when engaging in a scientific enquiry is bearing in mind the ultimate purpose of our enquiry/research.

Studies in the social science can either be explorative, explanatory, descriptive, pragmatic, correlative or predictive (Davis, 2014). Because this study is explorative, it thus aims to explore the challenges facing MET in public higher education institutions through a Systems Thinking analysis. It is because according to Robson (2001:59) an explorative study is a valuable means of finding out ‘what is happening; to seek new insights; to ask questions and to assess phenomena in a new light. With such in mind, Saunders, Lewis and Thornhill (2009:140) identify three principle ways of conducting exploratory research which are:

- (a) A search of the literature,
- (b) Interviewing experts in the subject, and
- (c) Conducting focus group interviews.

The advantage of an exploratory study is that it is flexible and adaptable to change, and one must be willing to change direction during the progress of the study, for example when new insights appear due to the results of new data according to Saunders *et al.* (2009). This is asserted by Babbie

(2008) who states that exploratory studies take place because a researcher wants to examine a subject or interest that is relatively new. He further identifies however that, “explorations studies are also appropriate for more persistent phenomena” (Babbie, 2008:97). Nonetheless, the flexibility of an exploratory study does not mean there is a lack of direction. This is agreed and reinforced by Adams and Schvaneveldt (1991) who are of the view that the absence of direction to the enquiry only means that the focus is broad at the start of the research process; however as the study progresses it narrows and becomes clearer.

Davis (2014) further states that exploratory studies typically entail flexibility in qualitative methods, such as the use of focus groups or personal one on one interviews. Thus, the research design is flexible in order to enable the researcher to understand an unknown area of research. As a result, data replication (reliability) and accuracy (validity) are usually not a scientific criterion as compared to their high importance in social scientific research (Babbie, 2008).

6.2.3 What is a research paradigm?

All research is underpinned by one or more research philosophies. Creswell (2009) calls them worldviews, while others such as Lincoln and Guba (2000) and; Mertens (2003) call them paradigms. Babbie (2008: 34) defined a paradigm as “a model or framework for observation and understanding, which shapes both what we see and how we understand it.” It signifies ways of looking at life (Yang, Zhang and Holzer, 2008). A research paradigm is thus, a belief about the way in which data about a phenomenon should be gathered, analysed and used. According to Saunders *et al.* (2009:108) the “research philosophy one adopts contains important assumptions about the way in which one views the world.” Thus Saunders *et al.* (2009) clarifies that such assumptions underpin a researcher’s strategy and the methods they choose as a part of that strategy. However, importantly the main influence is likely to be one’s view of the relationship between knowledge and the process by which it is developed (Saunders *et al.*, 2009). Johnson and Clark (2006) argue and stress that what is most pivotal is not whether our research should and shouldn’t be philosophical but rather how well we are in position to reflect upon our philosophical choices and defend them in relation to the alternatives we could have adopted.

The researcher is of the view that truth or what is factual depends mostly on the situation and the people's interpretation of the information and or phenomena. Hence, in the researcher's interpretive view of the world, truth depends on people and their surrounding environment and interpreting facts under such a notion moves away from the positivist notion of generalization of results (Du Plooy-Cillers, 2014). As a result, the research methodologies they use are sensitive to the specific context and never generalize beyond the context in which the study was conducted (Du Plooy-Cillers, 2014).

This study adopted an interpretive approach to assist in answering its research questions and achieving its objective. 'Truth' rests on socially constructed dogmas, norms and opinions, and subsequently there is no collective objective truth in social life. Therefore, exploring the challenges facing MET at public higher education institutions in KZN by means of identifying factors that influence the provision of MET involved interacting with people. How the chosen participants of the study see, understand and perceive their environment depends on subjective truth (Smith, 2003). Thus, this enquiry was designed to investigate individuals' perceptions and the meaning they give to the phenomena (Fox, Martin and Green, 2007), which in this regard, related to the challenges facing MET in public higher education institutions in KZN.

6.2.4 Philosophical Assumptions Underpinning this Study

The research process, because it is systematic, follows some certain logical steps (Davis, 2014). Generating knowledge to understand facts, reality and truth, is influenced by our cognitive interests. They clarify our understanding based on objective or subjective opinions, thus our assumptions range from broad assumptions (beliefs) to narrow assumptions (actions) (Davis, 2014). The figure below illustrates the philosophical assumptions underpinning this interpretivist study.

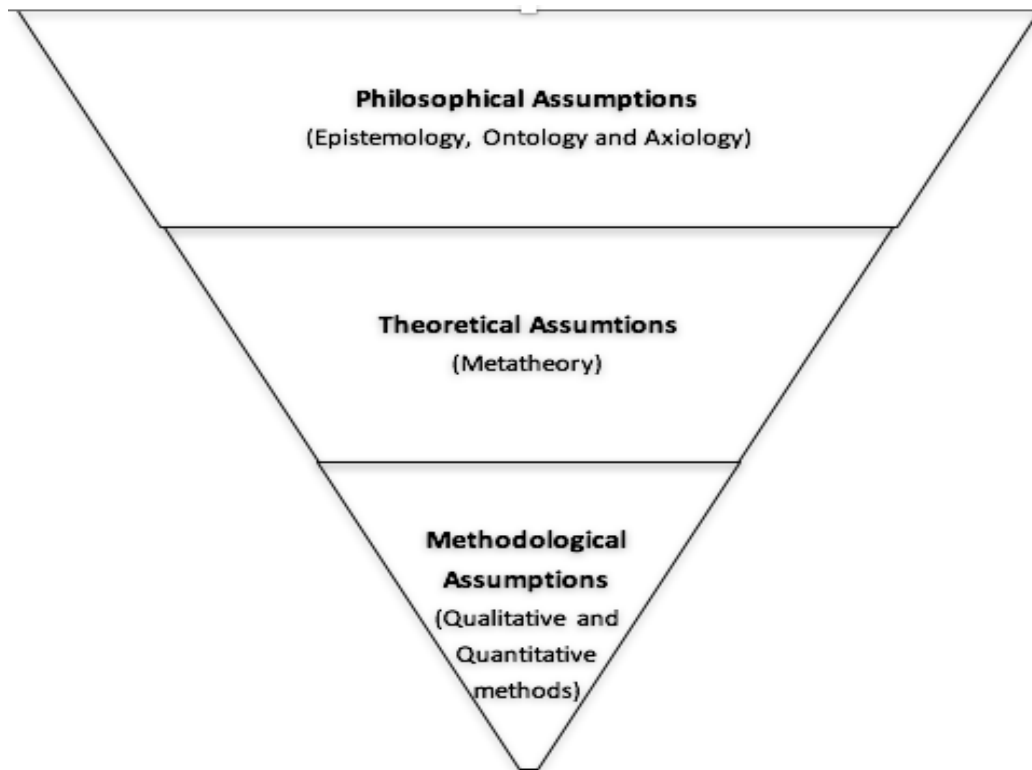


Figure 6.1: Hierarchy of assumptions in research

Source: Davis (2014:8)

Philosophical assumptions are pillared on epistemology, ontology and axiology, where: epistemology refers to our beliefs about knowledge and its nature; ontology to reality of ‘what is’ and axiology to our values, whether an inquiry is value free (objective) or value bound (subjective) (Davis, 2014:8). The researcher, in his interpretivist approach to the inquiry, was of the view that in the process of generating knowledge, facts are ‘fluid’ and embedded within a meaning system. The epistemological position of this study is that factors that influence MET in other regions of the world, such as in the Far East or Europe for example, may not necessarily produce the same challenges for MET in KZN’s public higher education institutions because the environmental circumstances are not the same. Thus, facts are not objective in the social sciences, but rather subjective, because what is factual heavily depends on context and people’s interpretations (Davis, 2014:29).

The ontological position of this study is informed by the fact public higher education institutions offering MET are located in different regions, both developed and developing. This presents

circumstances that may influence these institutions and their experience of reality. These institutions and the people that run them possess internally an experienced sense of reality; for example, what they see as a challenge might be an opportunity in other institutions and vice versa. Interpretivist inquiries are not value free; thus, they value complex understandings of unique realities. Thus, the values of the participants, as well as that of the researcher have influenced this inquiry, thus making this study's axiological position. On the other hand, Positivists, believe in value free objective research that is not tainted by personal bias (Davis, 2014). However, the lack of value-free research by interpretivists does not necessarily mean that their inquiries are a less honest representation of facts. Like positivists, interpretivists also have to ensure data quality control and must also adhere to ethics in research. The next section looks at the research methodology the study adopted and the methodological assumptions underpinning it.

6.3 RESEARCH METHODOLOGY

According to Walliman (2011), research methodology encompasses the techniques and tools that allow the researcher to collect, sort and analyse data so as to come to a conclusion. As a result, a research methodology is thus a systematic, theoretical analysis of the methods applied to a field of study and generally it encompasses concepts that inform the designs which may be qualitative or quantitative strategies for data collection and analysis. Locke (1989) cited in Seidman (2006:11) states that, "the purpose of the research and the question being asked, determine the adequacy of a research design". In this regard, the research design is provided below as a departure point.

6.3.1 RESEARCH DESIGN

Research design, according to Seltiz et al., (1962) cited in Kothari (2004:37), is a "conceptual configuration within which a study is done". On the other hand, Babbie (2012) defined research design as a strategy or blue print detailing how the researcher intends to go about doing the study/research. To Yin (2011:75), "research designs are logical blueprints."

This study took a qualitative design; although Yin (2011) sees such as design as being difficult because qualitative researchers need many qualities to succeed, such as active listening, asking good questions, knowing about the topic of study and caring about your data, and persevering to mention a few. According to Saunders *et al.* (2009:151), qualitative is used predominantly as a

synonym for any data collection technique (such as interviews) or data analysis procedures (such as categorising data) that generates or uses non-numerical data. A qualitative design allowed for flexibility in this research design because the focus was on individual beliefs, opinions and emotions (Mack, Woodsong, MacQueen, Guest and Namey, 2005).

Patton (2005:1) is of the view that, “qualitative researchers engage in naturalistic inquiry, studying real-world settings inductively to generate rich narrative descriptions and construct case studies.” The reason for this study taking an inductive approach was to get a feel of what was going on, so as to understand better the nature of the problem. Seidman (2006) is of the view that what determines the research design is ideally what one is trying to learn. The study of small samples of subjects might be more appropriate than a large number as with the deductive approach (Saunders *et al.*, 2009). Therefore, this study used a small sample because the researcher was not able to frame a hypothesis, because there although there was sufficient understanding of the topic and prior knowledge of the subject, there was limited access to data, in the form of limited knowledgeable persons to make a sufficiently sized sample.

Easterby-Smith *et al.* (2008) cited in Saunders *et al.* (2009:126) argued that knowledge of the different research traditions enables one to adapt one's own research design to cater for constraints. Saunders *et al.* (2009) stress that the most pivotal is the wealth of literature from which one can define a conceptual framework and a hypothesis. The researcher aimed to explore the situation of challenges facing MET in public higher education institutions and was of the view that it is appropriate that the research be inductive rather than deductive. Hence, a qualitative design created a space for exploring human side of the issue (Mack *et al.*, 2005) by exploring the participant's views, opinions and beliefs in such a setting. This assisted in capturing the contextual richness of the subject's everyday lives (Yin, 2011).

6.3.2 RESEARCH STRATEGY

A plan of action in research which inquires on how to go about collecting the necessary data can be described as a strategy. However, the choice of a strategy is guided by a number of things, such as the research question(s), the means to meet the research objectives, the magnitude of existing

knowledge, the amount of time and other resources available, as well the study's underpinning philosophy (Saunders *et al.*, 2009).

Table 6.2: Different strategies for qualitative, quantitative or mixed methods designs

Quantitative Designs	Mixed Methods Design	Qualitative Design
Experimental Designs	Sequential	Narrative research
Non-Experimental designs	Concurrent	Phenomenology
	Transformative	Ethnographies
		Grounded theory studies
		Case study

Source: Creswell (2009:12)

Creswell (2009) identified 'strategies of inquiry' which are on the table above, as strategies that can be adopted for the different research designs. In this regard, a phenomenological strategy was adopted by this study because it sort to explore the essence of human experience about the phenomenon under inquiry (Cresswell, 2009) and it has been successfully applied in public administration and the study of bureaucracy (Gabrielian, Yang and Spice, 2008).

This study sought to attain insights on the challenges experienced by public higher education institutions in the provision of MET in KZN and this was attained by engaging a small gap of key individuals from MET institutions. Moustakas, (1994) was of the view that by understanding lived experiences, this makes phenomenology both a philosophy and a method, because through extensive engagement, the process encompasses the study of a small number of subjects. Nevertheless, phenomenology allows subjects to reflect upon their experience about the matter under inquiry by the researcher (Gabrielian, Yang and Spice, 2008). In addition, this study adopted a Systems Methodology that is soft. A system-based methodology can either be soft or hard.

“Systems-based methodology for tackling real-world problems in which known-to-be-desirable ends cannot be taken as given...Soft systems methodology is based upon a phenomenological stance” (Checkland, 1999: 318).

The theoretical implications of Soft systems methodology is evident in this study's strategy. Hard methodologies have a built-in positivist ontology (Checkland, 1999: 277) which was unsuited to

the kind of research engaged in, in this study. Hence in bearing this in mind, this study's design has ultimately influenced its phenomenological strategy.

6.3.3 DATA COLLECTION

Secondary and primary data was used in the study. However, the preparation for data collection started when the researcher selected the methods to be used for collecting data. In accordance with the research design, the researcher planned how data would be gathered and documented to keep it intact, complete, organised and accessible (Creswell, 2009).

6.3.3.1 Secondary data

Secondary data can be generally understood as data that is existing and has not been collected by the researcher and it can encompass a whole variety of empirical forms. To Harris (2001), it refers to sources of data collected by others, while to Hox and Boeije (2005), it is existing data significant to the problem under inquiry, but may have been collected originally for a different purpose. They further identify that such data may be in the form of documents and audio or video tapes. There are many such sources these may include, government documents, company reports, media publications and published academic research (Harris, 2001). In this study, sources such as both academic and non-academic journals, books, official government reports, policy documents, newspaper articles and internet sources were used in the study as secondary data. Their use included, constructing the background, identifying the problem that needed researching and the literature review as well as theoretical framework of the study.

6.3.3.2 Primary data

According to Dawson (2002), collecting data from subjects through first hand investigation or observation is primary data collection. On the other hand, primary data according to Hox and Boeije (2005), are data collected for the explicit research problem at hand, using processes that fit the research problem best. Nonetheless, primary qualitative data can be collected through in-depth interviews, observations and focus groups (Mack *et al.*, 2005). In this study, primary data was collected using in-depth interviews. Understanding people's experiences in contemporary organizations can be done in various ways, such as by examining personal and institutional documents, through observation, by utilising survey questionnaires or by examining existing

literature (Seidman, 2006). However, the goal of this research was to understand the meaning the people involved in public higher education offering MET in KZN make of their experience thus, interviewing provided a necessary but costly and timely avenue of inquiry (Hox and Boeije, 2005; Seidman, 2006). In addition, the use of primary data was to ensure that the data collected helped to understand the problem and assisted in “the operationalization of the theoretical constructs, the research design, and data collection strategy which could be tailored to the research questions” (Hox and Boeije, 2005: 594).

6.3.3.2 (i) Interviews

Interviews are categorized into three types of interviews: structured, semi-structured and unstructured interviews (Dawson, 2002). In a qualitative research design, interviewing as a means of data collection is common in the social sciences because such allows the researcher to interact with the respondents either in person or over the telephone (Luna-Reyes and Andersen, 2003). This is asserted by Seidman (2006) who agreed that interviewing is a basic mode of inquiry in qualitative designs and thus in-depth interviewing is to make meaning of people’s experiences and is the best tool to attain an in-depth understanding of the lived experiences of these people. Seidman (2006) stresses that:

“Interviewing provides access to the context of people’s behaviour and thereby provides a way for researchers to understand the meaning of that behaviour Seidman” (2006:10).

The main role of the interviewer was to guide the dialog and remain neutral so that the remarks of the participants were not biased by the behaviour of the interviewer and to clear confusion before the interview concluded (McCracken, 1988). In this process, the researcher conducted seven interviews. The interviews averaged sixty minutes each. The reason for interviews in this study was that they are vibrant and offer richer data because participants were asked questions that were open-ended. They were given the chance to share their knowledge and views relating to the subject matter regarding the challenges facing MET in public higher education institutions in KZN. According to Luna-Reyes and Andersen (2003), the interaction between the researcher and respondents can either be structured following carefully worded questions, or unstructured, allowing the respondents to direct the topic by telling stories and giving examples. The interviews in this study were semi-structured. Although such interviews are the most common in qualitative

social research, the researcher adopted such an approach because he wanted to know specific information that could be compared and contrasted with other participant's information. As a result, the researcher asked the same questions at each interview between public higher education institutions offering MET and State institutions (Dawson, 2002).

Nevertheless, the interviews in this study were conducted with the assistance of an interview guide/schedule with open-ended questions because of the belief that an interviewer must never come to an interview with an empty slate (Seidman, 2006) and the researcher also wanted to follow a worded list of predetermined questions so as to ensure that the interviews concentrated on the subject matter. Dawson (2002) is of the view that a researcher for most types of interviews, such as those that are structured and semi-structured, needs an interview schedule. An interview guide is a list of pre-set questions the researcher arrives with which they want to be answered or they can be about what data the researcher wants to gather (Seidman, 2006). While open-ended questions are "questions for which the respondent is asked to provide his or her own answers. In-depth qualitative interviewing relies almost exclusively on open-ended questions" (Babbie, 2008:272). The interviews were also audio-recorded. Seidman (2006) is of the view that interviews ought to be recorded so to work reliability with the words of the interviewee which in this case is the participant or, if the researcher is accused of mishandling their interviews that undermines the data quality control protocol. For this benefit, the researcher also used an audio recorder in this study, because during the interviewing process, there could have been instances where the taking down of notes could potentially have disturbed the interview process and free flow of information, resulting in the researcher losing concentration and the ability to ask probing questions (Dawson, 2002). The process of using an audio recording device has several advantages such as the ability to replay the audio for information accuracy (Kvale and Brinkmann, 2009).

For this study, data collection through interviews allowed for clarification of definitions, elaborations and the collection of the participants own words in a way that was not supported by survey or questionnaires (Luna-Reyes and Andersen, 2003). Thus, interviewing was a powerful way to gain insights about the challenges facing MET in public higher education institutions in KZN through understanding the experiences of MET experts whose lives reflected those issues (Seidman, 2006). After the researcher conducted the interviews with the participants, the step

included analysing the data, by means of finding patterns and definitions that were common across all interview material elicited from participants (Luna-Reyes and Andersen, 2003).

6.3.4 RESEARCH SAMPLE

A sample is generally defined as a representation of a population. It is a number of people or subjects that are considered to be manageable to take part in a research study (Dawson, 2002). It is the process of selecting observations according to Babbie (2008:200). A population is defined as a group of entities or participants who hold specific characteristics and from which a sample is drawn to decide the limits or physiognomies (Creswell, 2009) of a research study. In social research, Babbie (2008) argues, there is no limit to whom or what can be studied. The units of analysis can be either individuals, groups or organizations such as corporations, church congregations, colleges and academic departments or supermarkets. Public higher education institutions that provide MET and State (Government) institutions that coordinate and promote maritime were formal organizations that were considered units of study (Babbie, 2008) in this study.

6.3.4.1 Sample Frame

A sample frame is a list of the actual cases from which sample will be drawn (Taherdoost, 2016:20). KZN has four public higher education institutions and from those, two (University of KwaZulu-Natal and Durban University of Technology) offer MET programmes, while the third (Mangosuthu University of Technology) will be taking its first MET students for the first time in 2019. The province of KZN also has two maritime State (Government) institutions which promote and coordinate MET. One at provincial level (Department of Economic Development, Tourism and Environmental Affairs) and the other (eThekweni Maritime Cluster) local government level. Thus, the unit of analysis for this inquiry were public organisations/institutions that either offer MET or promote and coordinate MET in the province of KZN and this was in accordance with the studies objectives. As a result, the researcher targeted all public higher education institutions in KZN that offer MET programmes and all State (Government) institutions that were involved in the coordination and promotion of MET in KZN. Making the units of analysis five organisations which enabled the research to understanding challenges facing MET at public higher education institutions in KZN.

6.3.4.2 Sampling Strategy (Design)

In sampling, there are two types of strategies, these are probability and non-probability. These are also called sampling methods (Babbie, 2008). In a research enquiry, these are informed by the research design which the researcher has adopted. The researcher in this study employed non-probability sampling strategy. Non-probability sampling is, “any technique in which samples are selected in some way not suggested by probability theory...” (Babbie, 2008:203). The reason for employing a non-probability sampling strategy was that not all units of analysis (public higher education institutions and maritime State (Government) institutions) in KZN offer MET, nor were they involved in the coordination and promotion MET.

6.3.4.3 Sampling Technique

Each research sampling strategy has its own techniques, such as purposive (judgmental), quota or snowball sampling for a non-probability sampling strategy. This study adopted a purposive sampling technique.

- ***Purposive sampling***

Purposive sampling is one of the most common sampling techniques for qualitative designs (Mack *et al.*, 2005) and very popular among researchers in the social sciences (Guare and Barrios, 2006), and it was used to enable the understanding of the units of analysis and the challenges they face in the provision of MET in KZN. When investigating units of analysis such as in this case, Seidman (2006:10) holds the view that:

“The primary way a researcher can investigate an educational organization, institution, or process is through the experience of the individual, the ‘others’ who make up the organization or carry out the process”.

In doing such, the researcher through a purposive sampling technique amongst the five insitutions that made the units of analysis, seek to understand the process of the provision of MET, the challenges within, State (Government) intervention in KZN. However, because of the size in terms of the number of individuals and the roles and responsinility, not all individuals (employees) involved in MET could partake in the study from five insitutions nor did all could provide the necessary answers the researcher wanted.

The choice of the use of purposive sampling was informed by certain characteristics individuals had within the institutions. This included the positions the participants held. As a result, the researcher interviewed heads of MET disciplines/departments at public higher education institutions and heads of State (Government) institutions that coordinate and promote MET in KZN. Their roles and responsibilities allowed them to be aware of the overall position, goal, the strategy of their respective institutions and had a better comprehension of the challenges facing their institutions.

Thus, participants in the institutions were chosen because they were perceived to be able to understand their institutions and had experience of related phenomena in such institutions (Brink, 1999; Le Compte *et al.*, 1993; Morse, 1989). The adoption of this approach was further justified by the fact that the researcher was well knowledgeable about population having been a former member of the International Maritime Lecturers Association (IMLA) and understood very well the purpose of the study. Hence judgemental sampling was used by the researcher. According to Babbie (2008), judgmental/purposive sampling can be used by a researcher if he or she has knowledge about the population and its elements and also the purpose of the study.

“Purposive sampling is based on the assumption that because the researcher knows the population under study, he or she might decide purposefully to select informants whom he or she considers suitable for the study” (Polit and Hungler, 1997:229).

Scholars such as Jette, Gover and Keck (2003) suggest that people who are knowledgeable in the topic under enquiry may reduce the sample size or participants needed in an inquiry. Nonetheless this type of sampling is chosen because if the participants were chosen “randomly, such would have violated the qualitative principle of obtaining information from experts” (Morse 1989: 125). Those that were sampled in this study had a unique, different or important perspective on the phenomenon (Mason, 2002; Trost, 1986 cited in Robinson, 2014:32) or the challenges facing MET at public higher education institutions in KZN.

6.3.4.4 Sample Size

A sample size is regarded as the number of persons that participate in an inquiry. For this study, seven participants were interviewed from the five institutions as displayed below. It should be noted

that MET at UKZN unlike in the other public higher education insitutions, overlaps across two disciplines (Law and Economics) which is individually headed hence the three interviews.

	Institution	Number of Interviews
1.	UKZN	3
2.	DUT	1
3.	MUT	1
4.	eThekwini Maritime Cluster	1
5	KZN Department of Economic Development, Tourism and Enviromental Affairs	1

Reaching this sample size was influenced by two things, the sampling technique adopted and saturation. According to Pascoe (2014), when the researcher finds it impossible to determine the entire population or get access to the entire population, purposive sampling can best be used. This was also partially the case for this study because the researcher had limited access to the population (MET teaching, promoting and coordinating staff at the five insitutions etc.). This was as a result of constrained financial resources and time. The researcher hence purposefully sampled only those that headed MET disciplines at three public higher education insitutions and those that headed the coordination and promotion of MET programmes and courses at the two State (Government) insitutions. Meaning that the researcher purposefully not only selected interviewees that he wished to include in the sample but this was also informed by the interviewees' characteristics and issues mentioned above (Pascoe, 2014). together with the idea of saturation.

Saturation has to do with and generally understood with having reached satisfactory data collection. Seidman (2006) identifies two criteria for 'enough' which is saturation and sufficiency, sufficiency being ample numbers to reflect the range of participants and sites that make up the population so that others not sampled can have a chance to relate to the experiences of those in it.

Saturation of information is when the researcher reaches a point in the study where he or she begins to hear the same information being reported thus no longer learning anything new (Seidman,

2006). Seven interviews, although seeming few, were deemed satisfactory on the grounds that all key individuals with the necessary knowledge were sampled and interviewed. The interview data collected from the seventh participant who did not head a MET discipline, but rather an ordinary teaching staff member, provided no new insights. Thus this met the basic criterion for saturation of information. This is further asserted by Seidman (2006):

“The method of in-depth, phenomenological interviewing applied to a sample of participants who all experiences similar structural and social conditions give enormous power to the stories of relatively few participants” (Seidman, 2006:55).

Nonetheless, in qualitative designs, it is generally agreed upon that what is fundamental is quality rather than quantity as compared to quantitative designs. Although saturation determines the sample size for most qualitative designs, it is not the only determinant because there are other factors (Mason, 2010). For this study, access to the population, the sampling technique adopted and size of the units of analysis, were such factors.

Other scholars such as Charmaz (2006) are of the view that what may also determine the sample size for a qualitative study are the aims of the study. Richie *et al.* (2003) outlines factors such as the budget; available resources; groups of special interest; the heterogeneity of the population; the selection criteria to mention a few. Morse (2000), identifies the scope, nature, design and quality of the data of the study. In addition, it is a matter of judgement and experience, the research method and the sampling technique adopted (Sandelowski, 1995) which should determine the sample size for qualitative designs.

While Fugard and Potts (2015) propose a quantitative computed tool to be used by qualitative designs that adopt a thematic analysis, Hammersley (2015) sees this as possibly having damaging consequences and misconceptions. While Dey (1999) is of the view that saturation as a concept is inappropriate, Francis *et al.* (2010) is of the view that there is no agreed method of establishing data saturation. Nevertheless, for this study, the sample seemed small, but saturation was reached quickly, and this was influenced by the sampling technique used and the overall objectives of the study.

Hammersley (2015) points out that determining the appropriate sample size, is knowing the number of informants/participants to observe or interview for qualitative studies is highly debated and will continue to be so for many years to come. Hammersley (2015:687) expresses that:

“Typically, qualitative research involves collecting data from a few participants, and/or in one place, and then making decisions subsequently about whether other people need to be interviewed and/or other places observed”.

Research strategies such as grounded theory require 20-30 interviews (Creswell, 1998:64) while Morse (1995: 225) suggests 30 -50 interviews. For ethnography and enthnosciences 30-50 for both according to Morse (1994: 225); while Bernard (2000:178) suggests 30-60 for enthnosciences. Nevertheless, they suggest large samples. This study’s sample was subjective and based on the researchers’ experience (Guare and Barrios, 2006) and seen as appropriate based on the phenomenological strategy it adopted. For studies that adopt a phenomenological strategy Creswell (1998:64) suggests between 5 to 25, while Morse (1995: 225) suggests atleast 6. According to Dworkin (2012) a large number of articles, book chapters, and books recommend guidance and suggest anywhere from 5 to 50 participants as adequate in interview based qualitative studies. Mason (2010:4) contends that:

“While these numbers are offered as guidance, the authors do not tend to present empirical arguments as to why these numbers”.

A number of factors influenced the sample size of this study. It should be noted that saturation has be reported after as few as 6 interviews in some studies (e.g. Isman, Mahmoud Warsame, Johansson, Fried, & Berggren, 2013; Isman, Ekeus, & Berggren, 2013). Like many other qualitative studies, this study’s justification lies on various factors such as: the researches resources (time and financial constraints); the desired analysis (thematic analysis); the researchers experience in the field and prior work suggested the sampling technique hence also eventually the sample size (Fugard and Potts, 2015). As well as the research strategy adopted (Creswell ,1998; Morse, 1995). Nevethless, in qualitative research designs there are no agreed upon formulas or computations that can be used to determine a priori the minimum number of sampling units required (Sandelowski, 1995). Thus, the sample size of this study was small enough to manage and the material/data collected large enough to provide “a new and richly textured understanding

of experience” or phenomenon under enquiry (Sandelowski,1995: 183) and this was a matter of the researcher’s subjective judgment, guided by their experience and assessing the data in-line with the goals of the research.

6.3.5 DATA ANALYSIS

Corbin and Strauss (2007) was of the view that analysis of data results from a process of examining and interpreting collected data will lead the researcher to draw meaning and gaining understanding, thus developing empirical knowledge. The transcription process took the form of the researcher listening to the recorded interviews and transcribing the audio to text (Microsoft Word document). All the transcribed interview data made up 48 typed pages. According to Kvale and Brinkmann (2009: 181), “there is no universal form or code for transcription of research interviews; there are some standard choices to be made”. In accordance to Kvale and Brinkmann (2009), a particular transcription and style was used by the researcher in this study. Therefore, a detailed linguistic analysis was not required but rather conversation analysis was carried out from which themes was drawn.

6.3.5.1 Thematic Analysis

It is generally acknowledged that thematic analysis is the most used technique of analysing qualitative data. Dawson (2002) is of the view that it is a highly inductive analysis, where themes emerge from the data. According to Seidman (2006):

“A more conventional way of presenting and analysing interview data”, is when the researcher...searches for connecting threads and patterns among the excerpts within those categories and for connections between the various categories that might be called themes” (Seidman, 2006:125).

To Patton (2005:1), “inductive analysis across cases yields patterns and themes, the fruit of qualitative research.” Thus, this analysis gave emphasis to determining, examining , and recording patterns (or "themes") within data for this research. Patterns across data sets are themes which are fundamental to the description of the challenges facing MET in public higher education institutions in KZN. They are associated to a research question according to Braun and Clarke (2006) and it provides a manageable and a theoretically-flexible approach to analysing qualitative data. In this

study, the thematic analysis thus entailed ‘classifying’ or ‘coding’ (Seidman, 2006), which involved the process of noting key issues identified, labelling them and putting them into appropriate categories by means of descriptive codes. Saldana (2009) defines a code in qualitative inquiry as:

“A word or short phrases that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data”
(Saldana, 2009:3).

Such data sources can take many forms such as interview transcripts, journals, documents, participant observation field notes, artefacts, video, photographs, e-mail correspondence and so on (Saldana, 2009). This study’s utilization of the coding of data in the form of interview transcripts, adopted an exploratory problem-solving technique which did not follow specific formulas. Nonetheless, coding was seen as more than just labelling, but rather an attempt to link data to the emerging ideas (Saldana, 2009).

Basit (2003) cited in Saldana (2009:22), concluded that the funds and time available and the inclination and expertise of the researcher informs the choice of using electronic or manual coding. The coding process was manually done rather than using complex systems such as CAQDAS/Codebooks and ENIVO programmes. According to Saldana (2009), with a student’s own independent research or dissertation project, extensive fieldwork or multiple participant interviews then CAQDAS becomes a pivotal and indispensable tool in the analysis. Furthermore, the researcher was not knowledgeable with the use of such complex electronic systems, which were also costly and time consuming and would have taken many seminars to learn them. Hence the researcher ‘manually’ coded the qualitative data using paper and pencil on hard copies, reason being that the data gathering was relatively small-scale and thus, manageable to analyse in this manner.

6.3.6 DATA QUALITY CONTROL

Data quality control is generally seen as the reliability of the data collected by a study. According to Koonin (2014) in research the process of identifying a problem, formulating the questions, reviewing literature and selecting the sample from the population and collecting and analysing the

data, has no merit if the research methodology which identifies the designs, strategies and techniques used to collect the data in the inquiry are not reliable and valid.

Reliability is “describing a quality of something or someone that is ‘dependable’ or ‘trustworthy’” (Giannatasio, 2008: 109). Yin (2011) points out that:

“A valid study is one that has properly collected and interpreted its data, so that the conclusions accurately reflect and represent the real world (or laboratory) that was studied” (Yin, 2011:78).

It is deemed pivotal in research to trust the findings of the researcher, so to assert that if the same research is conducted by a different researcher in the case of quantitative designs, he or she finds similar results. On the one hand, reliability and validity is applicable to quantitative designs because they focus on the measurability of results (Koonin, 2014). On the other, qualitative researchers according to Koonin (2014) attempt to give an in-depth perception of a phenomenon and their measurement of reliability and validity is more akin to the use of the concept of trustworthiness.

6.3.6.1 Trustworthiness

To Krefting (1991) trustworthiness in qualitative research is the ability to present data findings and results in a sound, credible and objective manner. Qualitative researchers use different criteria to determine trustworthiness. This could be through credibility, transferability, dependability or confirmability of the researcher findings (Koonin, 2014:258-259). Since this study was qualitative, unlike quantitative research that seeks to generalize results to a broader population, it sought to promote understanding of the phenomena, in a specific context (Koonin, 2014). Hence trustworthiness was supported by the transparency of the research process (Dawson, 2002), which was upheld by the audio recordings of the interviews (Mack *et al.*, 2005), because the recordings and transcribed data can be used to ensure confirmability and can therefore support the findings and interpretation of the researcher (Koonin, 2014).

6.4 SUMMARY OF RESEARCH METHODOLOGY

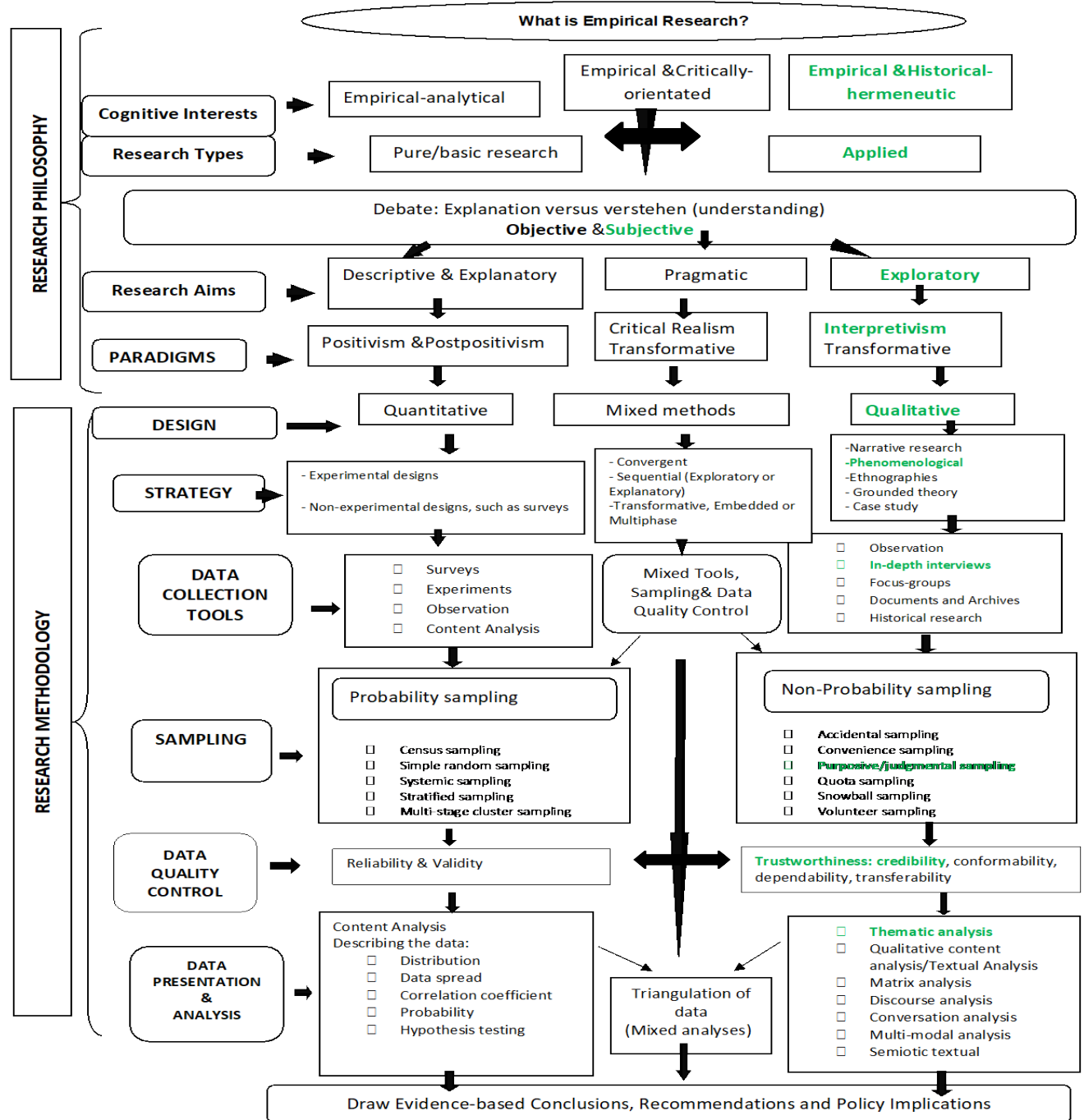


Figure 6.2: Summary of the research application process
Source: Author's own

6.5 ETHICAL CONSIDERATIONS

Research organization or institutions have their own ethical procedures and processes in place and these may be based on national or international guidelines or their own specific ethics committees (Mack *et al.*, 2005). According to Given (2008), whether a study interacts with human subjects or not, ethical issues are important because the involvement of ethical committees is a legal requirement governing the institution of which the researcher is a part of.

Before the study took place, an ethical clearance application form was filled and submitted to the University of KwaZulu-Natal's Research Ethics Committee for review and approval. After a successful review, an ethical clearance letter was issued acknowledging the student, the student's study and giving the student an approval to proceed with the study and data collection. According to Yin (2011), this exists in every research organization and/or university.

Prior to collecting the data and interacting with the participants, the researcher informed the participants of the purpose of the research and displayed the identity and institutional association of the supervisor and their contact details. The researcher also notified the participants that:

- Partaking was voluntary,
- Their responses would be handled in a confidential fashion,
- Secrecy would be ensured where fitting (for example, by coding their names),
- Informed them (the participants) that they could pull out from partaking in the study at any point in time without any negative or undesirable consequences to themselves and the institution with they represented, and
- Informed them of the nature of the study and that there were no rewards that would be received because of their input in the study.

An informed consent form was given to respondents of the study. An informed consent can be seen as a mechanism used to ensure that those that partake in a study, understand it and its purpose and what it means to partake in it so that they can make the decision to be involved in the study (Mack *et al.*, 2005). Respondents based their decision to participate in the study on adequate knowledge provided to them by the researcher. Regarding privacy and confidentiality, participants were afforded the right to keep their identities hidden from the public. Anonymity was of utmost

importance and it was the researcher's responsibility to uphold such. As a result, Mack *et al.* (2005), is of the view that:

“...informed consent is one of the most important tools for ensuring respect for persons during research” (Mack *et al.*, 2005:9).

6.6 CONCLUSION

This chapter has presented the research philosophy underpinning the study and the research methodology adopted in conducting this study. In steering the exploration, the researcher followed numerous stages of research and was guided by various authors in research methodology literature. Justification for each technique and strategy adopted was provided. Also the ethical issues in data collection and sampling techniques were explained. Based on the research methodology followed therein, the next chapter, Chapter Seven, presents the empirical findings/ results of this study.

CHAPTER SEVEN

FINDINGS AND ANALYSIS

7.1 INTRODUCTION

This chapter presents the findings and analysis of the data in line with the purpose and research objectives of the study. These findings were informed by the qualitative analysis in the form of a thematic analysis from data collected through interviews which led to common themes in accordance to the thematic analysis procedure described in the previous chapter. The reason for this approach being adopted was because the Systems Thinking approach used in this study emphasised engagement with MET stakeholders and the significance of personal perceptions held by each MET stakeholder as being vital in understanding the phenomenon being studied (Stermann, 2000).

Direct quotes from stakeholders interviewed supplement the findings because they were involved in MET at public higher education in KZN. This study identified that numerous factors influence the provision of MET at public higher education institutions in KZN. These can either be internal or external but still influence one another. The relationships between the factors are also investigated. This informed the construction of a Qualitative SD Model depicting the nature of such relationships, which will also be discussed.

7.2 PRESENTATION OF THE FINDINGS & ANALYSIS

This section presents the factors which influence MET at public higher education institutions in KZN. This is a comprehensive study of external and internal environments, and it considered the interaction between the structural and dynamic characterises of each of the environmental factors (Kroon, 1995). In presenting the primary findings from the environmental scanning derived from face-to face, one-on-one interviews with stakeholders from State (Government) institutions responsible for maritime skills promotion and development in the province and from public higher education institutions, the following inter-lined themes were identified:

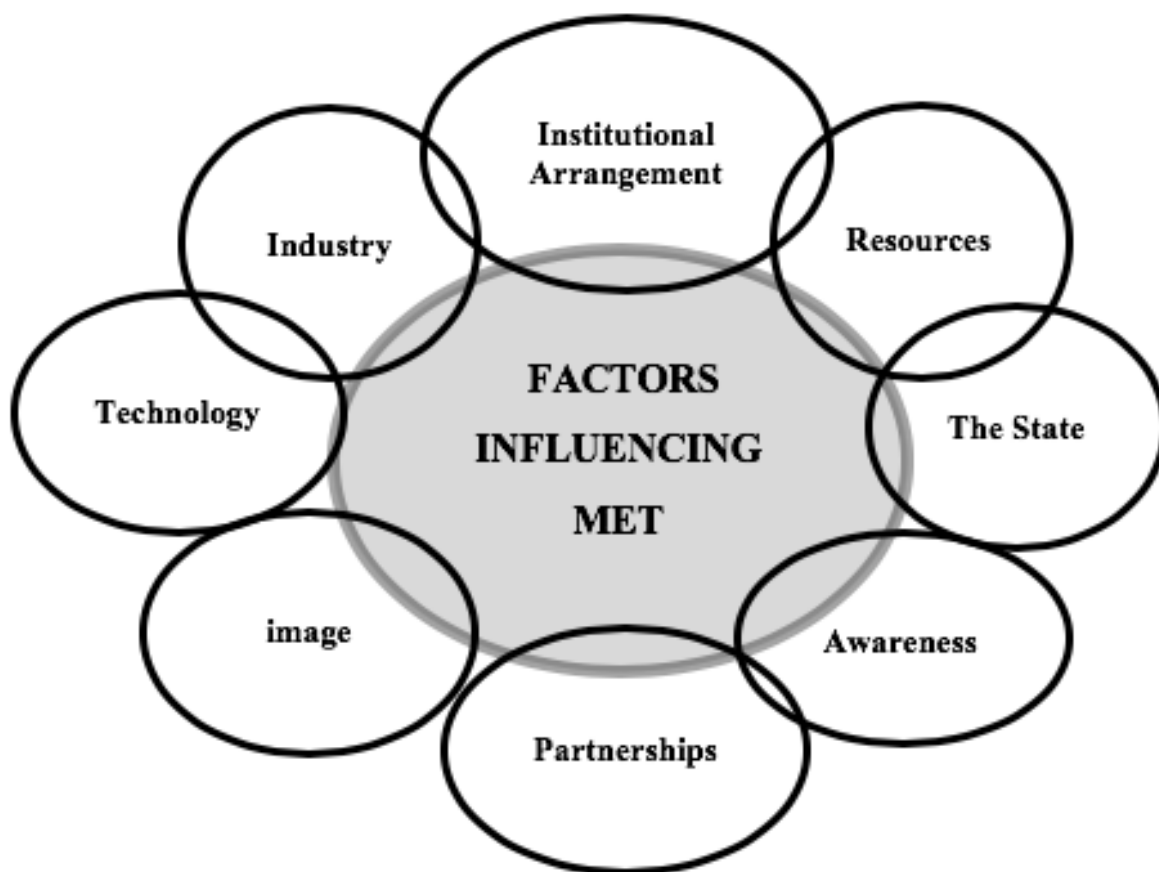


Figure 7.1: Inter-linking themes in provision of MET in public higher education institutions in KZN.

- RESOURCES (Physical, Human & Financial).
- INSTITUTIONAL ARRANGEMENT
- TECHNOLOGY
- IMAGE
- AWARENESS
- THE STATE
- INDUSTRY
- PARTNERSHIPS

These themes are identified, analysed and discussed therein. The above inter-linked themes are informed by the internal and external factors that have been identified as influencing the provision

of MET and eventually some were identified as presenting challenges for MET in public higher education institutions in KZN. The first part presents the internal factors and the next, the external factors.

7.2.1 THE INTERNAL FACTORS

7.2.1.1 RESOURCES

The findings show that like any other institution, private or public, MET in public higher education institutions in KZN operates in an environment that influences its behaviour and this may be within or beyond its control. Within the institutions, the availability of resources for MET has been greatly influenced by institutional budgeting. As a result, the study has found that ‘resources’ are the most influential internal factor. This relates to the availability of, and access to them. At a deeper level these resources were further broken down into physical, human and financial resources.

- **Physical Resources**

It should be noted that physical resources in the provision of MET takes various forms, and including training facilities such as vessels used for berths, class room simulators for seagoing vocations, lecture venues, study and information facilities such as libraries and teaching equipment especially for those institutions that offer shore-based MET programmes. Participants expressed that physical resources have little or no influence on MET that caters for shore-based qualifications in public higher education in institutions in KZN. Nevertheless, it was the direct opposite for sea-going qualifications and as a result, physical resources the ones that were most needed and lacking because of the nature of their MET programmes.

Participants expressed that access to and availability of resources was informed by the financial resources an institution is bestowed with. A participant identified that, well-resourced MET institutions in other areas of the world, such as in China for example:

“...institutions have a strong financial backing hence such institutions such as the Shanghai Maritime University have their own training vessels” (Interviewee: 1).

It was further stressed that the provision process of sea-going MET programmes has two stages. The first stage necessitates having basic physical resources such as specialized teaching facilities and training simulators. The predominant issue identified was not the lack of MET facilities such as simulators, but rather due to increased demand for MET. Because of such demand, institutions have not been able to keep facilities and equipment in pace with student numbers which has resulted in the need for more facilities. This is evident by a participant who expressed that:

“...the equipment cost millions which this too informs the number of students that can be trained” (Interviewee: 3).

This was asserted by a participant who expressed that:

“...the department is growing, for example back in 2009 when I joined we had less than 100 students that is including the students on berths, this year we are over 400 students so we have grown four times but from a staffing perspective, our staffing is stagnate, we still have the same staff numbers and even the class rooms haven't grown and training equipment has not significantly improved compared to what's out there around the world like China or Singapore” (Interviewee: 1).

The participant further expressed that:

“The problem is further lack of maintenance of the teaching venues we have, which also restricts us from having to increase numbers and more importantly for us, it is the lack of simulation so we need simulators that can take a maximum of 12 students at a time so that means that if we want to increase the number of students, because we need to run the same exercise multiple times for that students if you want to get through those students which currently is a challenge because of our current simulation” (Interviewee: 1).

The results hence point out that due to lack of sustainable financial backing, there are very limited facilities such as simulators, used in the provision of MET in KZN public higher education institutions and keeping up with demand for MET remains a challenge. Nevertheless, when the issue was further interrogated, it was found the lack of, or limited facilities, such as training

simulators was not only as a result of limited financial backing or sustainability thereof, but rather that the issue was multifaceted. Participants expressed that students taking up MET programmes in the past decade had quadrupled. As a result, this put a constraint on allocated resources which in addition have not kept up with increasing student intake.

The findings show that physical resources are vital in the provision of MET at public higher education institutions, especially for sea-going vocations. However, due the intensive financial commitment needed and lack of sustainability of commitment to keep up with demand, this has posed a challenge for MET. Making the availability of financial resources inter-linked with the availability of physical resources and human resources is another significant challenge. This is asserted by a participant who expressed that:

“One of the things that has also influenced or is going to influence are the resources, not only the financial resources but also the human resources”
(Interviewee: 3).

- **Human Resources**

Beyond the issues of financial and physical resources, human resources in the form of staffing plays a pivotal role in MET, its development and also its sustainability in public higher education institutions in KZN. Participants expressed that the maritime discipline is one of the most difficult to recruit teaching staff for and one participant expressed that:

“The real problem I think is the people are quite difficult to recruit because we are looking at some quite professional directions” **(Interviewee: 6).**

This was asserted by another participant that reiterated that:

“It is very difficult to get maritime specialist with the required experience to teach because the maritime industry is a very industrialized industry outside university so it’s not an industry that focuses on intensive academia in the country, nobody cares how much you read, or how much you do not read, it’s not that kind of industry, it’s how much you are exposed to the industry itself and experience therein” **(Interviewee: 7).**

The participants stressed that the maritime industry is not based on high level higher education qualifications but rather stresses on the experience required for a specific job. Academic institutions on the other hand require people with both experience and the necessary educational qualifications as highlighted below:

“The disjuncture is that the university cannot attract suitably qualified people to come and lecture because the parameter requirements are that you must have a masters or Ph.D.” (Interviewee: 7).

The disjuncture is asserted by another participant that expressed that:

“It is very difficult to find lecturers, because the minimum requirement is a masters for example in civil engineering we do not find such people, even worse they get four times the salary outside in the industry than inside the university setting, how can people regard it as a passion if no one pays you, I am young, I have a young family and I will drop my salary four times to serve you, it is impossible” (Interviewee: 3).

Participants expressed that the maritime industry is one of most financially rewarding industries, such as law, engineering, architecture and seafaring to name a few. As a result, it was found that salaries are far more attractive in the industry then at MET institutions in KZN. This is asserted by one participant, who expressed the following:

“...we have been trying to recruit a director for this unit but with no success, we really battled to do that, we advertised extensively in 2016, we actually placed an advertisement in one of the top end international publications called Lloyds List which is probably one or two most consulted publications globally in the maritime transport industry” (Interviewee: 6).

As a result, another participant asserted this by stating that:

“The biggest challenge we have and this is not only us but also Cape Peninsula University of Technology and it is global. It is the salaries; because if a person is earning a tax-free salary at sea it is very difficult to attract that person to then come and work as a MET lecturer” (Interviewee: 1).

This is because of the salary scales in the maritime industry being more attractive than at MET institutions. Participants further expressed that they could not recruit someone that earns more than top level management of the university as they could not afford such a person. Therefore, with salaries falling very far behind when compared to the maritime industry, many institutions are faced with the challenge of having limited MET academics with the necessary expertise and experience in KZN. This is supported by a participant who expressed that they:

“...have very few people who are, or really have expertise in this area with the academic profile required by higher education institutions, as a result we are trying to grow our own timber in that area as well” (Interviewee: 6).

Nevertheless, one participant expressed that, “growing their own timber” or upskilling their own people was just a short-term solution because such academics had no or limited industry experience. They expressed that:

“We need more people, more suitably qualified people like I said having a PhD is not going to cut it, because we also need somebody who can understand and give people the latitude to treat the provision of MET at higher education institutions in the same way that they understand industry needs” (Interviewee: 7).

Another participant highlighted that there was a direct link between the lack of or limited financial resources to the issue of not having the necessary human resources. This was asserted by several participants:

“... human resources are quite difficult particularly at a senior level and they are very expensive as well because to attract somebody of stature is not going to be easy and that is what we found from several attempts to appoint” (Interviewee: 6).

“The types of people we want to attract and come and recruit, they are being paid a lot. The salaries are much more than what we can afford to pay them, and that is negatively affecting MET” (Interviewee: 1).

The latter participant emphasised that it was not only remuneration packages that was an issue, but also the high recruitment requirements at public higher education institutions:

“The discipline has been trying to for some time to appoint a professor of Maritime Law and I think there are only maybe half a dozen people in South Africa who have PhDs in Maritime Law and some of those are kind of old as well so there is no point in appointing someone who is seventy years old”

(Interviewee: 6).

The human resource issue further revealed more complexities. Participants identified that beyond the issue of having limited financial resources for facilities and attracting the necessary teaching staff, the lack of or limit of human resources has led to the limit of postgraduate supervision capacity. A participant expressed that:

“...the constraint for us is not the direct immediate teaching, where if you have 25 postgraduate students there is not much difference in the teaching process then if we had 45 for example but what is a very big difference is supervision capacity so when those are masters students who are doing course work masters or full research masters or PhDs, the supervision capacity is limited, and very much at the moment here it’s really two people who can supervise maritime studies at postgraduate level” **(Interviewee: 6).**

The limit in postgraduate capacity has led to a succession issue. Participants expressed that this limited the public higher education institutions offering MET research capacity and growth. This is asserted by a participant who expressed that:

“Succession of MET academics is an issue, this especially at masters and PhD level, this is where there is a lack in research supervision capacity” **(Interviewee: 2).**

In addition, another participant expressed that:

“...once we can sort out the human resources we can increase numbers, you cannot increase numbers when you do not have the resources” **(Interviewee: 1).**

Nevertheless, the participants acknowledged that the issues of human resources for MET is directly industry related:

“Maritime experts are very few in South Africa, especially those with maritime qualifications who also meet university teaching requirements such as a minimum masters degree” (Interviewee: 3).

Those that are available, are either young, with little or no industry experience or old with the necessary experience but not affordable.

“People are available overseas but how can we afford them, when we cannot even afford the very few we have in the country so the budget doesn’t allow such” (Interviewee: 7).

The participant expressed that MET in public higher education institutions in KZN has not been prioritized by top management in these institutions because it was not seen as prestigious for example when compared to discipline such as medicine or accountancy. Participants expressed that if this was the case, then the necessary mechanisms to attract necessary human resources would be in place. Such as relaxing the recruitment standards and adjusting remuneration packages in MET.

- **Financial Resources**

This study has found that financial resources are in the centre of the development and sustainability of MET at public higher education institutions in KZN. Participants from public higher education institutions that provide MET in this study expressed a concern about the level of the institutions financial commitment to MET. One of the participants expressed that:

“I think if the institution takes a strategic decision that they are going to commit resources to something that they see as a strategic direction then they need to commit additional resources to that” (Interviewee: 6).

This is born by that participants identified that public higher education institutions offering MET in KZN see themselves as strategically positioned in catering for the provinces and the broader

country's maritime skills demands however, such a strategic position is yet to be backed by commitment in the form of financial investments in MET:

“There is no money to develop MET at public higher education institutions in KZN, as soon as you come saying you want millions just for one tiny maritime department in a faculty mixed with other disciplines, it's not feasible they say”
(Interviewee: 3).

Such financial investments can contribute to a number of things such as attractive remuneration packages in the form of salaries for more staff and infrastructure development.

“...the challenges and that's apart from the fact that shipping industry is international, people in the industry are up to 12 times more paid than a varsity lecturer in KZN so it's difficult for them to move from that environment into this environment” **(Interviewee: 7).**

As a result, due to limited resources such as finance and standard institutional arrangements in recruitment, participants relied on pro-bono from maritime professionals with the necessary qualifications required by higher education institutions in KZN.

“It is really a problem, many guys have come and volunteered because the kind of salaries they earn, they know themselves that its contribution to the community for them to be involved hence they not looking for a salary so whatever they get, they get as a stipend from the university, not really that they get paid much because the varsity just says it cannot afford them” **(Interviewee: 7).**

This is further asserted by another participant that expressed that:

“It's a challenge, how do you attract those people to come teach fulltime, we cannot attract them because we cannot afford them” **(Interviewee: 3).**

7.2.1.2 INSTITUTIONAL ARRANGEMENT

MET at public higher education institutions in KZN and the rest of South Africa, is found in small pockets. Hence there is no single public higher education institution that offers MET programmes

only. MET is thus found in public higher education institutions which are your traditional universities in KZN.

Institutional arrangement as a factor is also multifaceted, including the institutions top management commitment to its MET in terms of the strategies in place to address issues related to its provision of MET. Where MET succeeds, it has been the result of top management seeing the maritime industry and its education and training provision as a strategic position, which necessitates putting in place mechanisms to address such and remedies to counter issues that develop.

Some of the issues identified as relating to an institution's arrangement are: A) the university entry requirements to become an academic staff, B) Having the necessary person or persons to champion MET provision in the institution and C) Making available financial resources necessary for the development and sustainability of MET. A participant expressed that:

“There needs to be a champion, somebody that is passionate about the sector, knowledgeable and one wanting to see the dissemination of knowledge in this field, in terms of wanting students to be informed about the maritime sector, opportunities in the maritime sector” (Interviewee: 4).

The participants revealed that not having the right players such as a person to champion the development and sustainability of MET in an institution, leads to lack of coordination and commitment by management. Besides not having attractive salaries, job entry requirements are seen as not realistic for maritime professionals because, to recap, many rarely pursue postgraduate study. This is asserted by one of the participants who was trying to fill a vacant post:

“...we got two serious expressions of interest, one of which I thought was a really serious interesting guy but he did not have the academic profile, he had a Ph.D. but if you lined him up with a typical professor of sociology, history or economics, he did not have the publication record of a standard traditional academic...most of the people from the professional world wouldn't have that profile so it is extremely difficult to appoint people at a senior level” (Interviewee: 6).

This was supported by another participant's assertion that:

"...because the university requires MET lecturers to have a master's degree, so the people at sea, for example if you a captain on a ship, your highest qualification is in fact a junior degree which can in most cases be a diploma, so you will then come in even though you have all the experience you will come in as a junior lecturer because your do not have a master's degree" (Interviewee: 1).

Participants identified that it was fine to see and have young talent coming through and becoming MET academics but what is a concern is that young talent does not have the necessary industry experience, connections and/or networks. Participants also identified that because of the institutional arrangement in higher education there is currently a global debate. Universities across the world require a minimum of a master's or Ph.D to teach, while on the other hand in careers such as seafaring, which are considered as a very hands on profession, the person has to have the necessary practical skills.

As a result, participants are of the view that such persons should have a mixture of both. Institutions of higher education need someone with work experience, but they also need someone who has the qualities of a researcher to be an academic. This creates a dilemma in the provision of MET, because such people are very limited and hard to find which has been the case in KZN's public higher education institutions offering MET.

Nonetheless, the participants are of the view that when an institution sees MET provision as a strategic programme, it ought to have the institutional top management buy-in and also someone to champion the process. On participant expressed that:

"... in the past maritime was identified as a key area for research and teaching however I do not know how much resources were actually put behind that and so you need the support from the higher structures, the higher levels of influence, the deans, deputy vice chancellors and so on" (Interviewee: 4).

“...we need a higher-level involvement of the university, where the university will say, what do you guys suggest we do to assist you to overcome your challenges, because the current institutional arrangements are a problem” (Interviewee: 7).

As a result, such requires intensive investment in resources such as financial, human and physical resources, as majority of the participants expressed, which public higher education institutions offering MET lack in KZN. To achieve this, institutional commitment is needed, but such commitments ought to be driven by a person who is going to champion this within the institution. This was asserted by a participant who expressed that:

“...having a champion, someone keen on the development and sustainability of MET in KZN public higher education institutions is desperately needed” (Interviewee: 3).

Table: 7.1 Inter-linked internal variables influencing the complexity of MET provision in public higher education institutions in KZN
Physical Resources
Human Resources
Financial Resources
Institutional Arrangement

The feedback structure of these variables will be created and discussed in Chapter Eight. The findings show that the issues of the institutional arrangement and institutional budgeting, specifically centralised budgeting are core in addressing challenges facing MET in public higher education insitutions in the province. MET at public higher education institutions in KZN is resource constrained, and this threatens its development and sustainability. The resources allocation model or institutional budgeting model used, which the findings suggest is central budgeting, has had a dier effect on the provision of MET because of the cost implication involved in the provision of MET.

Centralised budgeting is a process in which all decision-making powers regarding financial allocations are in the hands of upper level administration (Hanover Research, 2019). This has been the case for MET in public higher education institution in KZN. Although such decisions at top management or upper level administration take place under conditions of great scarcity, the findings suggest that public higher education institutions offering MET seem to have not aligned their budgeting model to provincial and national priorities or policies such as Operation Phakisa.

The internal challenges (resource constraints) facing MET at public higher education institutions in KZN seem to imply that there might be little or no regard for MET and its needs by top management when making budgetary decisions. This might also include the broader needs of the country and its economy. The next section below, takes a look at the external factors influencing the provision of MET at public higher education institutions in KZN.

7.2.2 THE EXTERNAL FACTORS

The previous section presented the themes that informed the identification of the internal factors that influence the provision of MET in public higher education institutions in KZN. This section takes a look at the external factors. Unlike internal factors which an institution can influence, external factors are those things that an institution has little or no control or influence over. Such factors of influence can be both domestic or global in nature. Just like how the maritime industry and labour markets are global, so too can its education and training institutions be regarded as such, especially those that offer MET under the watchful eye of international institutions such as the International Maritime Organization (IMO).

Public higher education institutions offering MET not only have to adhere to domestic social, political and economic conditions, but are also exposed to for example, both domestic educational regulatory measures, in the case of South Africa SAQA and the international STCW. What this means is that domestic and international context exert an influence upon the institution and its affiliates. These can be referred to as ‘EXTERNAL FACTORS’ or factors that influence the dynamics of the provision of MET by public higher education institutions. The following external factors emerged as themes: the State, Industry, Technology, Image, Attractiveness and Partnerships.

7.2.2.1 INDUSTRY

It is generally acknowledged that because KZN has the busiest port in the southern hemisphere, such was resulted in an array of maritime clusters of industry in the province. As a result, this has led to industry influencing the direction in terms of requirements and supply of MET provision. A participant expressed that:

“The industry surrounds the province, the ports and harbours and a variety of maritime stakeholders have influenced the direction we are taking” (Interviewee: 3).

“Industry is very powerful because we are sitting on this big maritime cluster in KZN’s coast, areas such as Durban are very much at an advantage relative to other centres in South Africa and we are forging quite strong links with industry, very strong links in terms of for example, maritime law and without those links we would not be able to run some of programmes that we are running” (Interviewee: 6).

“We have a relatively good relationship with the local industry, we have our advisory boards which meets twice a year, first and second semester where industry comes in and we give them an update of what’s going on, I do keep in contact with them on a regular basis” (Interviewee: 1).

Another participant in this regard expressed that:

“By getting the industry involved there is already that wow! they are buying into this” (Interviewee: 3).

The latter participant reiterated and expressed that:

“Industry is powerful but what we haven’t done is leverage resources from industry in the extent that we would need because private business does contribute to the development of MET at public higher education institutions in KZN but more in kind than in cash because they are providing specialist people who coming in to help us on a substantial basis and that is very valuable” (Interviewee: 6).

Using the example of another public higher education offering MET in another province of South Africa, i.e. the Western Cape, another participant expressed that:

“...even universities like Stellenbosch which offer coastal engineering don’t have staff, they utilize industry personnel to come teach” (Interviewee: 3).

It was then identified that the industry is not just created by those who have been educated and trained in MET in public higher education institutions in KZN. The maritime industry also plays an active role in the process too, but this role is limited. With the challenges facing MET in public higher education institutions in KZN and the disjuncture in the demand by industry and the supply by MET, one participant expressed that:

“Industry is ready to go to institutions that are ready to give them what they want and these people (industry), said many times they are ready to put money for people (their employees or students) who are going to be trained in accordance to what they want which you allow them a hand in choosing what kind of things must be taught, who must teach those things and when those things must be taught” (Interviewee: 7).

Participants identified that this relationship between MET institutions and industry has been as a result of being located within a thriving maritime community and sector in KZN. One participant expressed that they benefit from a very powerful relationship with maritime bodies of different professions such as the Maritime Law Associate and so on.

“Durban is such a large maritime centre that there is already a considerable amount of talent sitting in the Durban area and we are able to draw on that to a very significant extent not only in KZN, because we are also getting experts coming in from other areas. We either bring in those people or use teleconferencing because we’ve got quite good audio-visual links here... some of the people who are helping us come as far as from Cape Town, such as practising lawyers who also help the University of Cape Town” (Interviewee: 6).

The participants further expressed that location in terms of the proximity to the maritime industry has had a big influence on the provision of MET at higher education institutions in KZN. Being

close to the concentration of a maritime community has made MET programmes seem to be more favourable and attractive, or in other words being offered in an environment or location in close proximity with the industry employers attracts more people:

“There is a much bigger maritime community in Durban than there is in Cape Town so we have a bigger catchment area in terms of professionals that we can and draw on” (Interviewee: 6).

“We have two of the most important ports in Southern Africa, the port of Richards Bay and the Port of Durban” (Interviewee: 4).

The participants identify that there is a direct connection between industry location and the attractiveness of MET offerings. This was asserted by a participant who expressed that years ago:

“...a question was raised, that our institution was so close to the harbour, we could almost see Bluff harbour from where its located, and yet we did not have, or offer anything regarding harbours or ports or management of ports to students which was robbing them of job opportunities because we had very high unemployment which is the problem we sit with even today” (Interviewee: 3).

It is highly advantageous when institutions of education and training are located in highly concentrated industry areas and offer programmes that service the concentration of such an industry. This has been the case of MET in public higher education institutions in KZN. These institutions benefit from this catchment in terms of getting the necessary industry assistance and backing at their door step, increases the attractiveness of MET programmes:

“Our location not only our proximity to the port but the whole maritime community that surrounds the port and the business opportunities that are here create a really conducive environment to attracting students from within South Africa and from overseas and also the domestic industry support” (Interviewee: 4).

Nonetheless, participants express that the support they received was not financial but expressed that in other countries there is a very strong tie between MET institutions and their surrounding industry. For example, shipping companies go as far as assisting MET at higher education institutions financially. One participant for example, identified that:

“At the Shanghai Maritime University they have a multi-level library complex which is made up of about 10 stories high at the value of around hundreds of millions Rands which Cosco Shipping Lines built and it’s the same in Singapore which has excellent MET system, the Singapore Maritime Academy and the port, the Maritime Port Authority have a very good relationship where they have actually had their simulators housed at the academy which then allows them, the academy students to use them whereas in South Africa, specifically KZN, this is not the case” (Interviewee: 1).

Nonetheless, the participant reiterated and expressed that:

“...we need simulation and we can’t get the funding. So, in the one instance yes industry takes our students, but we have a very cordial relationship however, when it comes to financial assistance and trying to grow the department that is non-existent” (Interviewee: 1).

The location of public higher education institutions offering MET and their proximity to the maritime industry has had huge benefits for MET in KZN. This has been because the province has a vibrant maritime industry and sectors. In addition, it is home to two ports which has allowed for industry to have a mutual interest in MET, and as a result to be involved in the MET process. This has resulted in relationships being developed between the supplier, the MET institutions and the consumer, which in this case is the maritime industry in Durban. This relationship has been beneficial for both parties but more so for MET institutions, when addressing their own staffing needs and human resources problems necessary for MET provision. However, the relationship between industry and MET institutions to date has not shifted to also providing financial support.

7.2.2.2 AWARENESS

The maritime industry, for most South African's including those located in the coast, is a distant field of study and career, and some do not even know what the word means (Mthuli, 2014), although for example KZN has two international ports, and the third is currently under construction as one of the participants expressed:

“When students start considering career options they rarely consider the maritime industry” (Interviewee: 3).

Another participant expressed that:

“...lack of awareness, it's a serious challenge, especially among the previously disadvantaged individuals, you find that there is no knowledge of even the maritime industry even existing to begin with, so you will find that even people are not or students are not inclined to even take MET qualifications because there is lack of knowledge” (Interviewee: 5).

The participant previous further expressed that:

“The general population do not even know what is maritime, are they going to get a job, unemployment forces make them think that way” (Interviewee: 3).

The latter further asserts that:

“...the youth of KZN is not educated about the maritime sector, even the general population of KZN, hence there is lack of information around maritime activities, which is actually sad because everything that we do and use has come to KZN via a ship, the clothes we wear, hence shipping is the mode of transport that is used the most than all the other modes of transport, especially by our country, which is a country that imports more than it exports” (Interviewee: 2).

“...you find that at times there are MET qualifications that are there but you find that they are not known about and taken up by those that were disadvantaged such as the black students” (Interviewee: 5).

The findings suggest that the maritime industry and MET is a distant thought and reality for many prospective students in the province of KZN. This has been due to the lack of awareness about the maritime industry and its opportunities. This has also been caused by the lack of education, knowledge and sources of information about the industry, especially for prospective students from rural areas and disadvantaged backgrounds. Hence awareness about the maritime industry can encourage prospective students to seek information about opportunities and this would also be beneficial for the industry because such would balance the gender, racial and generational divide in the industry.

7.2.2.3 IMAGE

The image of something has an influence on its attractiveness and this has been the case for the maritime industry in KZN. As a result, MET has eventually been directly affected. Nonetheless, this study has found that the image of the maritime industry to those that are aware of it and knowledgeable about it, has had a positive effect on the maritime industry and eventually MET. Regarding the image of the maritime industry and MET, a participant asserted that:

“Interestingly the image has led to a greater demand for maritime studies... we are battling to cope with the level of demand” (Interviewee 6).

The participants further identified that the expansion of the maritime industry through maritime infrastructural development such as the new port in Durban and the proposed port expansion at the port of Richards Bay, will need necessary maritime labour to support it during, prior and post construction. As a result, those knowledgeable about maritime see new career paths and opportunities in KZN:

“...we are seeing more people from industry because people are seeing that its growing and hence job opportunities are opening up that need maritime specialists but the image of the maritime industry in south Africa at the moment is quite positive in a sense that it is the target of, and has been singled out as a strategic sector and MET institutions are overwhelmed with applications” (Interviewee 6).

In addition, participants identified that incentives such a tax-free salary for seagoing vocations and study incentives such as bursaries also influenced the image and attractiveness making image, awareness and industry inter-linked. A participant expressed that:

“For the sea going it’s the tax-free salaries, but some are attracted by the initiatives that we have like, the fully sponsored trip to China and we also work with external sponsors who give us bursaries for our first-year students so I think the word also goes out that there are bursaries available” (Interviewee: 1).

The inter-link is asserted by participants who identified that image and attractiveness of MET in KZN does not only lie with image of the industry, but also the satisfaction of industry with the education system in meeting its demands. This is asserted by a participant, who expressed that:

“...companies in Durban are very happy with and satisfied with the quality of our students that we produce, they are coming back to take more students” (Interviewee: 1).

In addition, another participant reiterated this and expressed that:

“I know many courses, which have been phased out..., which I did not know that we were even offering them, I did not even know we had such a course but it was simply phased out because no one knew about it nor were students interested in it hence the university had to close the programme because at one time only one student was registered for it, so with MET, who is going to sell it, industry is going to sell it?, We can develop a course which is a big challenge for us, but by working closely in the development and sustainability of MET with industry, this allows for improvements of MET’s image, attractiveness and information about it. By industry part-taking this can be seen as a validating process. They are sharing what they need from us and the programme, as a result they trust our offerings, because they were involved in developing them, hence they can send their students to us rather than overseas” (Interviewee: 3).

The participants expressed that when industry is aware of and has taken part in the development of MET, the course/programme adds value to them and this also allows them to sell it to their

employees and other MET prospectives such as students seeking qualifications with employment opportunities after completion of their secondary schooling.

“Unemployment is forcing people to find new ways of attaining opportunities, they get into a MET programme so that they find job because their other applications in other programmes might have not been successful, now they see maybe they will find a job if they do MET, although this is the wrong attitude of picking a career” (Interviewee: 3).

The findings suggest that those that are aware about the maritime industry, have the necessary information and some knowledge about the industry. This tends to have a positive effect on prospective students and this has influenced its attractiveness. This can be seen in the demand for MET and the rise of MET student intake, from both the industry and those coming from secondary schooling. The attractiveness and the image have been also affected positively by other factors such as incentives and employment opportunities attached to MET, as well as industry involvement and the relationship it has with MET institutions in the province. All of this has improved the image of the maritime industry, and ultimately this has influenced the demand for MET.

7.2.2.4 TECHNOLOGY

It is generally acknowledged that technological advancements in the maritime industry effects the provision of MET and in some cases, becomes a constraint rather than easing and improving the process. This study's findings revealed that technology has no influence on the provision of MET that is directed at shore-based careers. However, it was found that this was the direct opposite for sea-going focused MET. Participants expressed that teaching equipment, such as simulators are vital for seagoing MET and other very technical maritime careers. Unfortunately, this is hampered by the high costs of the technology and adoption of the latest technology, for example simulators which ease and improve the teaching process and also improves the students learning process are very costly as a result in limited supply in the institutions. Hence this has had a negative effect on seagoing MET, especially with increasing numbers of students year on year. A participant expressed that:

“Simulator capacity needs to be increased and again if you want to compare what’s out there across the oceans and what we got, we are about thirty years behind with regards to the technology” (Interviewee: 1).

As a result, participants felt that students lack of access to the latest simulator technology definitely puts them at a disadvantage when compared to other students around the world from well-developed maritime countries. Such did not compromise quality, but just slowed down their learning process. In addition, the findings reveal that with the development of technology related learning platforms such as E-learning, public higher education institutions offering MET have been active in embracing such for the future development and sustainability of their MET. One participant expressed that:

“The technology we are using is online, e-learning. We as a department have made a lot of inroads with regards to using e-learning platforms and one of the reason we going that way is because we would like to offer the advanced diploma using distance learning so that our students at sea can further their studies” (Interviewee: 1).

Nonetheless, the participant acknowledged that the adoption of such technology improves the interaction of MET students in public higher education institutions and also improves their learning process but such requires huge financial commitment on the side of top management of public higher education institutions in KZN offering MET and if such commitment is lacking, this limits the access to technology:

“...we can’t teach them on old technology like the South African Agarlus. One of the engines that are on board that ship do not exist on trading ships where we send our students today. Those are completely different types of engines. The same with the bridge, the navigation equipment and etc...” (Interviewee: 1).

The latter participant further expressed that:

“...we need technology, such as the latest simulation technology, that can only happen if we have the financial resources or the partnerships we need” (Interviewee: 1).

This is supported by a participant who expresses that:

“...in the form of equipment needed, that’s where the budget comes in, how do you buy all this expensive equipment? Because we have to have simulation which is very expensive, we always discuss this in our meetings with the management. We told the university, we need to be able to buy all this equipment- the simulator technology so we can teach students, they said no we can find a better solution that costs less because buying is going to cost a fortune which the university will find very difficult to finance” (Interviewee: 3).

The findings suggest that keeping pace with the latest technology is vital in the development and sustainability of MET in public higher education institutions in KZN. However, this remains a distant reality. This is mainly due to the cost attached to the latest simulator technology. Hence there is no alignment between the technology used in MET and what is in industry. This has been as a result of budgetary constraints and not having the necessary financial resources necessary to purchase the latest simulation technology and the required quantity thereof.

The issue is further compounded by the need for not only the latest simulator technology but also increased numbers so to address capacity issues borne by the increasing number of students pursuing MET programmes. In addition, the findings reveal that with the development of technology related learning platforms such as e-learning, public higher education institutions offering MET have been active in embracing them. Many MET public higher education institutions in KZN have established e-learning systems and the STCW identifies this education method as advantageous in offering MET. E-learning can be seen as a vital tool in the provision of MET, because it can ease teaching and further influence the demand for MET for those that have no or limited access to conventional provision of MET through distant learning, especially students at sea.

<p>Table: 7.2 Inter-linked external variables influencing the complexity of MET provision in public higher education institutions in KZN</p>

Industry
Image
Awareness
Technology

The feedback structure of the above variables will be created and discussed in Chapter Eight. The next section below, now takes a look at how public higher education institutions in KZN offering MET have responded to these factors. The previous section presented both the internal and external factors that influence the provision of MET at public higher education institutions in the province of KZN in South Africa. In doing such, it was not identified how these institutions respond to these factors because some may either present challenges or opportunities. Thus, the next section now looks at *how public higher education institutions in KZN, offering MET, have responded and continue to respond to these factors*.

7.2.3 IDENTIFIED SOLUTIONS TO MET INSTITUTIONAL CHALLENGES

Partnerships

This study has found that like the rest of the global community of MET institutions, MET in public higher education institutions in KZN is influenced by a number of factors, but not all the factors identified could be grouped as internal or external factors. Nevertheless, some of these factors have presented challenges, while others have presented opportunities for MET in public higher education institutions in KZN. To recap these, include resources in the form of physical, human and financial resources and industry demands, technology and its advancements, and the image and awareness of the maritime industry.

The study then explored how they respond to such factors. It was found that through partnerships created for collaboration with respective provincial or local government institutions, public higher education institutions offering MET in KZN work collectively to cooperate and coordinate MET in order to close the maritime skills gap in the province. This is because the role of partnerships is vital in KZN's MET development and sustainability, as asserted by one participant who expressed that:

“...we need more hands-on desk, we need more people and stakeholders to be on board” (Interviewee: 7).

The findings reveal that the partnerships between public higher education institutions offering MET with industry and both provincial and local government institutions is very strong:

“Partnerships are very strong and these are both with the industry and the state but partnerships with the world of professional practitioners is much stronger such as with big law firms, the Maritime Law Association which is very strong, but also with other industry bodies such as the Institute of Chartered Ship Brokers which play a great role” (Interviewee: 6).

Nonetheless, the role of the industry has been limited in assisting MET in public higher education institutions address their challenges with one a participant expressing that such assistance was often only provided if they had something to gain from their partners:

“Its industry demands that call for the need for partnerships which are informed by limited resources, it’s a game of if you help us, we help you, we have one goal” (Interviewee: 3).

However, participants also expressed that:

“There need to be more partnerships and collaborations across education and training institutions not only in KZN, because you find that institutions in South Africa are working in silos and that is a challenge, it is a problem, so better coordination and more collaboration is needed, that will definitely assist. Such will result in a focus by institutions on those MET qualifications that are in dire need but not being offered at all, for instance within the province, that I think would be very much helpful” (Interviewee: 5).

The findings further revealed that partnerships are with a number of institutions both domestically and internationally and even with individuals for a number of reasons including the sharing of training facilities and technology, as well as human resources. For example, seagoing MET

requires simulators which public higher education institutions in KZN have limited numbers of. This has opened the room to foster relationships with other institutions to help them overcome this challenge:

“...We are piggy backing from China and bridging that gap through partnerships until comes a time that we have our own resources such as funding” (Interviewee: 1).

Another participant expressed that:

“...even from Tanzania, which is a country with the biggest ports in Eastern Africa, we are linking up with them and MOU’s are going to be formed because they want to limit the dependency on foreign MET training. They want training in Africa because Africa has a different niche than for example Holland. We think different, we have different cultures, we need to develop something peculiar to Africa because they are using foreigners to build and run their ports and harbours” (Interviewee: 3).

The latter participant further identified and expressed that:

“We are currently working with Shanghai Maritime University to provide us with a simulator, we wanting to increase our current simulation, which has thirty stations where we can have students in the class sitting two students per simulator so we can teach and they can also go and access the simulator because they can cover a number of subjects” (Interviewee: 1).

In relation to partnerships and the future of maritime development and sustainability supported by a well-developed MET system in South Africa and the rest of the continent, one participant, expressed that:

“In the beginning foreigners can oversee the development of the maritime industry in Africa, while Africa’s MET develops, which will take a number of years till Africans can do it themselves” (Interviewee: 3).

Nevertheless, the participants further revealed that such partnerships are not only with formal institutions but also with private individuals from industry. To address a challenge such as human resources, one participant identified that:

“How we have addressed it and done it in this unit is that we have a lot of people from industry either coming in on a part time basis which is how I typically started. I was in practice and I used to come here and give maybe six lectures a year and that is how I began” (Interviewee: 7).

This is also identified by another participant, that expressed that:

“I have a former Masters student who is thinking and asking if we can use her services. She would like to get back into some kind of academic activity. I see a prospect of using her to help us with teaching now whether I would see an immediate role but what I would certainly see is the role of her to assist with things like masters supervision because supervisors are limited. We do get enquires in doctoral work but also that ability to supervisor PhD is even more limited than masters supervision because there are not many people who have PhDs in maritime” (Interviewee: 6).

In addition, this study has found that industry has a good relationship with public higher education institutions offering MET in KZN and as a result plays a vital role in MET. However, this role is limited as compared to other countries around the world:

“They don’t support the department financially, if you have to go again to other MET institutions and I am quite lucky because I get to visit at least one a year, through my involvement in IMLA, the International Maritime Lecturers’ Association. And in most of these institutions there is a very strong tie with the industry. The shipping companies actually assist the universities financially, so for example, like Shanghai Maritime University they have a multi-level library complex which is made up of about 10 stories at the value of around five hundred million Rands that Kosco built; and so is the same in Singapore, where Singapore has a very good maritime academy and the Maritime Port Authority has a very

good relationship and their simulators are housed at the academy which then allows the academy students, to use it” (Interviewee: 1).

Such is further emphasised by another participant who expressed that:

“...particularly with regards to work integrated learning so the support is there with regards to taking on students (both sea-going and shore based), making us their first choice into programmes such as internships etc. so that relationship is there, that’s the plus side” (Interviewee: 1).

Nonetheless, public higher education institutions offering MET felt that industry and respective government institutions (both local and provincial) responsible for maritime skills development and sustainability still need to play an even more active role in MET provision in public higher education institutions. This is asserted by a participant that expressed that:

“We have sent proposals through Operation Phakisa - Working Group 17 so that our simulators are increased in terms of their capacity” (Interviewee: 1).

It is thus evident that partnerships are key in solving shared problems especially when the stakeholders have the same end goal in mind. In South Africa, MET institutions strive to effectively domesticate the maritime industry. In addition, the government through its respective local and provincial institutions strives to part-take in the development and sustainability of the maritime industry and understands that the country’s circumstances requires much focus on skills development and sustainability.

Participants identified that partnerships for maritime skills development and sustainability are young in KZN, but that they are addressing some of the challenges affecting the provision of MET at public higher education institutions:

“...so partnerships are powerful and I think they can help us but we haven’t harnessed them as well as we could, given our constraints we possibly could use those partnerships more strategically and this is something we are working on” (Interviewee: 6).

Nonetheless, partnerships are seen by public higher education institutions offering MET as means of assisting in the development and sustainability of maritime skills in the province. As a result, for this process to function properly, one participant expressed that:

“...without relying just on the resources of the university, the development and sustainability of maritime skills can be achieved in the province. We have been fortunate, stakeholders are playing a big role in the MET provision system in KZN, because we wouldn’t be able to do it independently” (Interviewee: 3).

The constraints facing MET at public higher education institutions and the role played by maritime stakeholders has proved to be vital to the survival and sustainability of MET in KZN.

“...if the stakeholders did not assist us, we would have never been able to afford to get maritime experts from for example Holland to assist us” (Interviewee: 3).

The participant further stressed that:

“Without, stakeholders, like EMC, we wouldn’t have been able to afford maritime experts from overseas to come to our institution to assist us develop new MET courses. We do not have a budget for that so it would have died a premature death, because we may have good ideas but with no resources or no one jumping in or seeing the opportunity it will die quickly” (Interviewee: 3).

As a result, partnerships with the relevant industry stakeholders is key if what they are offering is needed and wanted. Industry can even assist in curriculum redesign, so as to address new developments and future changes in the way things are done.

“There was a need to facilitate the creation of committees that puts together industry and education and training institutions, so that these institutions can then be guided properly to close the maritime skills gaps, such will result in them being aware of new developments and changes in industry long before they take place, an example of this would be Mangosuthu University of Technology’s

(MUT) new MET offerings which come as a result of the new dugout port that is currently being built at the old airport. When the new port was being planned, MUT had already consulted industry and identified the skills that would be needed and which institutions were offering such training. They started planning to bridge this gap or address the future labour demands for the dugout port rather than importing the labour from overseas. As a result, partnerships and consultations are vital” (Interviewee: 2).

Nevertheless, participants expressed that partnerships are not self-developed, rather such are initiatives brought about by an individual or parties facing challenges that are common in achieving common goals. For example, participants expressed that due to limited resources not only amongst public higher education institutions offering MET, but also state institutions, partnerships were formed to remedy the effects of the challenges. One participant expressed that:

“We respond through collaboration with other stakeholders and co-funding certain initiatives such as delivering on certain objectives through other institutions so that’s how we do it for example maritime awareness for instance, because you find that there are other institutions with awareness campaigns that are undertaken” (Interviewee: 5).

The findings further reveal that state institutions spearhead this role in KZN. This was asserted by a participant who claimed that:

“As a department, we use multifaceted projects and programmes and also special purpose vehicles and such partnerships to ensure that maritime development within the province as a whole increases. This can be in the form of training projects that we engage in or strategy development or policy development which is one of our mandates so also in that field we actually do play. So, it’s about collaborating with various stakeholders just to ensure maritime development in the province” (Interviewee: 5).

However, participants from both sides, MET institutions and government institutions, who strive for maritime development and sustainability, expressed that perhaps what currently lacks in KZN

MET is that there were no well-established relationships in place yet between public higher education institutions offering MET. That is where the problems lie because it would help a great deal if there was more formal collaboration rather than government institutions acting as the bridge between them. The next section below in accordance with the objectives of the study now looks at the role of government (both local and provincial) in MET at public higher education institutions in KZN.

7.2.4 THE ROLE OF THE STATE (PROVINCIAL AND LOCAL GOVERNMENT)

Facilitation

Around the world, the State (through its local, provincial/region or national) insitutions plays an active and a key role in the maritime industry, beyond traditional regulatory processes as the literature has shown in the earlier chapters. With the ever-increasing maritime safety and security and the growth and economic potential of the industry, states influence on all facets is more visible today than ever before. The State thus, through its respective institutions, plays an active role in the development and sustainability of its maritime industry because of it socio-economic influence. As a result, MET institutions are also seen as pivotal in this process.

State institutions which are mandated to safe guide the economic prosperity of South Africa are guided by strategies such as Operation Phakisa which is national government's strategy to actually develop the national maritime industry. They are also guided by the National Development Plan and in the case of provinces, provincial growth and development plans and other strategies. This is the case in KZN with regard to it local and provincial government insitutions. In closely understanding the role of the government and its respective institutions, one participant expressed that:

“The maritime industry is one of the strategic pillars of government, so it is key priority area and remember as a province we have the KwaZulu-Natal Integrated Maritime Strategy which is a road map for the robust development of the provincial maritime industry, which has four main goals for the maritime industry. The first being infrastructure development, the second deals with subsector development, the third being transformation and the fourth looks at skills Development and Research” (Interviewee: 5).

“We work closely with MET institutions, where we take their students through our graduate placement programme, where we take students into the industry by finding them opportunities such as jobs or businesses. The work contracts are usually two years where students stay in an internship so to gain work experience but after two years if the industry doesn’t absorb them, there are different options, we again intervene by looking for further opportunities for them to either go study further abroad. We sent a few graduates to pursue their MET masters in Sweden, while others went into other programmes in the industry” (Interviewee: 2).

Thus, because of the socio-economic rewards of the maritime industry, like in other areas of the globe, in KZN, government institutions such as EMC and DEDTEA too, play an active role in the development and sustainability of the maritime industry, identifying skills gaps and demands and by collectively working with all stakeholders involved from the producers which are MET institutions, to the consumers which is the industry, this study has found:

“We collaborate with the different stakeholders and run different programmes focused at the maritime sector...we currently working on a demand study, to get information on the skills that are in demand and those that are in short supply, to identify the gaps in the provision of MET, the challenges and how can those gaps be bridged. This information is not readily available” (Interviewee: 2).

These programmes run across the maritime industry such as: Enterprise development; Marine manufacturing; Industry promotion; as well as Training and skills development. Nonetheless, government institutions at both local and provincial level felt that the programmes that are currently available or being provided by public higher education institutions in KZN are somehow not satisfactory when compared to the growth and extension of the maritime industry. Participants expressed that for training and skills development to be achieved in the maritime industry in KZN, the first stage in the process is industry promotion. A participant expressed that:

“The majority of the population in South Africa, especially the African people, they were deprived of information. As a result, state institutions involved in facilitating maritime skills development and sustainability start at basic

education, where they educate the youth, about the different careers and opportunities available within the maritime industry because it's important to make them aware of such at an early stage of their education” (Interviewee: 2).

With this in mind, this study found that the government of the province through its respective institutions such as EMC and DEDTEA plays a role in facilitating MET at public higher education level in KZN. These institutions foster collaboration amongst the industry, government and between the public higher education institutions offering MET. The study further found that this role of fostering collaboration and facilitation was born of that:

“Public higher education institutions in the past had a tendency to work in isolation in KZN. They bench mark themselves with overseas universities, individually decide on what qualifications they would offer without doing proper consultation and research in terms of identifying if there is a need for that qualification and what opportunities in terms of future employment for the proposed students after completing their qualification exists” (Interviewee: 2).

This is asserted by another participant that expressed the view that:

“...public higher education institutions offering MET do not work together, the institutions are competing, that's my experience of working with them” (Interviewee: 5).

Thus, the intervention of maritime government institutions is to work with different stakeholders in the maritime industry, such as public higher education institutions offering MET to collectively address the maritime skills gap in the KZN maritime industry. This is assert by a participant from a public higher education institution in KZN that expressed that:

“We have very strong links with public bodies, such as the national office of the port regulator” (Interviewee: 6).

“We facilitate the working together of both industry experts (both local and international) and MET institutions to work together to identity the skills gaps,

needed skills and training, as well as education necessary to bridge the gap”
(Interviewee: 2).

This process involves identifying and designing MET modules and shaping the content to inform the qualifications that are deemed necessary in the province based on the information these stakeholders provide. The participants expressed that the MET facilitation and coordination by government institutions also involves conducting a skills audit of the MET lecturers so capacitate them to that they can teach newly developed MET programmes. The latter participant expressed that:

“Bridging the maritime skills gaps in KZN is beyond just creating MET programmes and complying to the relevant legislative requirements and approval, but rather what is a necessity is to know whether or not there is a need or demand for those maritime skills” **(Interviewee: 2).**

The need for facilitation goes beyond bridging the skills gap. This is expressed by a participant who was of the view that:

“...a student is lost in the mind of institutions after graduating, no one follows up about where a student ends up. Like last year, we produced this number of graduates and then what happened to those graduates, where are they, its like no one cares” **(Interviewee: 5).**

The need for facilitating and collectively addressing MET issues is further identified by a participant who identified that:

“MET students are being produced such as seafarers. However, you find that there is a limitation because of the availability of berths resulting from South Africa not having ships, so after the students complete their theoretical work and now require practical training to complete their seafaring qualification, where will they get the sea-hours (practical training) they need” **(Interviewee: 2).**

On the one hand, the links spread as far as assisting with facilities but also with some public higher education institutions offering MET:

“...when it comes to the equipment that we need to use, State institutions expressed that why don’t we bring our students to the port and harbour, where they have their simulators, best that one can find, where no university can afford, and work with the port and harbour authority and even the eThekweni Municipality who also wants to be involved which also has the training facilities which we can use to our advantage” (Interviewee: 3).

And on the other hand, another participant, making a comparison of the role and the relationship government institutions and industry have with MET institutions overseas pointed out that some government institutions in KZN with the necessary MET facilities such as simulators expressed that:

“...they have got them, they stand idle, yet we need simulation and we can’t get the funding” (Interviewee: 1).

This means that the role played by some government institutions in supporting MET in public higher education institutions is somehow dependent on the relationship they have with the respective institution in KZN and vis versa. As a result, the latter participant expressed that:

“...from the technological side of such simulations, which involves financial commitment which we do not have. The ports and harbours authority will take care of us” (Interviewee: 3).

In the spirit of maritime skills development and sustainability in KZN, another participant expressed that:

“Provincially this year, we have started to engage with the Moses Khotaini Institute, which is the agency of the provincial government. We are in the process of signing an MOU with them, because we have identified a number of projects where we could piggy back from each other” (Interviewee: 1).

Government institutions seen to be playing a pivotal role of enabling collaboration amongst public higher education institutions offering MET in KZN. Participants expressed that government institutions that promote and coordinate MET are:

“... a platform for a number of industry players to meet and collaborate and such is an advantage because there is no other single urban area in Africa that would have a bigger concentration of those players than eThekweni does, so from that point of view we are in the right place” (Interviewee 6).

“...work with all public institutions that offer MET in the province, around maritime qualifications so that whatever they are offering is in line with the skills demands of the maritime industry. Thus, we work with everyone, they work in a committee which is made up of representatives from the Department of Basic Education, Industry, higher education and government at local and provincial levels. Therefore, the discussions take place, all the affected and relevant stakeholders are present so that they can give their input” (Interviewee: 2).

Participants in this study revealed that the government through its respective institutions play an active role in collectively creating strategies which eventually influence MET at public higher education institutions in KZN. Participants see the relationship with state institutions as of mutual interest with one participant expressing that:

“...we are part of the same whole” (Interviewee: 7).

“We love working with public higher education institutions that are planning to offer new MET qualifications, because when we work with them, we can assist them shape the qualification in a way that it is informed by the industry needs, so that by the time they produce the first graduate, industry is expecting them” (Interviewee: 2).

However, this influence has been very limited:

“The state has a role to play, such as eThekweni Maritime Cluster and others that have been set up with state funding and industry funding through partnerships between them” (Interviewee: 4).

“...they are given a mandate to help MET qualifications to develop” (Interviewee: 3).

“They come and ask us for states and we give them and they ask us what we need and we tell them. How many more staff you need and how many more simulators and class rooms we give this information but things are never sent and we never get feedback to say when they are going to give us the things we need”
(Interviewee: 1).

Because the role of the both local and provincial government has been limited, participants felt that more should be done to increase its role so as to assure their commitment to maritime skills development and sustainability which could come in the form of assisting MET in public higher education institutions in KZN overcome its challenges. This is asserted by a participant that expressed that:

“I think they can play a greater role in for example through organizations such as SAMSA” **(Interviewee: 4).**

It was further identified that the role of the government in facilitating maritime development and sustainability in KZN is because of a misconnection between industry skills demands and MET supply:

“There is a disjuncture, a separation or disconnection between where industry is at in terms of speed, update and application, their systems and where the university teaches from” **(Interviewee: 7).**

As a result, participants acknowledged that there is a partial disjuncture between what MET programmes are providing at public higher education institutions in KZN and what the industry needs, especially rare or scarce maritime skills such as maritime finance, architecture and so on. As a result, it is acknowledged that when in the past, government institutions such as the EMC which is based in eThekweni Municipality in KZN and national institutions such as SAIMI, did not exist, there was much more misalignment in MET and it lacked proper coordination. There was even a lack of cooperation amongst MET institutions because there was a lack of a platform for MET institutions to meet and cooperate and coordinate their offerings in accordance to industry wants and needs.

Thus, government institutions such as for example EMC which promote maritime skills development, are seen as platforms or meeting groups of MET's to collectively work together and with the government to address maritime skills gaps and address further challenges. Nonetheless, it was also identified that the government through its institutions such as the Department of Transport or Port Regulators, influence MET. One participant asserted that by stating that:

“...if there any legislative change, we have to know about it and structure our teaching towards it because it directly affects maritime or shipping operations in the province or the bother other countries” (Interviewee: 7).

The government at both local and provincial level through its respective institutions has thus far been limited to facilitating MET in public higher education institutions in KZN in the hope to develop and sustain the maritime skills base in KZN. The findings reveal that, public higher education institutions offering MET feel that much more is needed to be done by government institutions such as EMC and DEDTEA mandated to promote and assist in the coordination of MET, especially at higher education level, in the form of for example, resource provision. However, it is acknowledged that the facilitation role of government institutions such as EMC and the South African International Maritime Institute (SAIMI) are relatively new as they have themselves been recently formulated. As a result, this has limited their capabilities:

“We disseminate a lot of information to state institutions but the relationship is one way. We need to take into account that institutions such as SAIMI are relatedly new organizations they have their own challenges but they are taking our requests further up the chain” (Interviewee: 1).

Through government projects such as Operation Phakisa which speak of tapping on to the economic potential of and taking opportunities in the blue economy (which refers to our oceans such as off shore drilling and exploration) all these new opportunities will open a whole new world for the province of KZN and the rest of South Africa and its socio-economic circumstances. The demand side of the maritime industry, in terms of labour in the form of skills and knowhow, will be vital in addressing the industry's growth and opportunities. As a result, participants expressed that there is a need for the government to play a bigger role, one that goes beyond mere facilitation. Nonetheless, the creation of institutions such as EMC serve as an advisory, collaboration and

cooperation platforms for MET institutions so that they do not duplicate offerings in the province and also to assist in identifying and bridging skills gaps.

7.3 CONCLUSION

This chapter has presented the data collected in the form of interviews with stakeholders involved in the provision of MET at public higher education institutions in KZN. This was achieved by using a thematic analysis technique used to analyse qualitative data, where after the interviews were transcribed and sorted by the researcher, themes emerged. These themes can be seen as factors contributing to the complexity in the provision of MET at public higher education institutions in KZN, which then leads to challenges therein. These factors were understood as being internal and external, and the last section identified the remedies public higher education institutions use to overcome their challenges and also the role of the government and its respective local and provincial institutions therein. The next chapter discusses these findings more deeply by looking at how all the themes, both internal and external influence one another and the overall dynamics in the provision of MET and public higher education institutions in KZN.

CHAPTER EIGHT

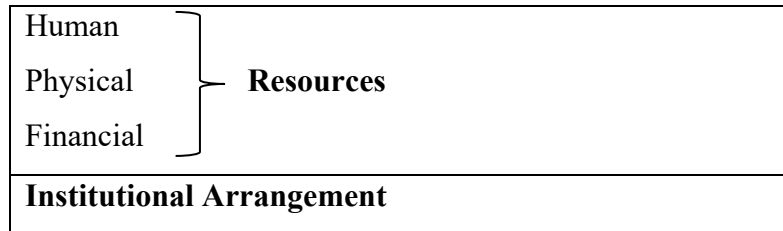
DISCUSSION OF FINDINGS

8.1 INTRODUCTION

The previous chapter presented the data collected through interviews and analysed it. Common factors were identified which make up the themes which are considered variables that can form the basis of the construction of the causal loop feedback diagrams which are in keeping with a Systems Thinking exploration which guides the overall study. As a result, the aim of this chapter, is to show the way in which the variables are inter-linked with one another and the resulting feedback influences between them. This will demonstrate the complexity in the provision of MET by public higher education institutions in KZN which leads to challenges therein. Hence the section presents the findings in the form of Causal Loop Diagrams (CLDs), followed by an explanation of the loops and nature of the relationship between the variables. The challenges facing MET at public higher education institutions in KZN is brought about the synergy created by a variety of external and internal factors of influence, which to recap are: physical, human and financial resources, institutional arrangements, and industry, technology, image and attractiveness in the attempt to domesticate the maritime industry in KZN. The Systems Thinking lens thus demonstrates that various variables and the way they interact with each other are responsible for challenges facing MET at public higher education institutions in KZN.

8.2 THE CLDs FOR INTERNAL FACTORS

According to Sterman (2000:137), “feedback is one of the core concepts of System Dynamics”. To capture the structure of systems in System Dynamics (SD) we use a number of diagramming tools which include Causal Loop Diagrams (CLDs) and stock and flow maps (Sterman, 2000). This study only uses CLDs because the researcher wanted to focus on investigating the feedback loops operative in the challenges facing MET in public higher education institutions in KZN, rather than focusing on the behavior of the system over time. The below variables were identified as influencing the internal dynamics of the provision of MET by public higher education institutions in KZN in the findings chapter:



The above variables which are regarded as being internal, interact to contribute to the overall feedback structure that will be presented at the end of the chapter. According to Maringa (2015), the provision of MET differs around the world in terms of methods and infrastructure such as the available facilities. Thus, developing countries, such as those found in Africa are faced with more challenges in offering quality training and education due to constraints than those found in the developed world. Most African States are constrained by lack of funds, hence this also leads to a lack of prioritising maritime matters (Ihenetu-Geoffrey, 2012). As a result, in line with and the African Union Maritime Charter cited in Mthuli (2014), all member States ought to strive to cooperate with each other and invest in MET in the continent. Nonetheless, the chapter starts by representing each variable feedback loop which are depicted and discussed below.

8.2.1 Physical Resources

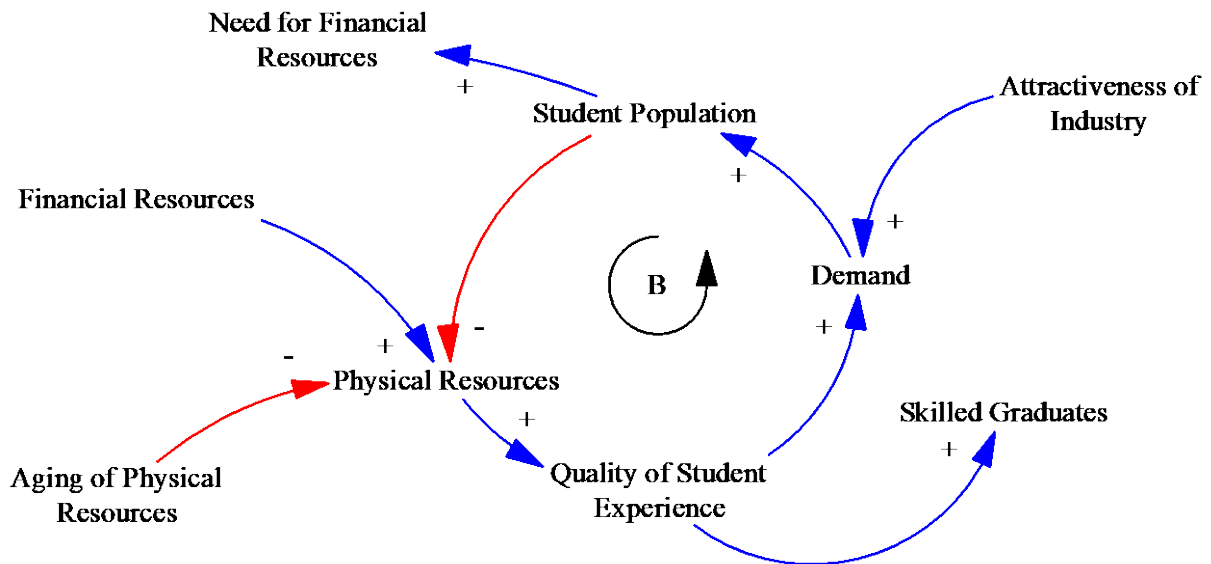


Figure 8.2: Physical Resources Loop

Source: Author's own

The findings in the previous chapter suggest that, as the **attractiveness of the maritime industry** increases in KZN, the **demand for MET** increases as people seek education and training so as to enable them to gain access into the industry. When the **demand for MET** increases, the **student population** at public higher education institutions offering MET programmes in KZN increases. However, it should be noted that the increase is not as a result of only domestic demand because Kiplimo and Nthia (2015) state that young people in East Africa, because of the limited offering of MET in the region, seek related education and training in foreign countries, or neighbouring countries, such as South Africa, because it offers some of the courses not found in Eastern Africa.

The findings further suggest that an increase in the **Student population**, decreases and puts a constraint on available **physical resources**, which also results in the fast deceleration or **aging of physical resources**. This then increases the **need for financial resources**. Such a situation poses a serious predicament for MET in public higher education institutions in KZN because physical resources necessitates the need for financial resources as suggested by the findings in the previous chapter. However, assuming that the **physical resources** increase with student intake, this would increase the **quality of students' experience**. An **increase in the quality of student experience**

would **increase skilled graduates** and also at the same time, again **increase the demand for MET** which gives us a **Balancing loop (B)**. It should thus be noted that the predominant issue has not been the lack of MET facilities such as simulators, but rather the increasing demand for MET and student intake puts a strain on already limited and aging resources.

Institutions have not been able to keep facilities and equipment in pace with student numbers which has resulted in the need for more facilities. This holistic view of the influence of physical resources identifies that there is no one stand-alone factor in play, but rather that there are various factors in play within and outside the system that influence the functioning of the system as a whole. The findings show that physical resources are vital in the provision of MET at public higher education institutions, especially for sea-going vocations/careers. As a result, due to the intensive financial commitment needed and lack of the ability to keep up with such demand, MET is faced with considerable challenges in this regard. Therefore, the availability of financial resources influences the availability of physical resources and human resources, such as MET lecturers and practitioners.

Physical resources take many forms in the provision of MET, such as simulators, teaching facilities such as class rooms, libraries, availability and access to sea-training facilities (berths) and other specialized class room instruments. The issue of the lack or limited physical resources has long been a problem for many MET institutions in South Africa. This is supported by Bonnin and Woods (2002: 23-4) who found that all South African education and training institutions in the past were faced with the challenge of their students been unable to secure training berths (on-board training). They of the view that such a challenge was a very serious issue and that if there were no solutions to such, the country's higher education and training institutions would be forced to consider the viability of MET affected.

“...the issue of not having berths for students to complete their qualifications forced higher education institutions offering sea-going MET to operate under their full capacity, and in the past the one department left it to students to find their own sea-time” (Bonnin and Woods, 2002: 23-4).

Nonetheless, the lack of availability and access to berths for example, is not uniquely a South African challenge (Ruggunan, 2016). It is also being experienced by other African States such as Nigeria (Dada, 2008; Nzeshi, 2010); and Kenya (Fuazudeen, 2011; Mabuti, 2013; Kiplimo and Nthia, 2015), as well as other countries around the world such as India, Australia, Sweden, Sri Lanka, the Philippines, the United Kingdom and a range of the traditional maritime nations of Western Europe (Paul, 2009). In some countries, the plight of cadets with regards to securing berths starts with the difficulty in finding ship-owners or crewing agents willing to accept them (Caesar, Cahoon and Fei, 2014). Zhao and Amante (2005) established that cadets in the Philippines for example, could spend up to 13 months in search of berthing placement with a ship. According to Kiplimo and Nthia (2015), lack of berths causes deficiencies in training in East Africa; hence the findings in the previous chapter suggest such for MET in public higher education institutions in KZN.

For institutions to realise their vision and mission they need the necessary resources, without which, the goals of the institution can be threatened. In countries such as Nigeria in the West of Africa, the lack of physical resources such as facilities not only threatens the quality of MET but also “makes it impossible for MET institutions to admit a high number of students” (Dada, 2008). According to the Maritime Academy of Nigeria, the development of more infrastructures in the institution would help increase the number of students admitted annually to pursue a career in seafaring. However, the lack of suitable infrastructure is tied to the lack of sufficient funding for it (Nzeshi, 2010).

The challenge of the lack of, or limited physical resources facing MET in Nigeria, is similar to those facing KZN’s MET in public higher education institutions. However, on the one hand, unlike Nigeria which needs the resources to increase their MET student population because of the lack of existing physical resources, public higher education institutions in KZN have failed to keep the development and sustainability of MET physical resources in pace with the increasing student population due to limited financial recourses. In the eastern region of Africa in countries where the maritime industries are buzzing with growth like in South Africa, Kiplimo and Nthia (2015: 305) identifies that although MET is in its formative stage after entering the STCW whitelist in 2010, MET institutions in Kenya for example are faced with the challenge of developing adequate

MET facilities to provide the much-needed training. This supports Musa's (2000) identification that there was a need for some further improvement in training facilities even though they were underutilized. The provision of MET at public higher education institutions is not in its formative stages in South Africa, especially in KZN. However, scholars such as Kujwa (1992) expressed that although MET was particularly specialized and expensive, facilities were under-utilized and resources were being wasted. However, the findings in the previous chapter suggest the direct opposite. In the past Kujwa (1996) identified that:

“...facilities were under-utilized, and resources were being wasted those that received education and training in the maritime field were trained for redundancy due to for example not being trained to accepted standards or training for jobs which were being phased out” (Kujwa, 1996:2).

This was not unique to South Africa only. For example, according to SAMSA (2011), China's MET constraints are the in-flexibility of maritime degree courses, meaning that, due to the curriculum design, students do not have the flexibility to work on-shore at shipping companies or on vessels. This was further identified by Wang (2011), who was of the view that the curriculum seemed to have too much focus on theory while not providing enough practical hands-on training especially for on-board practicing procedures. The education and training institution in China are only responsible for providing a proportion of training, which the rest has to be provided by the employer after the student has graduated. This means that there is a big waste of MET resources because the student is not competent enough (Wang, 2011).

The need for physical resources is not unique to KZN's MET at public higher education institutions. The issue of the lack of MET facilities, such as available space and high-quality training simulators, has also affected Western countries such as Scotland, where there is a need to upgrade current training simulators to be in par with technological advances (The Mackinnon Partnership, 2008). Although it is generally accepted that South Africa's MET surpasses its African counterparts because it has long had STCW Whitelist status, KZN MET in public higher education institutions remains challenged by constraints facing its lesser developed counter parts in Africa. A holistic view has identified that the challenges of physical resources may be common amongst MET in public higher education in KZN like its counter parts around the world, but the

causes that lead to such complexity differs such as the demand for and access to available resources needed for MET to thrive.

This is not only unique to KZN and Africa's MET. In countries such as China, since 1978 the government has gradually increased investment in MET. However, there is still a shortage of financial resources needed for further development of MET because it is still not satisfactory, in comparison with the requirements of the Chinese and international shipping industry (Chen, 2000:71-73). Thus, it is not only sustained financial backing that guarantees effective MET, but rather a range of other factors in the provision of MET such as demand, student population and the attractiveness of the industry, to mention a few. Nevertheless, internationally, the issue of the high cost of training in MET is not new. Wainaina (1989) asserted the need for continuous education and training for MET experts but criticized the high costs that are associated with the process.

8.2.2 Human Resources

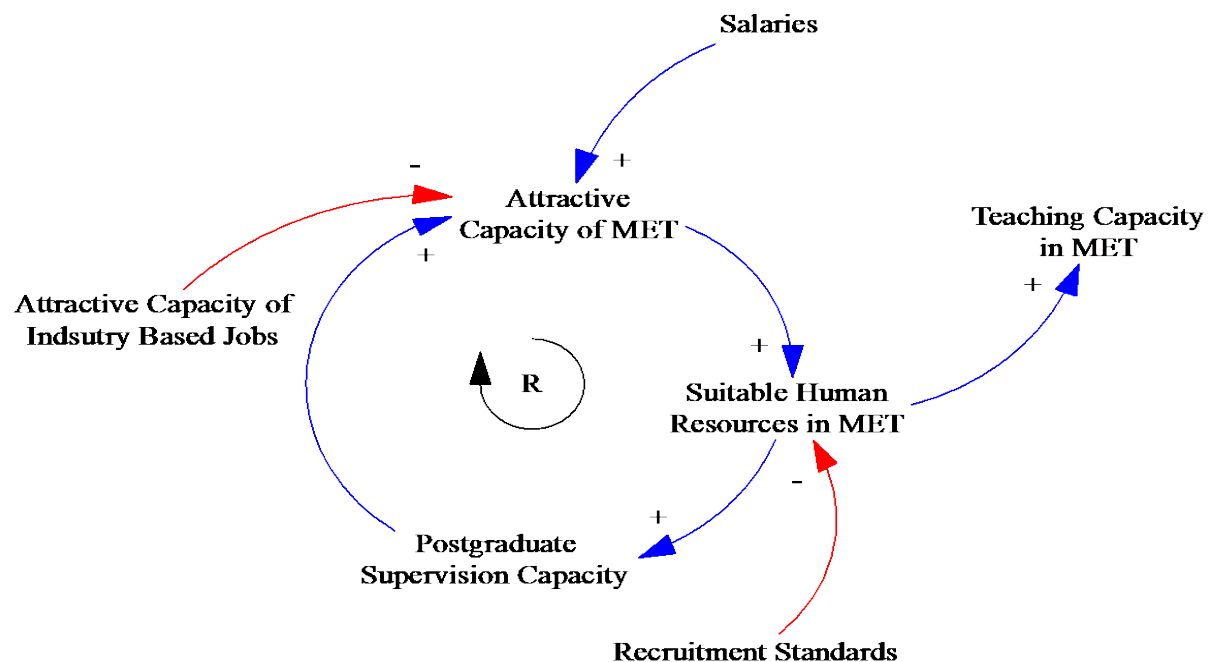


Figure 8.3: Human Resources Loop

Source: Author's own

The findings in the previous chapter suggest that with regard to human resources, the **Attractive Capacity of Industry Based Jobs** decreases the **Attractive Capacity of MET** because the

maritime discipline is one of the most difficult to recruit teaching staff for; hence creating a knowledge gap. The findings in the previous chapter indicates that the maritime industry is one of most financially rewarding industries in KZN. Salaries are far more attractive in this industry than public higher education institutions. This is supported by SOMMSA (2016) who identified that post 1994, many experienced seafarers seek employment abroad where their skills are highly sought and where they can earn United States Dollars on a tax-free basis. Hence, this is not unique to MET in public higher education institutions in KZN, but is a global phenomenon. For example, a decrease in **Attractive Capacity of MET** in countries such as Scotland is putting pressure on education and training institutions, because of the shortage of adequately qualified teachers and those who are prepared to accept the salary of a university lecturer are limited, because shore-based jobs in the maritime industry pay better (the Mackinnon Partnership, 2008). However, when the **Attractive Capacity of MET** increases, such also increases the amount of **Suitable Human Resources in MET**.

“Attracting, upgrading and the retention of competent MET instructors will raise the skills of future human resources; this is a challenge in the present circumstances” (Gamil, 2008: 2).

In regions in East Africa such as Kenya for example, the lack of qualified, trained staff hereon referred to as “suitable human resources” is partly attributed to a knowledge gap (Kiplimo and Nthia, 2015). **Suitable Human Resources in MET** not only increases **Teaching Capacity in MET** but also increases **Postgraduate Supervision Capacity**. According to the Mackinnon Partnership (2008), colleges in Scotland are relying on teaching staff from abroad to take up vacancies because of industry competition and the limited number of experienced lecturers. The shortage of well prepared, educated and sufficiently trained MET staff members is a significant concern in the maritime industry (Cross, 2010). This issue was identified by Menon (1986) who noted that over the years developing countries have struggled with a shortage of adequately trained and sufficiently qualified maritime teaching staff. To remedy this problem some countries recruit expatriates. However this is not sustainable because of the high cost of such, for example, on salaries and other allowances required by foreign nationals (Mabuti, 2013). On the other hand, **Recruitment Standards** decrease **Suitable Human Resources in MET** in public higher

education institutions in KZN. It is very beneficial and important as in any profession, that the teaching staff, apart from a good theoretical background have some experience in the field one is teaching (Cross, 2010). Therefore, as such recruitment standards become more specific and demanding the number of available people to fill such posts decreases, further reducing the chance of finding suitable human resources in MET. Nevertheless, the increased **Postgraduate Supervision Capacity** increases **Attractive Capacity of MET**. This creates a **Reinforcing feedback loop** as expressed in Figure 8.3.

The findings of this study hence suggest that a lack of human resources in the form of capacity in teaching and supervision results in a constraint in MET, its development and sustainability in addressing issues which are crucial in bridging the maritime skills gaps in KZN. The finding further suggests that such factors increase the attractive capacity of industry based jobs. In essence, MET is seen as being, made up of learning, teaching, and various resources that have to harmoniously function to achieve the goal of protecting the maritime environment and ensuring safety at sea (Gamil, 2008). However, this process is affected by a number of external and internal factors such as the attractive capacity of industry based jobs or issues relating to recruitment standards, which is evident in the case of MET at public higher education institutions in KZN.

This issue is not unique to KZN. The shortage of appropriately qualified, well-trained maritime labour is a core problem that needs to be addressed in regions such as Europe as well. As a result, MET has been placed at centre stage (Pallis, Ilias and Papachriston, 2013). Sea experience is quite valuable for seafarers, as well as for shipping firms offering land-based positions (Wang, 2011).

Like KZN, the rest of South Africa's maritime industry is faced with critical and scarce skills shortages (SAMSA, 2013). This has resulted in the decrease of attractive capacity of MET. MET institutions are not islands, and this is asserted by Mabuti (2013). They exist and operate in an environment that is open and they are reliant and influenced by elements and conditions existing in and outside the system. MET institutions are in the forefront of bridging maritime skills gaps. However, they have long been faced with challenges in South Africa (Knowler, 1994; Ingen, 1994). According to Karma (1997), MET institutions must be prepared to be scrutinized, hence they need to satisfy all stakeholders such as clients, sponsors, authorities and the public.

Nevertheless, this study's findings suggest that, in doing so, public higher education institutions offering MET in KZN need to also satisfy its own internal needs such as human resources.

Kiplimo and Nthia (2015) is of the view that MET institutions ought to have structured strategies that cater for the development of staff. However, because there is limited maritime teaching staff in Kenya, while it builds its human resource and knowledge base in MET, the country has considered use of foreign experts as a short-term solution, particularly for specialized training (Mabuti, 2013:31). Such has been the case for public higher education institutions in KZN the findings suggest, where MET institutions resorted to even looking for maritime specialist beyond South Africa's borders. Nonetheless, MET in a higher education system faced with a decline in state funding, slow academic succession, transformation and declining institutional capacity, (such as the case of South Africa's public higher education institutions) poses serious challenges for MET. This is worsened by its decreasing attractive capacity, which leads to more problems such as lack of suitable human resources in MET, which then leads to decrease in postgraduate supervision capacity in MET, thus continuing the feedback dynamic demonstrated in the causal loop (Figure 8.3).

Figure 8.3 suggests that one of the mechanisms to improve the attractive capacity of MET in public higher education institutions could be the repackaging of remuneration offers/salaries so as to attract prospective MET specialist. Nevertheless, this will remain difficult to achieve because as the findings suggest, very high recruitment standards make it difficult to secure suitable human resources. Furthermore, financial constraints faced by MET at public higher education institutions in KZN worsen the situation. Thus, there is a direct link between the lack or limited financial resources and the issue of not having suitable human resources in MET.

“MET institutions need to have, in addition to at least the minimum teaching facilities and simulator installations, high quality instructors, supervisors and assessors” (Gamil, 2008:1).

8.2.3 Financial Resources

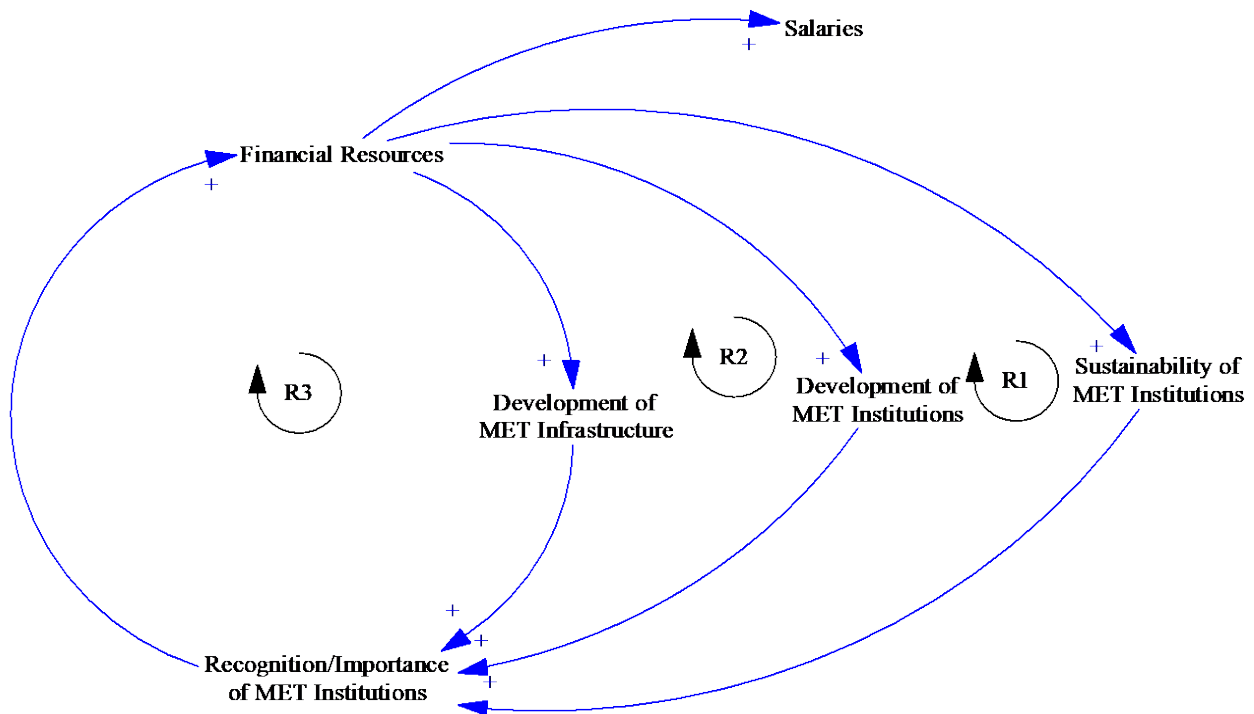


Figure 8.4: Financial Resources Loops (R1, R2 and R3)

Source: Author's own

The findings in the previous chapter suggest that an increase in **Financial Resources** would increase the **Development of MET infrastructure** at public higher education institutions in KZN. This would result in an increased **recognition of the importance of MET Institutions**, which would in -turn increase the **Financial Resources available to such institutions**, resulting in **Reinforcing Feedback** represented as **R3** in Figure 8.4.

This study has found that financial resources are at the centre of the development and sustainability of MET at public higher education institutions in KZN. This is not unique to KZN, the budget plays an important role in Brazil's MET, as additional investments can be necessary to increase student enrolment for its MET (Lobrigo and Pawlik, 2012). An increase in financial resources also results in the availability of funds to increase salaries needed to attract the necessary human resources as supported by the primary findings. The KZN Integrated Maritime Strategy (2013) asserts this by identifying that more funding is needed to incentivize and retrain skilled

educators at secondary level and lecturers at tertiary level who are often attracted to the commercial industry because of the higher financial remuneration packages that it offers.

Nevertheless, the findings in the previous chapter also suggest that, an increase in **Financial Resources** also increases the **Development of MET institutions** in KZN. This would result in an increased **recognition/importance of MET Institutions**, which would in return increase **Financial Resources** resulting in the **Reinforcing Feedback** represented as **R2** in Figure 8.4. With regard to recognition or importance of MET, the findings in the previous chapter paint a picture that public higher education institutions offering MET in KZN see themselves as strategically positioned in catering for the province and the broader country's maritime skills demands. However, such a strategic position is yet to be backed by commitment in the form of financial investments in MET.

The findings in the previous chapter further suggest that, an increase in **Financial Resources** increases the **Sustainability of MET Institutions** which are state owned in KZN. This would result in an increased **recognition/importance of MET Institutions**, which would in return increase **Financial Resources** resulting in **Reinforcing Feedback** represented as **R1** in Figure 8.4. The findings suggest that currently with the financial and human resources constraints facing MET, the sustainability of MET in public higher education institutions in KZN has been as a result of industry lending a hand in the form of pro-bono time spent at such institutions from maritime professionals with the necessary qualifications required by higher education institutions in KZN. This is due to the fact that these institutions cannot attract such people to work full-time, because they cannot afford them.

Early authors of MET in South Africa, such as Kujwa (1996) identified that MET lacked coordination and resources were wasted making MET expensive. Nevertheless, financial resources remain vital in the provision of MET, however this remains a challenge for public higher education institutions in KZN faced with a decline in State funding (Price Water Cooper, 2015; Green and Hardman, 2015), prompting public higher education institutions to develop innovative methods to ensure financial stability according to the latter. The findings suggest that the involvement of

industry in MET at public higher education institutions in KZN can be considered also as a developed innovative method to overcome their financial and human constraints.

To harmoniously provide MET, institutions in this process need financial resources, not only to ensure their specific educational objectives are met, but also to ensure safety and protection of the maritime environment (Gamil, 2008) Thus, MET provision is a very complex process influenced by various factors such as financial resources, as the case of public higher education institutions in KZN. Financial resources not only affect human resources but also physical resources such as infrastructure, which in turn also affects the quality of the MET provided. In this way, it is possible to recognise the many feedback relationships at play in the situation of MET in higher education in KZN.

Training standards in line with new technological and operational requirements that require new shipboard competencies as prescribed by the STCW have impacted MET institutions worldwide (Chong Ju, 2011) because they are not islands (Mabuti, 2013). According to the findings, Public higher education institutions in KZN offering MET regulated by the STCW remain challenged with the lack of financial resources needed for their development in terms of infrastructure and sustainability. MET in higher education in KZN exists in an environment that is open, reliant on, and influenced by elements and conditions existing in the system, which such lack of resources compromises. This supports the view put forward by Wanga (2015) who asserted that the STCW Manila amendments have placed additional burdens and challenges on MET institutions, especially on those that need to meet the STCW full compliance, such as Kenyan MET institutions which Wanga (2015) identified as being yoke of fulfilling and meeting the STCW Manila amendments.

“MET varies from country to country depending on the specific situations of geography, history, culture, legislation, economy, politics, technology and society” (Chen, 2000:46).

Far East MET institutions such as universities are faced with difficulties in implementing the STCW because: (a) they cannot secure berths, which is mandatory in realising the on-board training requirements for deck and engine officers. Thus, on-board training placements are not

adequate, and they have to depend on commercial ships for on-board training, (b) MET institutions are yet to establish E-learning systems even though the STCW identifies this education method as advantageous in offering MET. However, Chong Ju (2011) identified that due to a lack of financial resources and infrastructure, E-learning is not a close reality, (c) there is a need for financial support in the form of investment because there are additional costs in installing equipment such as simulators that need upgrading to more advanced training systems so as to meet the STCW Manila Amendments. In China for example, the lack of the necessary resources such as funding, facilities and staff to teach, leads to a somewhat low quality of graduates (SAMSA, 2011).

In order to address such challenges, many MET institutions in China, such as the Shanghai Maritime University (SMU), have responded by focusing on innovation and customer orientation by for example offering comprehensive MET programmes from Diploma programmes, to Bachelor of Science (B.Sc) Degrees and on-the-job training. Furthermore, investment was made to develop teaching and research and improve training infrastructure and a new SMU campus capable of housing 20 000 students was built (Shickeng, 2009). Nevertheless, the issues of financial resources have also had an impact of the maritime industry too, for example in countries such as Singapore, where with regard to wages, low seafarer wages and the availability of jobs onshore has resulted in many qualified seafarers working onshore rather than at sea/on vessels (SAMSA, 2011).

The availability of resources becomes vital in the effective and efficient domestication of the maritime industry. Thus, domesticating is needed to address the local supply of human resources demanded by the industry. Resources such as financial, human, and physical resources play a pivotal role in MET institutions, both in developing and developed countries. The issue of resources is a very serious problem facing MET institutions, as the findings suggest. However, Fuazudeen (2011) identifies that MET institutions, for example in Kenya, lack properly qualified instructors and assessors and this was coupled with the issue of not having the necessary infrastructure for practical training, including insufficient simulation equipment, in addition to the lack of training vessels to offer berths for students. When one looks at the case of public higher education institutions in KZN, there are commonalities in terms of the issues at play. The

behaviour in relation to the relationship amongst the variables differs in the South African context. However, they still contribute to similar problems.

8.2.4 Institutional Arrangement

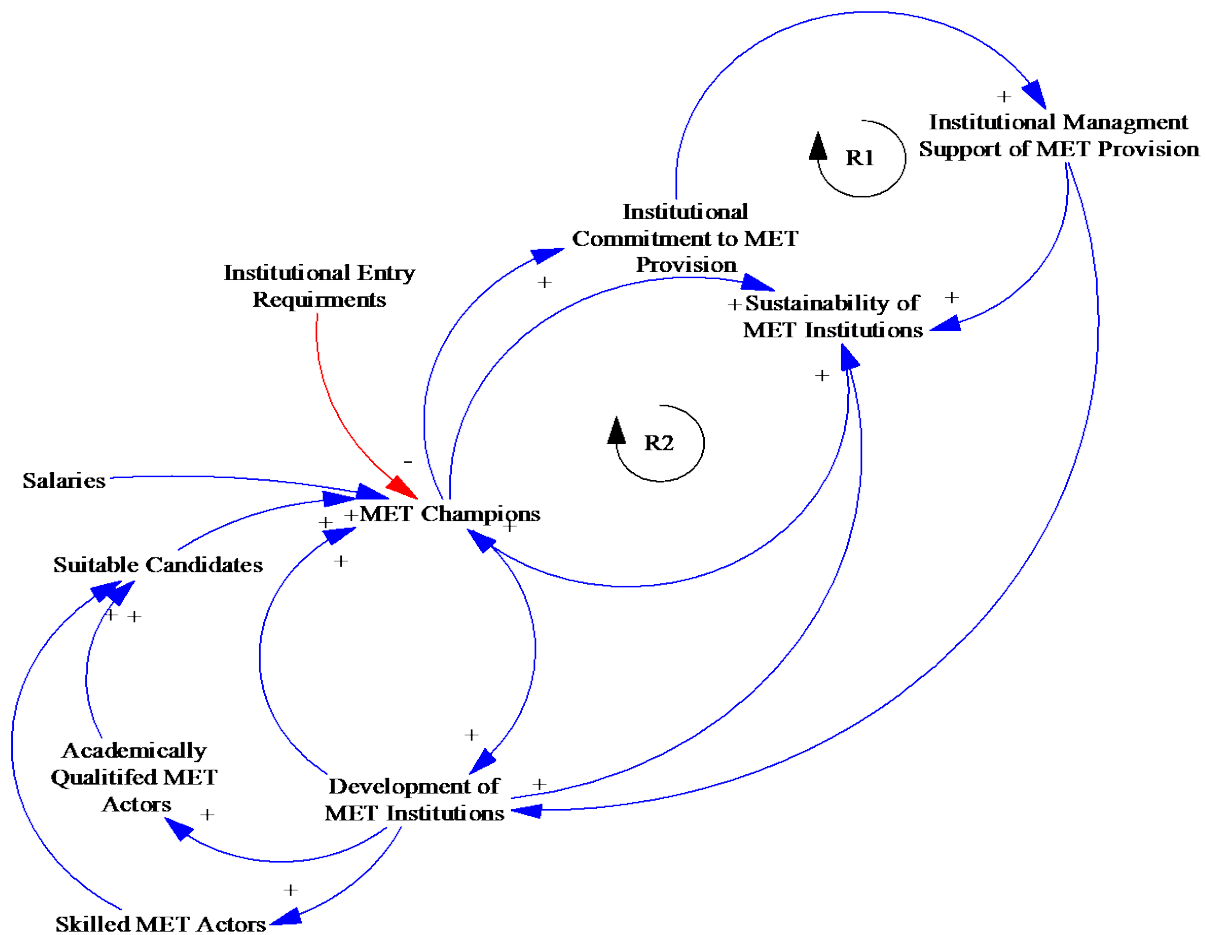


Figure 8.5: Institutional Arrangement Loops (R1 and R2)

Source: Author's own

The findings in the previous chapter for the final internal factor suggest that in public higher education institutions in KZN, **Institutional Commitment to MET Provision** increases **Institutional Management Support of MET Provision**, which then increases the **Sustainability of MET Institutions**. Such increases **MET Champions** and that increase then increases the **Institutional Commitment to MET Provision** resulting in the **Reinforcing Feedback** represented as **R1** in Figure 8.5. The findings also reveal that **Sustainability of MET Institutions**

increases **MET Champions** which then again increase **Sustainability of MET institutions**. This results in another **Reinforcing Feedback** represented as **R2** in Figure 8.5.

The findings also suggest that an increase in **Institutional Management Support of MET Provision** increases the **Development of MET Institutions** which again increases **MET Champions**. The findings suggest that the influence of institutional arrangements is very multifaceted. This is further supported by another feedback in the diagram that suggests that the **Development of MET institutions** increases **Skilled MET Actors**, at the same time increasing **Academically Qualified MET Actors** which both increase **Suitable Candidates** who may become **MET Champions**.

One needs to note that not only financial resources in the form of salaries as indicated in Figure 8.5 give rise to **MET Champions**, but rather also **Institutional Commitment to MET Provision** even though such resource allocation will also eventually lead to an increase in **MET Champions**. One needs to also note that the findings suggest that **Institutional Entry Requirements** decreases possible **MET Champions** because such standards may lessen the chances of certain individuals becoming MET Champions due to them not meeting certain requirements. Nevertheless, **MET Champions** increase the **Sustainability of MET Institutions** in public higher education institutions in KZN in the long run as they will be able to attract more attention and thus resources to MET institutions specifically and MET generally.

The findings thus indicate that the institutional arrangement in terms of commitment to MET is lacking in KZN, although public higher education institutions see the provision of MET as their strategic objective. The lack of support comes in the form of the lack of commitment and institutional management support for MET provision which in turn threatens the sustainability of MET. Although management and staff of MET institutions have the responsibilities of implementing policy decisions made by the Boards of the Academy and the Federal Ministry of Transport (Ihenetu-Geoffrey, 2012); without having the right players such as a person to champion the development and sustainability of MET in an institution, such will eventually lead to a lack of coordination and commitment by management. Sustainability not only takes the form of committing the required resources such as financial resources, but also having the necessary

human capital to champion for MET development. Such is not unique to KZN. Ihenetu-Geoffrey (2012) identified that Africa's soft maritime infrastructure needs utmost attention because people, training and systems are required, as any strategy is only as good as the people who are tasked with implementing it. Thus, human resource development is a fundamental component of any maritime strategy. Mabuti (2013) supports Musa's (2000) conclusion that the present MET system, for example like the one in Kenya which has similar challenges to KZN, needed to be enhanced with regard to organisational structure and management, academic programmes, facilities, qualified personnel. This will contribute to an effective and efficient MET system in Kenya.

The findings above reveal the provision of MET is complex and that resources are key in the development and sustainability of MET in public higher education institutions in KZN. The availability of financial resources is key in addressing other resource related issues such as human and physical resources. However, institutional budgeting can be seen as that, which influences the availability of resources for MET in public higher education institutions in KZN.

There are various budget models or budget-related practices that are used when allocating financial resources. Hanover Research (2019) identifies six budget model utilized in higher education, which are: Incremental Budgeting, Zero-Based Budgeting, Activity-Based Budgeting, Responsibility Center Management, Centralized Budgeting, and Performance-Based Budgeting. The findings of this study seem to show that public higher education institutions practise centralised budgeting. Centralised budgeting is a process in which all decision-making powers regarding financial allocations are in the hands of upper level administration (Hanover Research, 2019).

Based on the internal challenges facing MET at public higher education institutions in KZN, top management at these institutions seem to be lacking commitment in developing MET and its sustainability. Considering the role the maritime industry plays in the province and the rest of the country's economy, commitment need by public higher education institutions' top management ought to be assured and realised by allocating the necessary resources. This necessitates allocating the necessary financial resources and putting in place mechanisms needed to address the financial

implications related to MET. This could take the form of for example combining aspects of centralized budgeting with decentralized budgeting, which according to Hanover Research (2019), is typically used by colleges and universities.

A budgeting model combining central with with another model, the rationale for choosing which Departments are centrally budgeted may be adaptable. For example, in the case of MET in public higher education institutions in KZN, MET departments might be decentrally budgeted or top management might use Responsibility Centre Management (CRM) because of the cost implication associated with the provision of MET as well as its provisional and national priority status.

CRM is more of a management philosophy than a budgeting strategy according to Hanover (2019), and it is designed to support the achievement of academic priorities within an institution, and allows for a budget which closely follows those priorities (Hanover Research, 2019). RCM may offer a number of advantages over traditional incremental model of budgeting (Drexel University, 2019). Thus, RCM can be used as a solution to budgetary woes brought on by the the resources implications associated with the provision of MET by public higher education institutions in KZN. It can assist in the aligning of public higher education institutions commitment to MET provision with provisional and national priorities, such as Operation Phakisa. The figure below thus presents a Qualitative SD Model of the internal factors influencing the provision of MET in public higher education institutions in KZN.

Model. This model is able provide a holistic picture of the feedback structure involved in the provision of MET in public higher education institutions in KZN and the resultant challenges.

8.3 THE CLDS FOR EXTERNAL FACTORS

The below external variables were identified from the data as influencing the dynamics of the provision of MET by public higher education institutions in KZN.

Image
Industry
Awareness
Technology
The State
Partnerships

The variables are regarded as being external, because they exist beyond the system of MET provision by public higher education institutions in KZN. They evertheless exert an important infleunce on the system. They interact to contribute to the overrall feedback structure that will be presented at the end of the chapter. This section discusses each external variabale in accordance with the findings presented in the previous chapter by beginning with the influence of industry on MET in public higher education institutions in KZN.

8.3.1 Industry

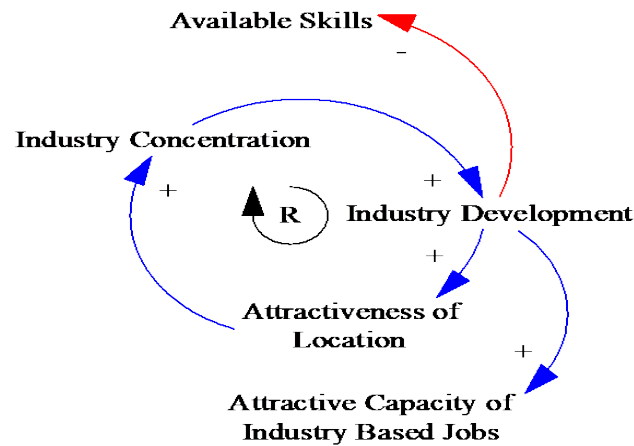


Figure 8.7: Maritime industry loop R.

Source: Author's own

The findings in the previous chapter suggest that, favourable **Location** of KZN as a harbour province increases the **Industry Concentration** and the **Industry Development** presenting a **Reinforcing (R)** loop in Figure 8.7. Since public higher education offering MET is often concentrated in areas with buzzing maritime activities, KZN has a strong attractive capacity for such institutions. This is further enhanced by the fact that it has the busiest port in Africa and the intensive industry activity surrounding and supporting it. This has led to the industry clusters playing a direct role in MET at public higher education institutions in KZN. Scholars such as Mthethwa (2003) assert that the location of South Africa favours the above because the country is well situated to take advantage of many maritime opportunities in the region, such as the East-West cargo traffic and the booming African offshore oil and gas industry (South Africa's Department of Environmental Affairs, 2017).

The increase in **Industry Development** leads to a decrease in **Available Skills**. This suggests that, as the industry develops, the limited or small pool of maritime skills is absorbed by the developing industry leaving a much smaller pool for the industry because MET supply has not been in pace with the development and skills demands of the provinces maritime industry requirements. However, the increase in **Industry Development** increases the **Attractive Capacity of Industry Based Jobs**, because more and more people see or associate the scarcity of available skills and development of the maritime industry with job opportunities.

The relationship between the industry, and education and training in the maritime has long been established. For example, scholars such as Cross (2010) observed that seafarer shortages results in the shortage of MET teaching staff. Global labour markets affect MET institutions, thus MET, especially at a higher education level is a high investment with very high returns (Deng, 2012), which the findings in the previous chapter also supports. Nevertheless, Figure 8.7 also highlights the effect of industry location, its concentration and MET's proximity to such influences on MET in public higher education institutions in KZN. This is not unique to KZN because Kiplimo and Nthia (2015) observed in the Eastern African region that the maritime industry and its subsectors that are buzzing with growth and development such as the Port of Mombasa in Dar es Salam and the planned new Port of Luma which is being constructed, necessitate the need for more educated and trained people in the country to carry out the various maritime related tasks feeding into the regions maritime industry development. Thus, MET institutions have a big role to play. This is also the case in Nigeria, which is in Western Africa, where opportunities in the rapidly growing economy in the oil, gas, bulk carriers and seaborne trade has increased demand for maritime programmes. This presents opportunities for METs in the country to grow the countries maritime sectors. Richter (2016) thus identified that in the Philippines, the MET sector is a vital and favorable contributor to the growth of the maritime industry, but this also applies to many countries around the world.

Eler, Calambuhay, Bernas and Magramo (2009) identified that the maritime industry is not only concerned about the limited supply of maritime labour. In countries such as Turkey, the development of its maritime industry and has been addressed by the development of newly revised programmes which conform to the European Qualification Framework (EQF) that addresses the overall problems effecting the maritime industry, such as safety and security at sea, and education and training. This has been informed by the current development and needs of the industry. In the case of the KZN maritime industry, the findings thus suggest that, because the required skills are limited, the lack of development thus decreases the available pool of skills as stated earlier. In countries such as the UK, where the maritime industry is developed but experiencing a decline in the attractiveness of industry based jobs especially seafaring; industry players such as ship owners are developing and coordinating a set of initiatives directed at marketing careers in the maritime sector (SAMSA, 2011). In Brazil for example, the decision on how many students are to be recruited for the first year of MET studies is based on industry requirements, available facilities

and infrastructure capacity and budget by the Department of Ports and Coasts (DPC) (Lobrigo and Pawlik, 2012).

MET provision must reflect industries extra managerial needs in the global maritime industry such as new and increasing needs in technology, health, safety and security, environmental pollution, waste management, etc. Thus, public higher education institutions offering MET in KZN have to also take into account of their location, the surrounding maritime industry and its development because such, at the end of the day, has a direct influence on them.

8.3.2 Technology

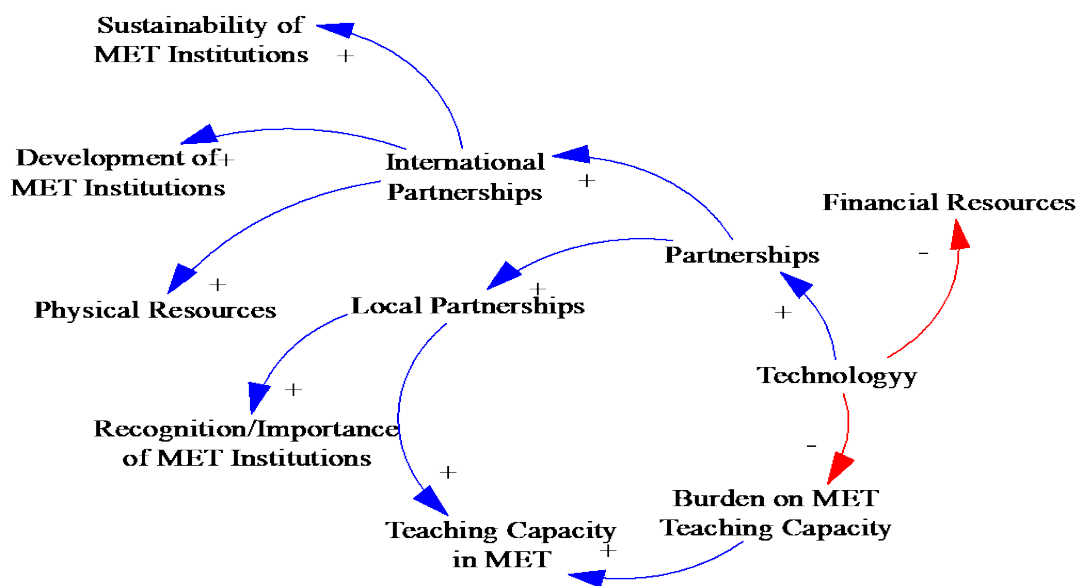


Figure 8.8: Technological advancements loop

Source: Authors own

According to the UNCTAD (2009), a hindrance to maritime countries is either (i) not staying abreast of technology and introducing technological advancements to the country's maritime activities, or (ii) not upskilling maritime sector professionals to use new technology within the sector, which creates skills shortages. With regards to technology, the findings in the previous chapter suggest that technological advancements in the maritime industry decreases **Available Financial Resources** for MET in public higher education institutions in KZN. Meaning, that MET institutions must allocate their already limited financial resources to

addressing their technological needs such as integrating new technologies into their education and training so to try a stay abreast of technology. This becomes challenging because consistently applying the latest technology that is currently being used in the ever-advancing maritime industry is very costly process.

Doughlas (1993) identified that the accelerated development in technology, such as in bridges of ships, necessitated MET to include and adopt training devices (simulators). However, this would result in a burden in maintaining such devices and the resulting increased costs of such maintenance. Technological advancements present problems for MET institutions around the world because of the cost implications attached, yet no training can be conducted effectively without the essential technical means of education. This is a major problem because sadly the training of seafarers is one of the most expensive pursuits (Alexandrov, 1999:4).

According to others such as Mazzarino and Maggi (2000), the impact of technology on the maritime industry as well as the the impact of new technology used on-board ships on MET is well documented. Beer and Meethan (2007) also notes that the introduction of new technology, both on board ships and vessels and in port operations, has created skill gaps in the industry. Bonnin and Woods (2002) are of the view that like numerous other industries, new technologies have had a great impact on the maritime industry, thus it has not been immune to its influence.

The findings provide us with view that **Technological advancements** decrease the **Burden on MET Teaching Capacity** which leads to an increase in the **Teaching Capacity in MET** in public higher education institutions in KZN. But the findings also suggest that, as a result of limited financial resources, to attain the necessary Technology such as simulation for sea-going vocations such as seafaring, the effects of **Technology** on MET in the province has led to an increase or development of **Partnerships**, both at **Local** and **International levels**. State-of-the-art technology such as laboratory and simulation equipment require a high capital (Muirhead, 2004:141) and this is beyond the reach of many countries in Africa.

Partnerships increase and play a vital role in the **Development** and **Sustainability of MET Institutions** in KZN. They are also key in increasing access to much needed **Physical**

Resources and ensuring the **Recognition or Importance of MET institutions** by the surrounding stakeholders and communities in the province. Thus, partnerships to address technological constraints for MET in public higher education institutions in KZN are imperative because as technology in the maritime increases, MET institutions will see an increase in not only new students pursuing MET because of attractive capacity of jobs in the industry, but also individuals from industry wanting to keep themselves abreast. This is mentioned by Knapper and Cropley (1991) who identified that some individuals in industries characterized by rapidly changing technology and information systems such as the maritime industry in this case, to remain in employment might be obligated to fund lifelong learning. Technological advancements in KZN's maritime industry like the rest of the globe requires that. However, the challenges relating to access and integrating of new technologies into MET at public higher education institutions may be seen as jeopardising lifelong learning for those already in the maritime industry in the province. Gamil (2008:10), notes that:

“Seafarers and port operators need to be trained on how to manage and operate a ship equipped with the latest innovations of automation. As a result, new technologies change the perception of education and training, the way people think, how people communicate, and the students' demands”.

What this means is that as technology improves in ships and port operation so too must the MET in institutions. However, Cweilewica and Lisoski (2012) in this regard stress on the necessity to reduce the cost of MET brought about by technology and see this as necessary to maintain a good number of MET students in the countries MET institutions.

Technology advancements in industry and new STCW requirements, necessitates persistent MET curriculum redesign. Not only must MET institutions reform their curriculum design, but they must also have the required resources to acquire new training technologies to compliment changes in curriculum. In Scotland for example, the Mackinnon Partnership (2008) stress the need to upgrade training simulators to be in par with technological advances such as those brought about by the Global Maritime Distress and Safety System. Gluch, Kirchhoff and Felsenstein (2010) stress that this will raise the number of effective hours of education and training, not only for the theoretical education in the classroom, but also for the extensive use of simulators for training.

The extreme use of simulators is strongly advised by STCW and the use of simulators entails having well-designed scenarios, very experienced instructors and adequate equipment. However, it is known that not all MET institutions have these sophisticated bridge and engine-room simulators and those that do have them, often have limited access to them (Ziarati *et al.*, 2012). Which this the case with KZN's MET in public higher education institutions.

Even so, the advancement of technology not only results in the need for upgrading MET equipment but also, in the need to upgrade the human component in the industry, especially since MET instructors are crucial in the progress of education and training in this sector (Gamil, 2008). Making technology also a key influence to the human resources necessary for effective MET in institutions. Technology may facilitate in the ease of transferring knowledge and sustainable improvement in MET according to Khan (2014), however such has presented challenges for MET in the developing world, including institutions such as public higher education institutions in KZN. According to Ziarati and Ziarati (2012:12):

“It is recognised that not all MET institutions have sophisticated bridge and engine-room simulators and those that do have some have limited access to them”.

Gamil (2008) is of the view that in the face of new technological advancements in the maritime industry and legislative challenges, MET institutions need to constantly adapt. As a result, the finding in the previous chapter suggest that costly technological advancements in the maritime industry present advantages for both industry and MET institutions. However, due to a lack of access to needed resources such as finance resources, such advantages might remain a dream for many resource constrained MET institutions, especially in the developing world, if it were not for the development of partnerships to develop and sustain MET in these institutions.

8.3.3 Awareness

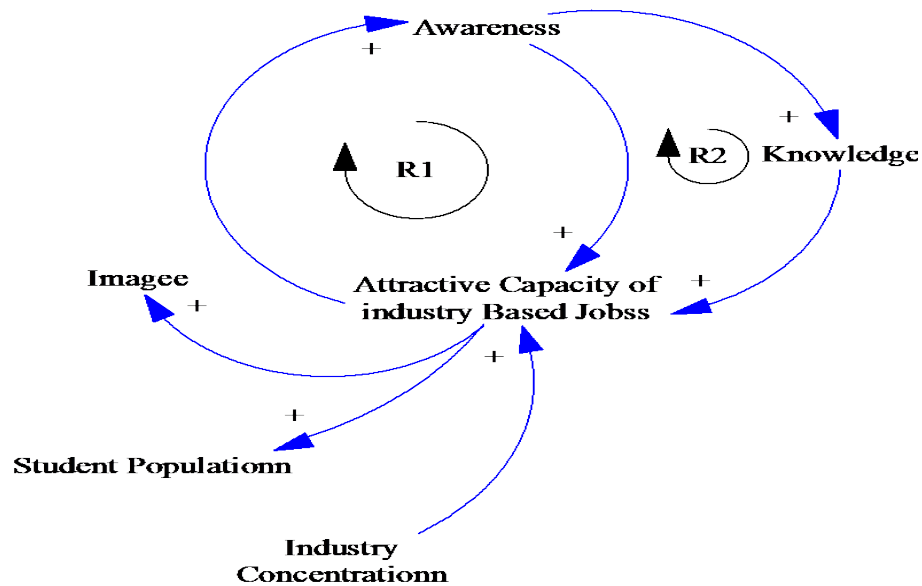


Figure 8.9: Maritime industry awareness loop R1 & R 2

Source: Author's own

MET institutions in Western Europe are experiencing a declining number of students pursuing maritime studies (Pallis and Ng, 2011; Ng, Koo and Pallis, 2011; Lobrigo and Pawlik, 2014). It assumed that there is little attractiveness to maritime careers such as seafaring, because western countries and their populace are seen as having too much wealth and therefore there is no financial need to engage in maritime vocations (Cross, 2010). According to Cross (2010:3), these:

“...circumstances are related to western oriented societies, there is no doubt that in maritime developing countries these situations and attitudes will also develop, as the standard of living, in that country, rises”.

This is pointed out by Lobrigo and Pawlik (2012) who are of the view that the importance of financial and economic factors validates the speculation that seafaring careers may lose their attractiveness as soon as the wage level declines or as soon as any shore-based profession becomes more lucrative. Nonetheless, the findings in the previous chapter with regard to awareness, suggest the following: An increase in **Attractive Capacity of Industry Based Jobs** increases **Awareness** of the maritime industry in KZN, which in turn again increases the **Attractive Capacity of Industry Based Jobs**, resulting in **Reinforcing** feedback loop **R1** in Figure 8.9.

In addition, the increase in **Awareness**, increases peoples **Knowledge** about MET in public higher education institutions in KZN, especially prospective students, thus resulting in an additional **Reinforcing** feedback loop, **R2**, in Figure 8.9. In addition, the findings suggest that, the **Attractive Capacity of Industry Based Jobs**, increases the **Image** of MET and also its **Student Population**. This is the opposite to the maritime industry in Europe which needs to increase its MET students population in order to sustain the existence of nautical studies programs at MET centers, which is threatened to extinction in some regions (Lobrigo and Pawlik, 2014).

Furthermore, the **Industry Concentration** also increases the **Attractive Capacity of Industry Based Jobs**. This is not unique to KZN, for example, the Philippines because of its geographical location of the country, its vast islands and maritime activities such as fishing and transport (Baylon and Santos, 2011). This is a part of the everyday lives of many of the citizens, therefore they want and need to pursue maritime vocations to a much greater extent when compared to countries that do not have such extensive access to the sea and related activities (Baylon and Santos, 2011). Thus, industry concentration and location are significant elements in the attractiveness of the maritime industry and consequently MET in these regions.

The findings in the previous chapter identify a number of influencing factors with regard to awareness. This takes the form of people having knowledge and the necessary information about the maritime industry. These are the underlining factors that influence **Awareness** and the **Attractive Capacity of Industry Based Jobs**. When people are aware of the maritime industry's existence, have information about it, then they can make career decisions based on this awareness and personal needs and wants. As a result, in countries such as Singapore for example, stakeholders such as the Singapore Maritime Foundation and the Singapore Shipping Association have come together to share resources to create awareness around maritime careers (SAMSA, 2011: 208-209). In the developing world, in countries such as Kenya for example, they embark on intensive awareness campaigns among stakeholders such as high schools and the public in general, to shift negative beliefs about the maritime profession and make it more attractive (Mabuti, 2013). All of this eventually influences the provision of MET institutions in these countries.

8.3.4 Image

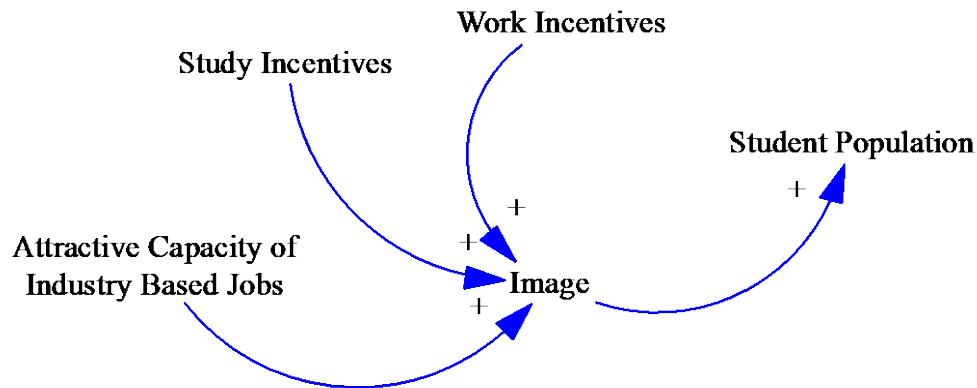


Figure 8.10: Image of MET loop

Source: Author's own

People may be aware of something, but such can result in either a negative or positive image of it and this is the case of the maritime industry. The maritime industry normally has an image problem, and according to Jensen, Bergqvist, Hjella and Lekakou (2013), it does not get the media attention it needs. Thus, according to Lobrigo and Pawlik (2012), there is a need to create an image of the maritime professional career, where positions are not restricted to working only at sea and this can possibly increase the attractiveness of the field to young people. The outdated and false perception of the profession that is held amongst young people, who associate maritime vocations as being away from home for ten to twelve months also lessens the attractiveness of such vocations (Cross, 2010).

The maritime industry is not only made up of shipping, there other supporting sectors such as finance, maritime law and other vocations related to maritime that could hold greater appeal if youngsters were made aware of their existence. Lobrigo and Pawlik (2012) note that there are numerous causes for poor retention in the maritime industry and creating the impression that pursuing MET is not restricted only to a sea based career and that there are other relevant opportunities ashore can make the field more attractive to young people. Jensen *et al.* (2013: 1) explain that it is of utmost importance to understand the perception of the shipping industry amongst young people to be able to effectively promote careers in shipping.

Various factors contribute to the image of the maritime industry in KZN which influences MET, the findings suggest. Figure 8.10 suggests that **Work incentives**, **Study Incentives** as well as the **Attractive industry Based Jobs** individually increase the **Image** of MET in the province, in a positive manner. This has led to an increase in the MET **Student Population** in public higher education institutions in the province over the years. In countries such as Sweden, Norway and Greece young people generally have a positive image of the shipping industry (Jensen *et al.*, 2013). The image of the maritime industry is pivotal because the future supply of maritime personnel with the necessary industry-specific qualifications is of particular concern in the shipping industry (Bakka, 2007; Grewal and Haugstetter, 2007; Bakka, 2008; Ng, Koo and Ho, 2009).

In countries such as Australia with a developing maritime industry like KZN, poor industry image and lack of awareness of the industry is contributing to skills shortages. This is also due to the continuing growth of a number of sub-sectors in the industry such as transport, offshore oil and gas exploration, export of bulk commodities, construction and container trade (SAMSA, 2011). Other countries such as Poland have not been immune to the broader challenges facing Europe's maritime industry such as the lack of interest in maritime professions according to Walczak (2008). Walczak (2008) further observed that the situation in Poland is not as intense as in Western Europe, nevertheless the country is faced with issues such as high unemployment, especially amongst the youth and a drop in the number of students pursuing maritime courses, although not that much at maritime universities.

Socio-economic circumstances also play a key role in the increase in the **Attractive Capacity of Industry Based Jobs** which portrays a positive image of the maritime industry as well as **Incentives** (work and study). These can be seen as efforts to attract the youth the findings suggest. This is not unique to KZN, because various attempts have been made and introduced in the past to attract young people into the industry in Europe for (Cross, 2010) for example. Thus, a number of factors result in the youth of today being less interested in maritime jobs (Walczak, 2008). For example, Caesar, Cahoon and Fei (2014) are of the view that improving the image and retention of seafarers requires multiple approaches. This includes increasing the funding of training and skill development, and improving the welfare and working conditions of seamen, as well as mapping out a long-term career plan for them. In other areas around the world, like in the Philippines, the shipping industry is improving the working conditions and the general image of the industry to

influence more MET students to pursue a career in seafaring and other related maritime vocations (Richter, 2016).

8.3.5 The State (provincial and local government)

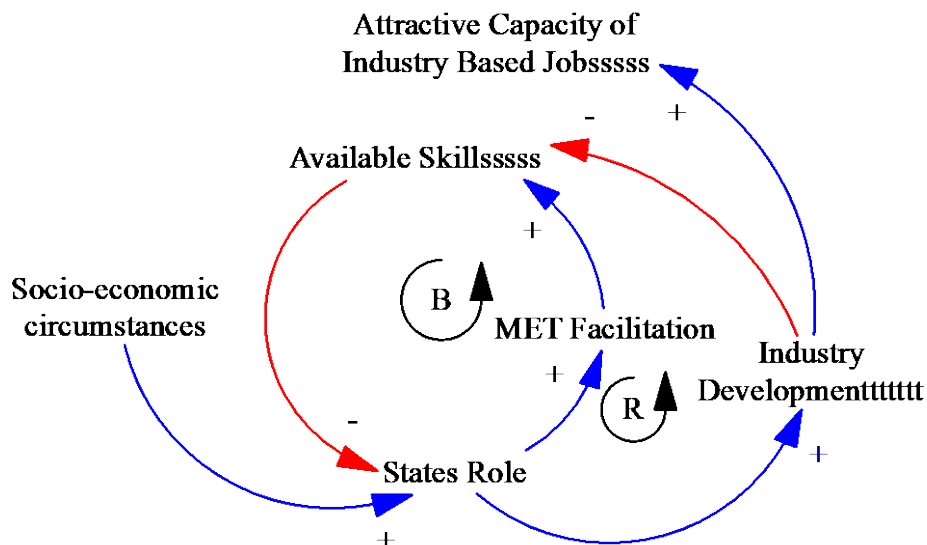


Figure 8.11: The role of the state loop (B).

Source: Author's own

The findings suggest that **Socio-economic Circumstances** in KZN, increase the **State's Role** in the maritime industry. This is not unique to KZN. In countries such as Canada where the government considers MET a priority as part of its policy to deal with chronic unemployment, training in fisheries, navigation and oil and gas operations has been given a high profile and such as had an influence on MET in the country. While, maritime **Industry Development** increases the **Attractive Capacity of Industry Based Jobs**, it however decreases **Available Skills**, because the available jobs are absorbed by the industry at a faster rate than the supply of skills. A decrease in **Available Skills** increases the **State's Role** in the maritime industry which in turn increases its **MET Facilitation** at public higher education institutions. Again that also results in the increase in **Available Skills** which decrease the **State's Role** in the maritime industry in the province, this presenting a **Balancing** feedback loop (B) in Figure 8.11. When skills needs in the industry a met by available skills supply, the role of the State is limited to, for example a regulatory role which is generally seen as a principle of a free market economy. However, when the available skills in the

industry decrease, the State through its various institutions intervenes and then the issue is resolved, which in this case when available skills increase that State's role decreases in the maritime industry.

These findings coincide with the literature. States around the world through their various institutions play an active role by regulating MET. Nevertheless, countries such as the Philippines ensure MET regulatory compliance to the STCW Convention 1978 as amended in 1995 and in 2010. Such has had a large impact on MET systems in the country according to Richter (2016). Those programs that are regularly monitored and found to be non-compliant are immediately closed or phased out.

The role of the state in MET goes beyond putting in place regulatory measures to ensure compliance to the STCW, but also addressing issues in the maritime industry that can be influenced by MET. For example, the role of state and industry in MET is as a result of many issues in the maritime industry. This is the case in countries such as Nigeria where government and industry believe that MET institutions are not in the position to provide adequate maritime training for the country's demands (Dada, 2008). Ihenetu-Geoffrey (2012) is thus of the view that the Nigerian state ought to play a principal role in the development of the country's MET, by providing adequate security and a conducive environment for teaching and learning, but also by formulating policies and strategic plans that will enable the growth and sustained improvement of the MET institutions so to benefit the industry and country at large. As a result, socio-economic circumstances in the country such as unemployment and or poverty can be addressed through the maritime industry, but such can be achieved by first addressing its MET issues. This necessitates the state's role to facilitate MET, which has been the case in KZN as the findings suggest. An instance of this in national policies such as the New Growth Path which focus on identifying decent work opportunities in areas that have the potential to create employment on a large scale; the maritime industry is seen as such an industry in KZN (Department of Economic Development, 2011).

In other countries, such as Brazil, the MET tuition fees are waived and students are provided with campus accommodation and a monthly stipend (Lobrigo and Pawlik, 2012) and state institutions such as the DPC go as far as deciding how many students are to be recruited for the first year

of studies in the country's MET institutions. The decision is further informed by industry requirements, available facilities, infrastructure capacity and financial resources (Lobrigo and Pawlik, 2012).

On the other hand in Greece the state plays a key role in facilitating the funding for MET, with funding coming from the contributions of vessels registered in the country and also from the European Union (SAMSA, 2011). These strategies although expensive for those that bear the cost, have been adopted with the acknowledgement that the maritime industry is key in these countries economic prosperities. As a result, in the Philippines for example, a Fund for Maritime Education Development and Enhancement (F-MADE) has been proposed, which will be used exclusively for enhancing the quality and competitiveness of quality Maritime Higher Education Institutions in the country (Ritual, 2015). According to Ritual (2015), this will allow the constant supply of highly competent maritime labour market for both the Filipino and international maritime industry in line with the STCW.

The role of the state is central in the development of MET in Africa. As a result, the draft African Union Maritime Charter, calls for member states to not only address the MET issues alone in their countries but rather to work collectively with other states to fund MET at all levels (eThekweni Maritime Cluster, 2011). Thus, the maritime industry is seen as imperative not only in the developmental agenda to fight socio-economic issues pertaining to socio-economic issues such slow economic growth and unemployment in KZN, but also in South Africa and the rest of African. The maritime industry has the economic potential to contribution tremendously to development, thus various national developmental policies and plans such as the National Development Plan (NDP) and Operation Phakisa, and KZN Integrated Maritime Strategy that have been adopted by government are efforts in this direction. As a result, the KZN Integrated Maritime Strategy (2013) points out that:

“...provincial governments can assist in the promotion and popularization of the maritime sector, to encourage more of the youth to consider a career in the maritime sector” (KZN Integrated-Maritime Strategy, 2013: 93).

8.3.6 Partnerships

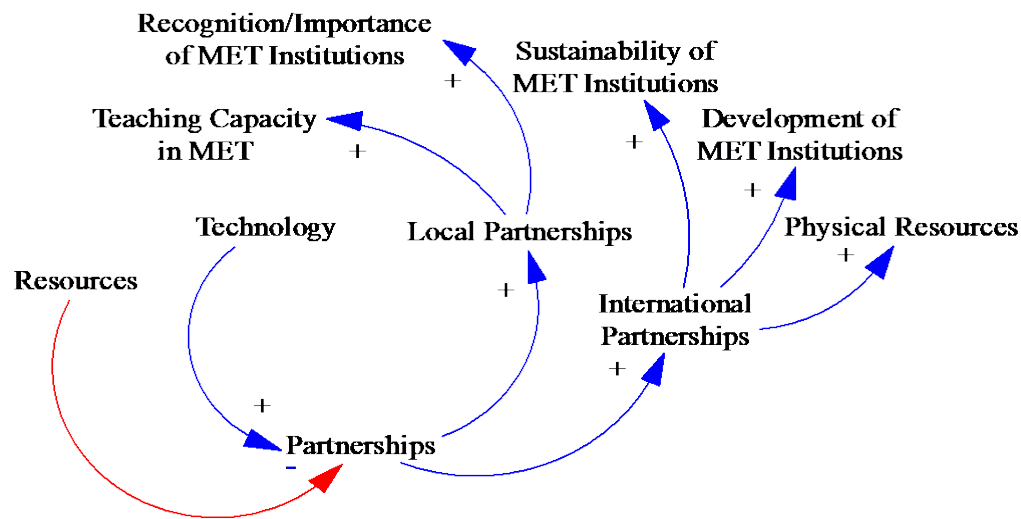


Figure 8.12: Partnerships loop

Source: Author's own

With the ever growing need for resources and increasing scarcity facing public institutions, partnerships have become more predominant in the delivery of public services (Wilson and Boyle, 2004), for example in the provision of affordable housing (Othman and Abedellatif, 2011), public healthcare and reducing its cost (Davis, Lee, Jarvis, Zorbas and Redman, 2003), as well as the development of the ICT-sector (Bruno, Esposito, Landoli and Raffa, 2004). These partnerships are also becoming more common in developing MET in public higher education institutions in KZN. Despite the small scale of such partnerships, a number of benefits can be delivered as a result and partnership can benefit organisations with little in the way of resources (Wilson and Boyle, 2004).

The findings from the previous chapter suggest that limited or a decrease in **Resources** (physical, financial and human), leads to the creation of **Partnerships** for MET in public higher education institutions in KZN. Partnerships for MET are not something new, although the level and need far surpasses the past. In developing countries in regions such as East Africa, international partnerships play an integral part in addressing maritime skills demands and the development of MET in countries such as Kenya, Uganda and Tanzania. These

countries comprised the East African Community (EAC) in the 1960s, together with the United Kingdom (Kiplimo and Nthia, 2015).

Technology, in terms of advancement in technology in the maritime industry, has also led to **Partnerships**, which are both **Local** and **International** in nature. This is not unique to KZN as the findings in the previous chapter suggest. Nevertheless, countries such as Turkey, to address its MET issues resulting from technological advancements in the maritime industry and being able to meet the STCW requirements, has developed partnerships with well-known and established international maritime institutions and universities in UK and in other European Union member states (Ziarati, 2010). In KZN, the findings indicate that **International Partnerships** increase access to **Resources** and assist in the **Development** and **Sustainability of MET** in public higher education institutions in KZN, while **Local Partnerships** assist in increasing **Teaching Capacity in MET** and the **Importance or Recognition of MET Institutions**. Having the desired teaching capacity in MET is twofold, its involving both human and/or physical resources. Although the findings reveal that only local partnerships have contributed to the increase in teaching capacity in MET, international ones can also play such a role for MET in public higher education institutions.

Physical resources in the form of equipment (and the training required to operate them) are key in the development and sustainability of MET. However, it is beyond the reach of many because of the high cost attached to them, thus partnerships in KZN public higher education institutions has to address these issues too which mostly pertains to the issue of the availability of berths and simulation. Hence partnerships assist a great deal, because when berths aboard commercial ships are limited, students, in this case cadets, might spend their ‘sea-time’ in a training vessel, owned and run by the MET institution at which they are enrolled with. This not the case in KZN, but in other countries such as China, because the ownership of training ships are costly and is thus a difficult target for MET providers in KZN and the broader African continent (Sampson, 2004).

Collaboration amongst the various stakeholders in MET allows them to maximize the available funds through a collaborative arrangement as the Mackinnon Partnership (2008) identified in

Scotland. The formation of partnership is the first phase in enabling collaboration. The findings further suggest that through developed partnerships, an environment for the creation of collective strategies to strengthen collaborations between local and international MET institutions is created. Therefore, strategies such as that of the European Union (EU) which, stress countries collectively working and learning with one another thereby creating a collective synergy, is the EU's most strategic asset regarding MET (Albayrak and Ziarati, 2009).

Partnerships go beyond just addressing resource deficits, but also ensure quality education and training in the maritime, make the industry safe and attractive to new job seekers and improve working conditions and remuneration packages according to the EU's Green Paper which will inform the region's future maritime policy (Walczak, 2008:430). This is supported by Maringa (2015) who was of the view that, partnerships can improve quality of MET in Africa because the challenges in the continent in achieving quality MET are as a result of the lack of collaboration. In addition, he stressed that one of the ways of overcoming MET challenges such as resource constraints, is by increasing collaboration amongst MET institutions in Africa because there is a direct link between MET providers and the success of Africa's economic and security development.

The quality of MET, specifically for maritime services and its components such as maritime teachers, students and curriculum are not necessarily in line with the needs of the fast developing shipping industry, and it is through the creation of partnerships that such can be addressed, as is the case of MET in public higher education institutions (Wang, 2011). Nevertheless, Szozda and Masny (2008) identify that insufficient funds are the main limitation in maritime partnerships. Therefore, organizational and financial participation by every stakeholder, such as ship owners, is desirable to achieve desired goals. However, this remains to be achieved in KZN MET in public higher education institutions.

8.4 THE OVERALL QUALITATIVE SD MODEL

When variables were identified from the main themes that developed from the primary data, they were arranged into CLDs in this chapter. To make the CLD models easier to understand, an explanation of each fragment (each theme in the form of a loop) was discussed. Now, these CLDs

shall be combined revealing the relationships amongst the different loops and creating a holistic view of all the small loops together; thus a Qualitative SD Model was created.

This model enables the researcher to provide a holistic picture of the feedback structure inherent in the provision of MET by public higher education institutions in KZN. The Qualitative SD Model will emphasise the deeper lying feedbacks and factors contributing to the challenges facing MET at public higher education institutions. The Qualitative SD Model below is thus created by building up and merging model fragments involved in each theme. The Model is provided because while each theme was explained separately, they collectively influence one another to impact the MET system as a whole and “such an influence can only be recognised by viewing the model as a whole” (Singh, 2014: 175).

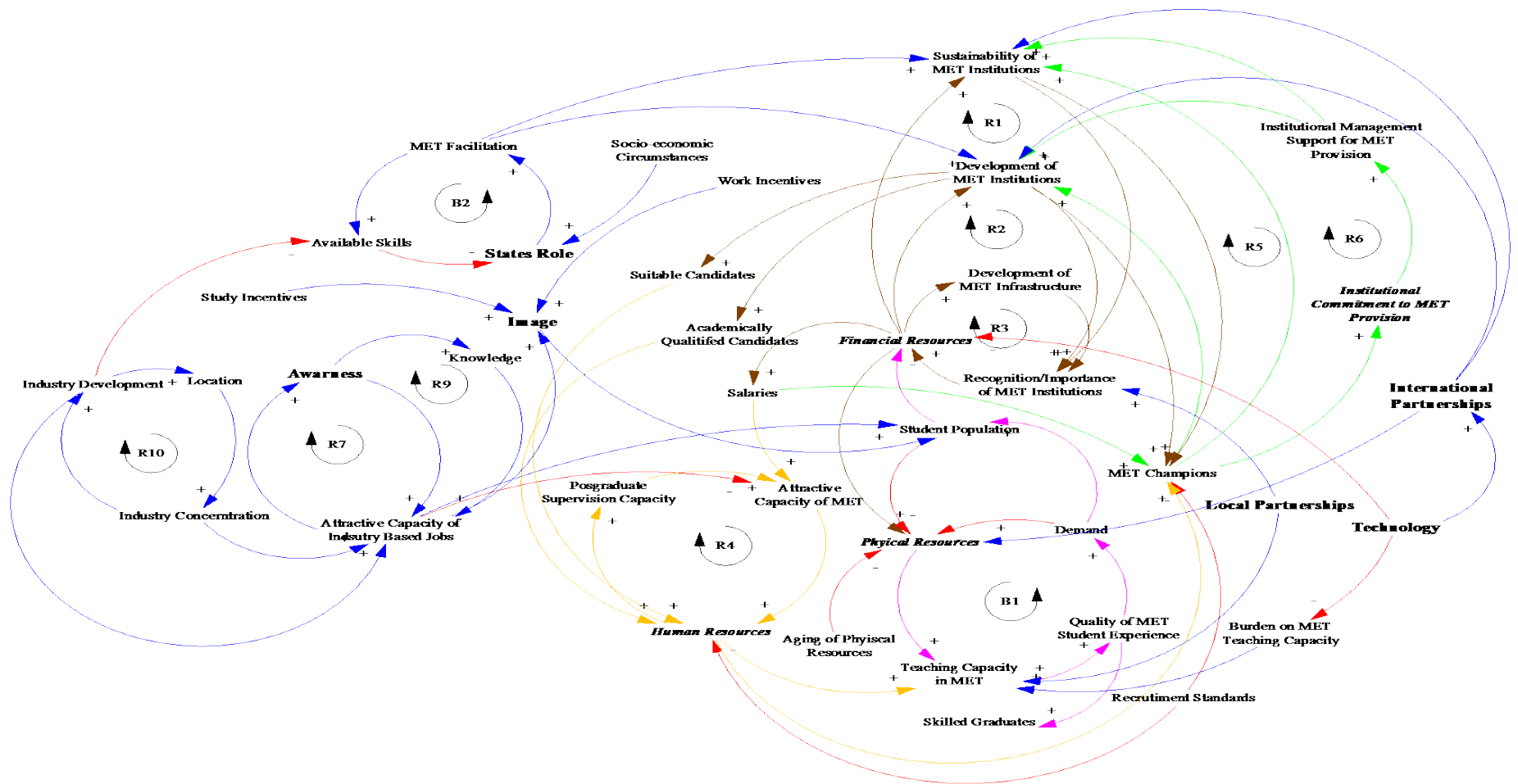


Figure 8.13: A Qualitative SD Model of the challenges facing MET in public higher education institutions in KZN

Source: Author's own

Looking at the overall qualitative system dynamics model reveals a holistic picture of how the development of MET institutions fits into the picture of the maritime industry in KZN. It is important to see that the one is not divorced from the other but rather that they reinforce each other and influence each other's state of being.

In addition, a closer examination of the diagram reveals a greater number of reinforcing loops as compared to balancing ones. What this reveals is that the system as a whole has great potential for positively reinforcing behaviour if the correct mechanisms are put into place to ensure that the behaviour of the loops move in a favorable direction. However, the danger with this number of reinforcing loops in a system is that their behaviour can also be in a negative direction, leading to negative consequences for the system as a whole. In such cases, these reinforcing loops can become what is termed destructive or vicious feedback loops contributing to rapidly declining and unhealthy modes of system functioning for the system as whole. It then becomes very difficult to develop strategies that can bring the system back to a healthy mode of functioning.

This demonstrates the importance of thinking in a systems fashion as in the approach this study adopted, because strategies that are developed to improve a system which adopt a piece-meal approach may not contribute to sustainable change or may produce negative or unintended consequences. It also highlights the importance of ensuring that all stakeholders involved in developing strategies are cognisant of the many variables involved and the manner in which they interact with one another before developing strategies to improve and/or assist in the development of such systems. Again, their inability to see all the variables involved and how they influence each other may lead them to have an incomplete picture of the story the system tells and thus to believe they are developing and instituting effective strategies when in reality the opposite actually occurs.

8.5 CONCLUSION

To achieve this study's research objectives, both primary and secondary data were used. However, most of the secondary data assisted the researcher in the introductory chapter, and its conceptualization by providing the background and rationale for this study. Furthermore, the secondary data was used to explore what others had said and written about MET, thus assisting

the researcher in constructing Chapter Two and Three which comprise the literature review. In these chapters, the researcher presented a global overview of MET by presenting the state of MET in the various regions around the world. This was followed by examining of the factors which the researcher saw as being a critical influence on MET, followed by the case of South Africa and KZN, by giving an overview of the country, its maritime industry and its state of MET.

The chapters revealed that the maritime industry has many issues and MET was one of them, thus this study sort to investigate these issues, but with a focus on public higher education institutions offering MET in KZN. While Chapter Five presented the theoretical framework, Chapter Six on the other hand presented a map which would guide this enquiry via the research methodology illustrating the research philosophy, design, strategy, sampling strategy and technique, data collection tools and process, data quality control and data analysis. This process has culminated in this chapter, and Chapter Seven and Eight, which present the findings, analysis and discussion of the primary data collected. The next chapter proceeds to the conclusions as well as the recommendations of this study.

CHAPTER NINE

CONCLUSION AND RECOMMENDATIONS

9.1 INTRODUCTION

The previous chapter discussed the findings by analysing the data and implications emerged revealing the challenges facing MET in public higher education institutions, using the province of KwaZulu-Natal in South Africa as a point of reference. The process of understanding the challenges began by firstly identifying both the internal and external factors that influence the provision of MET in these public higher education institutions in KZN. This was to understand the dynamics in the provision of MET by public higher education institutions, using a qualitative SD methodology.

Thus, this empirical exploration was guided by an interpretive worldview, a qualitative design and phenomenological strategy and consisted of collecting primary data using one on one, face to face interviews with key individuals in maritime education and training public institutions as well as maritime development and promotion institutes in KZN. The data was analysed using thematic analysis techniques. The analysis revealed that eight themes are operative in the challenges facing MET at public higher education institutions in KZN, namely: (1) Resources [human, physical & financial]; (2) Institutional Arrangement; (3) Industry; (4) Awareness; (5) Image; (6) Technology; (7) the State; and (8) Partnerships.

With all that has been discovered, it is thus imperative to see whether, and to what extent has the research objectives been answered. The next section thus provides a review of the research objectives of this study.

9.2 REVIEW OF RESEARCH OBJECTIVES

9.2.1 To identify internal factors influencing the provision of MET in public higher education institution in KZN.

The interviewees from public higher education institutions in KZN offering MET identified that the factors that are within the institution that influence MET provision have been resources and the institutional arrangement. The interviewees identified that such resources comprise human, financial and physical resources.

The provision of MET is a very costly activity, especially for sea-going vocations, and because of limited available financial resources this had a great influence on other things such as physical and human resources. It was also identified that, because the maritime industry is very specialized with limited specialists and is rapidly developing in KZN; remuneration packages in these jobs were much higher than in public higher education for MET lecturing jobs. Hence, were seen as less attractive. This has a direct influence of the available pool of human resources for MET because public higher education institutions could not attract the necessary personnel and this was borne of limited financial resources to create attractive enough remuneration packages.

Again, the interviewees expressed that because the maritime industry is fast developing not only in KZN, but also in the country and the rest of the world, technological advancements in the industry have also been integrated into MET provision, such as the STCW regulations and training technology. It was thus recognized that because MET in public higher education institutions has limited financial resources, such financial constraints limited the availability of physical resources such as simulators, berths and so on, making the relationship between having and not having resources very complex.

Staying with these internal resources, the study also identified that the institutional arrangement influenced MET in their institutions. Institutional arrangement was seen as the leaderships structures that govern the overall institutions, such as their management. It was identified that for MET in public institutions in KZN to flourish, there is a need from commitment for top management structures to recognize and support the development of MET in their respective

institutions. This meant understanding the uniqueness of MET and its resource requirements, and thus prioritising its needs in these comprehensive public institutions which offer other disciplines.

Nonetheless, this can be only achieved by means of having a person to champion this initiative. A champion was seen as a person that would fight for MET and champion for its development by means of lobbying for resource allocation and recognition of its importance not only for the respective institution, but also the broader environment. Such champions could also be responsible for dealing with the lack of maritime awareness, improving the image of the maritime industry and using MET to fight unemployment, especially amongst the youth in a country with one of the highest unemployment levels in the world. Such initiatives would assist in positioning the maritime industry the employer of choice in KZN and consequently assist in bridging the maritime skills gaps.

9.2.2 To identify the external factors influencing the provision of MET in public higher education institutions in KZN.

The interviewees identified a number of external factors that influence the provision of MET in public higher education institutions in KZN, these were: (1) Industry; (2) Awareness; (3) Image; (4) Technology; (5) the State; and (6) Partnerships.

The industry was identified as the surrounding maritime businesses and their activities related to MET institutions in KZN, as well as the people therein. The interviewees identified that the location of KZN influences its continued development. The increase in activities in its ports and other related industries, and the infrastructural development such as the new dug out port in the city of Durban and the extension of the port of Richards Bay and many other activities in the coast of KZN such as future oil and gas exploration, will further increase the demand for maritime skills and also increase the maritime skills gaps. This has and will continue to increase the demand for MET in public higher education institutions.

The interviews identified that over the decade there has been an increase in students wanting and pursuing MET vocations in public higher education institutions in KZN. However, this has not been enough to close the skills gap in the province.

On the side of MET in public higher education institutions, there has been lack of both teaching and training capacity to increase student intake over the years. This study has identified that this has been as a result of a number of factors such as limited resources (human, financial and physical) in such institutions. From the human aspect of things, this took the form of having not enough lecturers with the necessary academic requirements, experience and industry connections. This was related to not having attractive remuneration packages such to attract such people, which MET in public higher education institutions in KZN has failed to achieve. The interviewees identified that to achieve this, the necessary financial resources have to be allocated for MET in order to make MET in public higher education attractive. However, such resources were not sufficiently available.

In terms of awareness, the interviewees identified that the general public in KZN lack maritime awareness, especially the majority from disadvantaged backgrounds and that the majority of people were denied access to the maritime industry in Apartheid South Africa, including Black South Africans who constitute the majority. Such has had an influence on MET provision in public higher education institutions in KZN. Nevertheless, interviewees identified that because of state initiatives to educate by means of bursaries and increase awareness of the maritime industry especially amongst the youth from disadvantaged backgrounds and those that were excluded from MET in the past, a steady demand for MET in public higher education institutions has been noted. The socio-economic circumstances of the province has resulted in the state recognising the impact the maritime industry can have in addressing issues such as high unemployment and slow economic growth, thus by increasing maritime awareness, the maritime skills gap can be reduced, as well as unemployment in the province.

The interviewees also identified that such awareness increases the image of the maritime industry which again has had antrary effect on the demand for MET programmes at public higher education institutions in KZN. Furthermore, because of the development and growth of the maritime industry in the province, many have now begun to see employment opportunities. Thus the maritime industry has become an employer of choice because of lack of job opportunities in traditional

labour markets, and this too has provided a positive image of the industry. This positive image in turn influences the demand for MET in public higher education institutions in the province.

In terms of technology, it was identified that at public higher education institutional level, technology was also in the centre of MET provision, especially sea-going vocations. However, this had dire cost implications for MET institutions because of financial resource constraints. It was identified that technological advancements in the industry had to be integrated to MET. Regulation such as the STCW recommends such. Although MET in public higher education institutions in the province adheres to such, the increase in student intake and rapid technological advancements has threatened MET in these institutions. Technological physical resources such as simulators need constant upgrading to be in par with the technology on ships and used at ports around the world. However, such could not be achieved due to the cost of such technology, as well as because of the ever-increasing number of student intake on a yearly basis which would necessitate an increase in financial allocations.

The last external factor that interviewees identified as influencing the provision of MET at public higher education institutions has been partnerships. Partnerships were identified as processes of different stakeholders from the maritime industry, including MET institutions working together to address common issues. In the past, MET institutions, worked in isolation from one another. To date however, this has changed. It was identified that although partnerships for MET development and sustainability are fairly new in KZN between public higher education institutions, there still remained a long way. Nonetheless, partnerships between MET institutions and industry has long existed and has been be very beneficial for MET in public higher education institutions in the provision.

It was identified from the interviewees that due to limited resources such as human resources; industry organizations such as associations, and individual experts from industry have played and continue to play an active role in the development and sustainability of MET in public higher education institutions in KZN. Because of the lack of the ability to attract and retain maritime experts in public higher educations in KZN, partnerships have taken the place of industry experts availing themselves for part-time teaching and student supervision, sometimes accepting stipends

from being away from their respective industry jobs. These partnerships assist in addressing the capacity challenges facing MET in public higher education institutions faced with growing student intakes due to demand for MET, and the lack of attractiveness of MET permanent posts.

9.2.3 Examine how KZN's public higher education institutions offering MET have responded and continue to these factors.

This study has identified that numerous internal and external factors influence the provision of MET in public higher education institutions in KZN. How these public higher education institutions have responded to such as been through creating relationships with relevant stakeholders through building partnerships. Because of the ever-growing need for resources and increasing scarcity facing MET in public higher education institutions in KZN, partnerships have become more prevalent. Nonetheless, it was identified that partnerships for MET are not something new, although the level and need far surpasses the past.

The findings also indicate that international partnerships increase access to resources and assist in the development and sustainability of MET in public higher education institutions in KZN, while domestic partnerships assist in increasing teaching capacity in MET. Having the desired teaching capacity in MET is twofold. It involves having the needed human or physical resources. Although the interviewees revealed that only local partnerships have contributed to the increase in teaching capacity in MET from the human aspect of things, international partnership can also play such as role for MET in public higher education institutions in KZN.

These partnerships will enable an environment for the creation of collective strategies to strengthen collaborations between local and international MET institutions in KZN. Nonetheless, partnerships ought to be more than just addressing the resources needed in MET in KZN but also ensure quality education and training, thus making the industry attractive and safe for prospective students and employees in the province.

9.2.4 Assess the role of the State (provincial and local government) in MET at public higher education institutions in KZN

States around the world are indirectly and directly active in MET. Even the adherence to the STCW is state driven. The role of the State (both provincial and local government) in MET at public higher education institutions in KZN was identified by interviewees as one that has been very limited and minimal, although socio-economic circumstance of the province have increased the State's role in the maritime industry through institutions such as the EMC.

The maritime industry development has increased the attractive capacity of industry based jobs, even though such jobs were already attractive in the first place. Nonetheless, the maritime skills gap has also influenced the state's role in the maritime industry. Due to the challenges facing MET, such as working in isolation and not being able to bridge the skills gaps in the province has recently resulted in the state playing an active role in MET facilitation at public higher education institutions. This is not unique to KZN because states around the world through their various institutions play a similar role, thus going beyond simply regulating MET.

Similarly, the role of the state in MET in KZN has recently gone beyond putting in place regulatory measures to ensure compliance to the STCW, but also by addressing issues in the maritime industry that can be influenced by MET. This included initiatives such as Phakisa and New Growth Path for example, that focus on identifying decent work opportunities for a population struggling with high unemployment rates. The maritime industry is an industry with the potential to create employment on a large scale and hence the lack of coordination and collaboration in MET in the past has threatened the development and sustainability of MET, including in public higher education institutions in KZN.

Thus, to realise the objectives of initiatives such as Operation Phakisa and New Growth Path to mention a few, the state has played an active role in bringing together MET public higher education institutions to work collectively to address each other's challenges and broader maritime issues in the province of KZN. The state has created various institutions in South Africa such as the South African International Maritime Institute (SAIMI) and the eThekweni Maritime Cluster to assist in the facilitation of MET and to ensure the development and sustainability of MET.

9.3 CONTRIBUTION OF THIS STUDY

The purpose of research is to generate new knowledge and this may include empowering a group of people or the introduction of new procedures (Fox, Martin and Green, 2007). Time is a cruel factor in research. Much has happened and changed in South Africa post the country's democratization in 1994 and the globalization of the maritime industry. The factors and policy stakeholders influencing the provision of MET change over time. Such changes include, but are not limited to, globalization of the maritime industry, maritime technological advancements, the cost of MET provision, youth participation in MET, professionalization of maritime, and the States intervention in MET to ensure maritime safety and security, education and training standardization, cooperation and coordination both domestically and globally. Thus, this study takes account of these factors and the complexity therein resulting in challenges facing MET provision in public higher education institutions in KZN and the broader country. This study has contributed knowledge on how, in the ever-globalizing world, MET can be managed at public higher education institutions, using the case of KwaZulu-Natal (KZN) as a reference so as to effectively, efficiently and economically domesticate the maritime labour market.

The use of Systems Thinking as a theory of analysis is the centre of this study. A theory normally "provides causal explanations about phenomena that are perplexing or enigmatic to us, i.e. a cognitive problem or a practical problem...in the natural world, theory sheds causative light on physical occurrences or natural states that require new or greater understanding...in human affairs, a theory sheds light on psychological and behavioural events that require new or greater understanding" (Kotze and Van Wyk, 1986:184). Thus, to view a phenomenon or problem under consideration, a theory provides a set of means or perspective lenses (Kotze and Van Wyk, 1986). As a result, a Systems Thinking lens has been utilized to explore past and present internal and external factors influencing the provision of MET at public higher education institutions in KZN, to re-contextualize strategies used to address the province's MET and to identify how the new model would work and why. Thus, this study has contributed immensely on the understanding of the challenges facing MET from a holistic manner. No studies have been done that examine the challenges in the provision of MET from a holistic, Systems Thinking exploration perspective. Therefore, by using a qualitative SD exploration, this study has contributed on both these shortfalls.

The existing literature on MET not only in KZN, and South Africa, but also globally, tends to look at the challenges facing MET from a fragmented perspective by only focusing on one aspect of the issue in isolation to the others. Although this has been useful in understanding some of the issues in the provision of MET, there has been no emphasis on the larger picture of such issues in terms of how such factors influence one another and contribute to challenges facing MET. As a result, there exists a lack of empirical data on the challenges facing MET and the factors that contribute to these challenges not only at public higher education institutions in KZN, but in the rest of South Africa too. It is hoped that this study will contribute to lessening this gap in research.

This study has revealed not only the many factors that influence MET and which lead to challenges, but has also ventured more deeply to identify how these factors influence one another. The behaviour of the interaction of these factors with each other leads to feedbacks which either compound or lesson the challenges facing MET in public higher education institutions in KZN. The relationship between the factors in the system result in other factors that ultimately become part of the system, making the provision of MET even more complex in public higher education institutions in KZN. Thus, the role of the state through its respective institutions and other stakeholders such as industry, continue to be central in the success of MET at public higher education institutions in KZN.

9.4 RECOMMENDATIONS

The data collection and analysis of this empirical work was based on the exploration of the challenges facing MET in public higher education institutions in KZN, South Africa. Below are the recommendation that are presented and they are arranged in accordance with the themes that emerged. Thus, these can be applied to MET at public higher education institutions in KZN but are also significant to other public higher education institutions offering MET in South Africa and the rest of the world facing similar challenges.

9.4.1 Resources and the Government

- The necessary resources, such as financial resources, human resources and physical resources are vital for the development and sustainability of MET. However, this remains the major

challenge for MET as it grows in size and scope in public higher education institutions in KZN. Human resources relate to attracting and retaining staff and in order for such to take place, the necessary incentives such as financial resources that are needed to create competitive salaries, ought to be set aside for MET. It is recognised that MET institutions cannot achieve such by themselves. Thus the government should take their reality into consideration and allocate the necessary financial resources to MET and related public higher education institutions. In order to attract and retain the desired and necessary human capital and obtain and increase physical resources such as training equipment, facilities and simulation technology, significant financial capital is required which is beyond the grasp of public higher education institutions offering MET in KZN.

The government must create a fund for sustainable MET and development, similar to that proposed by the Philippines, which is a Fund for Maritime Education Development and Enhancement (F-MADE) (Ritual, 2015). Such a fund in KZN would not only be used to increase and upgrade facilities such as simulation and other teaching resources, but this could also be used to attract and retain the desired and necessary human capital for the development and sustainability of MET at public higher education institutions in KZN. This approach according to SAMSA (2011) is not only unique to Philippines, but also to other countries such as Australia, where there is a call to increase MET funding so as to support the development of MET, because in countries such as Canada with excellent MET facilities and well-qualified staff, this has been possible because of its fairly strong financial support. This is due to the fact that their provincial government considers MET a priority as part of its policy to deal with its socio-economic circumstances such as chronic unemployment.

9.4.2 Institutional Arrangement

- It is of utmost need for MET at public higher education institutions in KZN to strive to succeed. However, this depends on the support and commitment they receive and having the necessary persons to ensure such is achieved. Although the findings of this study revealed that such is limited, there is the need for more institutional management support for MET provision that will ensure the development of MET at public higher education institutions in KZN. The success of MET does not only rely on having the necessary resources but also having the

necessary structures in place that will effectively, efficiently and economically utilize these resources; guided by policies that recognize the circumstances surrounding MET at public higher education institutions.

There must thus be a collective consensus at institutional management level that MET at public higher education institutions in KZN is unique from other disciplines hence requires different supporting mechanisms and strategies which are unique from the broader comprehensive institution. For example, the reviewing of requirement policies such as the minimum institutional entry requirement for academics, especially for disciplines that rarely have people who get to Masters and Ph.D level of study and who are also difficult to attract and retain. In public higher education institutions, there is a need for top managements' resources commitment to the provision of MET. This can only be realised by aligning the institutions' policies for example the institutional budgetary process with State (provincial and national government) policies (Operation Phakisa) or priorities (Blue economy). When such a standpoint is taken by those that manage public higher education institutions, those that champion the development and sustainability of MET will succeed.

9.4.3 Industry

- Industry has been key in the development of MET at public higher education institutions in KZN. The industry's rapid growth and development tends to attract experts that are academics from MET institutions, which thus decreases available human capital needed by MET institutions. Nonetheless, this phenomenon is beyond the control of both industry and MET institutions. Thus, industry, through such things as industry associations for example, can continue to play an active role supporting MET through human capital sharing, where industry experts lend their time to teach (for free or on a stipend basis) at MET public higher education institutions in KZN.
- Industry's role in the development and sustainability of MET at public higher education institutions ought to go beyond human capital sharing. Industry formations such as associations, for example shipping companies, can also play a big role in funding the development and sustainability of MET. This would not be unique to KZN. In other regions of

the world, such as in the United Kingdom, China and Singapore to mention a few, shipping companies individually or through their respective associations directly fund MET institutions. Such funds are used to develop MET infrastructure and other facilities as well as being used to adapt and integrate the latest maritime technology into teaching.

9.4.4. Awareness and Image

- This study has found that there is a close link between maritime industry awareness and image. MET in public higher education institutions has seen a steady increase in students wanting to pursue MET programmes because this has been informed by awareness of and knowledge about the maritime industry. This has increased the attractive capacity of industry based jobs which then increased MET student populations in KZN. Nonetheless, there remains a need for MET institutions to also actively play a role in maritime awareness in KZN, especially in areas that are inland in the province and to people commonly excluded from partaking in the maritime industry in the province. Such initiatives would not only increase maritime awareness for prospective students but also increase their knowledge about the industry.
- Public higher education institutions in KZN can go beyond ensuring maritime awareness, but also play an active role in improving its image by organizing or developing means such as festivals, roadshows or videos to show in detail that the industry is safe and secure. This has so far only been state driven through various institutions such as the eThekweni Maritime Cluster.

9.4.5 Technology and partnerships

- Technological advancements in the maritime industry have a direct influence on MET because they must be integrated with maritime education and teaching. Even though such advancements may decrease available financial resources, they will nevertheless lessen the burden on MET teaching capacity in public higher education institutions in KZN. Yet, due to the increasing MET student populations in KZN's public higher education institutions, there are many challenges in not only attaining such technology but also increasing it. Although local and international partnerships are in place, more needs to be leveraged from these partnerships, such as for example creating funding schemes for the purchase of simulation

technology for developing MET institutions. Thus, MET in public higher education institutions in KZN will highly benefit from its relationships with well-developed and financed international MET institutions if they leverage more than just the signing of MOUs.

9.5 RECOMMENDATIONS FOR FURTHER RESEARCH

Future scientific enquiries will benefit from exploring the challenges facing MET at other public higher education institutions not only in South Africa and Africa but also internationally, and comparing the findings to what has been discovered in this study so as to enhance the understanding of the challenges facing MET at public higher education institutions. Future research could be based on also investigating the challenges facing MET at public higher education institutions in the developed and developing world. The differing socio-economic circumstances, development levels and resource endowments of these two worlds would be interesting points of departure for future studies.

Adopting a quantitative SD approach would be an interesting approach at exploring the challenges facing MET at public higher education. Reason being that this study adopted only a qualitative SD methodology which resulted in not engaging in the full SD process involving the computer simulations and policy testing phases of the methodology. It would thus be effective in revealing the system's overall behaviour over time while all the identified variables interact with one another. However, this would be very timeous because such would require the qualitative model to be converted into a stock and flow diagram and the quantification of all identified variables (which is mandatory before a simulation can be run).

This study identified eight factors that are central to the challenges facing MET at public higher education institutions in KZN. While each factor's depiction in the Qualitative SD model illustrates that each theme is complex, a much deeper exploration can be achieved if each factor is made a point of departure for future studies. This would result in various studies seeking a deeper understanding of each theme, facilitate a deeper investigation into each theme, because numerous other related variables might emerge as being instrumental within the auspices of each of the themes.

Lastly further scientific enquiry into the challenges facing MET can broaden by scope. This would entail including other stakeholders in MET, such as academics/lecturers, administrators, trainers and students which this proved very problematic in this study because of the limited number and availability of people with experience and expertise in the field of MET in the province of KZN. The research methodology that might be adopted for further inquiries into MET may approach the phenomenon using different methods such as the strategy, sampling technique and analysis because these eventually affect sample size.

9.6 CONCLUDING REMARKS

The Systems Thinking exploration presented in this study has shown that the challenges facing MET at public higher education institutions in KZN are multifaceted. This approach has enabled us to see how dynamic the process of the provision of MET is. Thus, by identifying both the internal and external factors and the role of other stakeholders such as the government and industry we are able to understand the complex feedback relationships at play amongst the different factors within and beyond the control of MET institutions in KZN.

Cunningham (2015) is of the view that education and training of the human element is of utmost importance for an effective and efficient global maritime industry. Nonetheless, to attain such, education and training institutions that produce this human element are the foundation that leads to an effective and efficient global maritime industry. If these institutions are weak and or lacking, such may result in numerous challenges for the maritime industry. This has been the case in KZN, with the imbalance in the supply and demand of MET. Thus, there is a need for more coordination and increased cooperation and collaboration which will not only support the maritime policy agendas in KZN, but also result in building a collective effort amongst the various stakeholders in addressing the challenges facing MET at public higher education institutions in KZN.

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APPENDICES

ETHICAL CLEARANCE



12 May 2017

Mr Syanda Alpheous Mthuli (210508740)
School of Management, IT & Governance
Westville Campus

Dear Mr Mthuli,

Protocol reference number: HSS/0503/017D

Project title: A systems thinking exploration of the challenges facing Maritime Education & Training: The case of public higher education institutions in KwaZulu-Natal

Full Approval – Expedited Application

In response to your application received on 25 April 2017, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol have been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

Dr Shamila Naidoo (Deputy Chair)

/ms

Cc Supervisor: Professor TI Nzimakwe
Cc Academic Leader Research: Professor Brian McArthur
Cc School Administrator: Ms Angela Pearce

Humanities & Social Sciences Research Ethics Committee

Dr Shenuka Singh (Chair)

Westville Campus, Govan Mbeki Building

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INFORMED CONSENT FORMS

Informed Consent Form

UNIVERSITY OF KWAZULU-NATAL

School of Management, IT & Governance

Doctor of Administration Research Project

Researcher: Mr Syanda A. Mthuli (031 260 7756)

Supervisor: Prof T.I Nzimakwe (031-260 2606)

Research Office: Ms P Ximba 031-2603587

CONSENT

I.....(full names of participant)
hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project titled: *A Systems Thinking exploration of the challenges facing Maritime Education and Training: The case of public higher education institutions in KwaZulu-Natal (KZN)*. I understand that I am at liberty to withdraw from the project at any time, should I so desire.

SIGNATURE OF PARTICIPANT

DATE

.....

.....

I consent to have my interview recorded

Yes	No
-----	----

Information Sheet for Participants

UNIVERSITY OF KWAZULU-NATAL

School of Management, IT & Governance

Doctor of Administration Research Project

Researcher: Mr Syanda A. Mthuli (031 260 7756)

Supervisor: Prof T.I Nzimakwe (031-260 2606)

Research Office: Ms P Ximba 031-2603587

Dear Participant,

My name is **Syanda Apheous Mthuli** a Doctor of Administration student, at the School of Management IT & Governance at the University of KwaZulu-Natal. You are invited to participate in a research project entitled: **A Systems Thinking exploration of the challenges facing Maritime Education & Training: The case of public higher education institutions in KwaZulu-Natal (KZN)**. The purpose of this study is to provide an analysis of maritime education and training (MET) at public higher education institutions in KZN. The objectives are as follows:

- *To explore internal factors that influence the provision of Maritime Education & Training at public higher education institution in KZN,*
- *To explore external factors that influence the provision of Maritime Education & Training at public higher education institutions in KZN,*
- *To identify how KZN's public higher education institutions offering MET have responded to these factors,*
- *To examine the States role in Maritime Education & Training at public higher education institutions in KZN.*

Through your participation, I hope to understand **what are the factors that influence the provision of MET at public higher education institutions in KZN?** The results of the interview are intended to contribute to **an understanding of the status of maritime education and training**

in KZN hence by noting institutions comments on factors that result in opportunities and challenges. Your participation in this project is voluntary. You may refuse to participate or withdraw from the project at any time with no negative consequence. There will be no monetary gain from participating in this study. Confidentiality and anonymity of records identifying you as a participant will be maintained by the University of KwaZulu-Natal. Anonymity of the participants will be ensured in the presentation of the data. If you have any questions or concerns about participating in this study, you may contact me or my supervisor at the numbers listed above. The **interview** should take you about **45 to 60** minutes to complete.

Sincerely

Investigator's signature _____ Date _____

This page is to be retained by participant.

INTERVIEW SCHEDULES/GUIDES

Interview Guide 1: MET institutions

1.What are the internal factors that influence the provision of MET in your institution?

(Below are some of the factors, however more can be identified and discussed during the interview).

- Resources

Additional probing questions

- In your opinion, the MET courses offered in your institution, are they sufficient in addressing the maritime skills demands in KZN?
- What do you think has most influenced MET in your institution?
- In light of the globalization of maritime industry, what factors have put your institution at an advantage in the provision of MET?
- In light of the globalization of the maritime industry, what factors have put your institution at an disadvantage in the provision of MET?

2. What are the external factors that influence the provision of MET in your institution?

(Below are some of the factors, however more can be identified and discussed during the interview).

- Industry
- Incidents
- Safety and Security
- Technology
- Quality
- Internationalization
- Image
- Attractiveness
- the State
- Partnerships

Additional probing questions

- How has the supply and demand for appropriately qualified maritime skills effected the provision of MET in your institution?
- Is the provision of MET costly, and why?
- How has this affected the provision of MET in your institution and how has your institution responded to this?
- Is the growth and demand for MET programmes in your institution satisfactory if not why?
- What role is the State playing in the provision of MET in your institution?
- What role must the State play in the provision of MET in your institution?
- What challenges did your institution encounter in meeting the new 2010 STCW amendments called ‘the Manila Amendments’?
- What are the challenges your institution is facing in meeting and exceeding the minimum required standards of the 2010 STCW?

3. How has your public higher education institution offering MET responds and continue respond to these factors?

- Industry
- Incidents
- Safety and Security
- Technology
- Quality
- Internationalization
- Image
- Attractiveness
- Resources
- the State
- Partnerships

Additional probing question

- Does your institution have any cooperation and collaboration initiatives for MET with other MET public higher education institutions in KZN, South Africa, Africa or abroad, if not why?
- Is there the lack of coordination in MET public higher education and training institutions in KZN, if so why and what is the cause?
- Is the lack of coordination in MET by public higher education and training institutions contributing to the current skills gaps in KZN maritime industry, if not what or who is?

Interview Guide 2: State Maritime institutions in KZN

1. What role is your institution playing in shaping the provision of MET in KZN?
2. What has been the role of your institution in shaping MET at public higher education and training institutions in KZN?
3. In your opinion, what role must your institution play in the provision of MET in KZN?
4. Why should your institution take this direction?
5. What challenges has/is your institution encountering in this regard?
6. How is your institution responding to these challenges?
7. What stakeholder collaboration and partnerships does your institution have in the domestic and international maritime industry?
8. In your opinion, is there the lack of coordination in MET in public higher education and training institutions in KZN, if so why and what is the cause?
9. Is the lack of coordination in MET by public higher education and training institutions contributing to the current skills gaps in KZN maritime industry, if not what or who is?
10. Is the growth of MET programmes in public higher education institution in KZN satisfactory if not why?
11. Is the growth of MET programmes in and supply of maritime skill by public higher education institution in KZN in line with the provinces demands?
12. What do you think is needs to be done for public higher education and training institutions offering MET in KZN to satisfactory domestically the provinces maritime industry?

TURN IT IN REPORT

A SYSTEMS THINKING EXPLORATION OF THE CHALLENGES FACING MARITIME EDUCATION & TRAINING: THE CASE OF PUBLIC HIGHER EDUCATION INSTITUTIONS IN KWAZULU-NATAL

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