New Technologies, Work, Skills and Identity

The Case of Maritime Industry

Nippin Anand

2011

School of Social Sciences
Cardiff University

This thesis is submitted to Cardiff University in fulfilment of the
requirements for the Degree of Doctor of Philosophy

UMI Number: U584560

UMI

®

Dissertation Publishing

ProQuest®

ACKNOWLEDGEMENTS

ABSTRACT

This thesis is an empirical investigation of the implications of new technologies for work, skills and identity of workers in the maritime sector. The research question is focused on how employers and seafarers understand the changing nature of work and skills as a result of technological advances. This question will be answered within the wider context of global competition and the competitive reasons to promote new technologies in workplaces. The methods of data collection involve qualitative interviews with shipping company managers, training staff and seafarers. The findings reveal a significant mismatch between the competitive reasons to implement new technologies and its (un)intended consequences on the professional identity of workers. More specifically, the thesis highlights the tensions between management strategies aimed at profit maximization, cost control and safety concerns and the myriad perceptions of workers based on their understanding of the seafaring profession. The thesis provides a fresh perspective of the existing theories of technology in the context of global competition.

GLOSSARY OF ABBREVIATIONS

BSA:	British Sociological Association
CBT:	Computer Based Training
EC:	European Commission
ECDIS:	Electronic Charts and Display Information Systems
EMN:	Established Maritime Nations
EU:	European Union
FOC:	Flag of Convenience
GPS:	Global Positioning Systems
HRM:	Human Resource Manager
IMO:	International Maritime Organisation
ISM:	International Safety Management
ITF:	International Transport Workers Federation
LNG:	Liquefied Natural Gas
LPG:	Liquefied Petroleum Gas
MAIB:	Marine Accident Investigation Board
MARPOL:	Marine Pollution
NEC:	Non-established Countries
OECD:	Organisation for Economic Co-operation and Development
OOW:	Officer of the Watch
PSC:	Port State Control
SMD:	Safe Manning Document
SOCSI:	School of Social Sciences
SOLAS:	Safety of Lives at Sea
SRA:	Social Research Association
STCW:	Standard of Training Certification and Watchkeeping
UNCLOS:	United Nations Convention on the Law of the Sea
UNCTAD:	United Nations Conference on Trade and Development
VHF:	Very High Frequency Radios

Table of Contents

CHAPTER 1   INTRODUCTION

This research is an empirical investigation of the implications of new technologies for work, skills and identity of workers in the maritime sector. The research is focused on understanding the workers' perspective about the changing nature of work and skills as a result of technological advances. This issue will be addressed in the wider context of global competition and the competitive reasons to promote new technologies.

In the words of Atkinson *et al.,* (2003), 'social scientists do not dream up "problems" to investigate out of thin air' (p. 99). Research problems and the selection of a particular research area are often matters of personal choices driven by curiosity. In my case the curiosity to research in the maritime sector was the result of my past work experience as a professional seafarer for more than eleven years. Hence, I embarked on an academic journey with a loose set of questions or rather 'curiosities', on which, if I reflect back, would require another doctoral thesis.

I joined seafaring in 1995 and stayed at sea until 2005 which could perhaps be seen as one of the most exciting decades in global shipping, at least from the viewpoint of technological advances. There was a rapid shift towards containerised cargoes and a significant proportion of container ships were introduced in the company for which I was working. Furthermore, the existing general cargo ships with conventional technologies were being modified to carry containerised cargoes. As a cadet I remember having spent a lot of time in learning the ropes, the various techniques of lashing general cargoes and skilled operation of cranes and battening down cargo hatches. Most of these skills were, however, no longer required with the arrival of container ships as most cargo operations were either mechanised or transferred to the shore side.

The job of a navigator was similarly influenced by new technologies. On my first assignment, as a team of three deck cadets we regularly practised navigation using celestial bodies (sun, stars and planetary bodies) and sextants. We were expected also to know by heart the names of all major stars and constellations. As was customary, the person who achieved the most precise ship's position of the week was rewarded by the shipmaster. The use of satellite navigator was strictly limited to the watch officer and at that time satellite navigators were capable only of transmitting the ship's position once every four hours. For ship shore

communication, the Morse code was still the most preferred way to communicate with the shore side. For this, radio officers with specialised radio operating skills were employed on ships.

The advent of the Global Positioning Systems (GPS) followed by its mandatory implementation on merchant ships revolutionised the conduct of navigation. In lieu of relying on the conventional skills and cumbersome calculation of sextant and celestial navigation the new GPS technology offered a 'happy-click-button' navigation on ships. Navigation became not only simpler but also safer as the GPS offered far more accurate ship positions. But as cadets, and even as I progressed through the ranks, we were always discouraged from making excessive use of electronic equipment during navigation. As a 'fair weather practice' at sea, as seafarers we were always encouraged to practise the conventional skills of navigation.

About three years after I joined at sea, the global maritime automated distress and safety system, an automated system designed to improve safety, was introduced. Subsequently, both the radio communication equipment and the radio officer were phased out from ships. Instead, the watch officers were expected to be trained to share the responsibility of the radio officer. In the engine room, I witnessed a reduction in the engine staff with the arrival of unmanned machinery spaces. The engine room and machinery spaces no longer required 24 hour attendance by a qualified engineer. The machinery spaces could be locked during the night and any malfunction or abnormality could be transmitted as an engine alarm to the engineer's accommodation.

The list is ongoing but it is interesting to note that the technological advancements resulted in mixed sentiments from most seafarers (including myself). The reduction in crew sizes on ships with the advent of new technologies was perhaps the issue most discussed by shipmates. Another common complaint we had was that although much of the traditional skills were no longer in practice with new technologies, these skills continued to be taught and tested as part of maritime training and certification. Nevertheless at the same time there was also a positive view that the management and operations have become far safer with new technologies. Most of us shared the opinion that new technologies were implemented for our own good with the aim to improve the safety of lives on ships.

Reflecting on my past experiences, many shipmates even discussed the impact of new technologies outside of work in their social lives at sea. During the earlier part of my seafaring career, many colleagues perceived seafaring as an 'adventurous' job that offered the unique opportunity to travel the world and enjoy long stays in foreign ports. But with containerisation and the fast turnaround of ships, port stays became only a matter of hours. There was hardly any time to step ashore except to make a quick telephone call home to family and friends (at that stage satellite communication on ship was comparatively expensive). The manning sizes on the ships were being reduced: in lieu of three or four cadets, at times there was only one cadet or none on our company ships because of shrinking accommodation sizes. Crew accommodation sizes were being purposely reduced to improve cargo capacities. Radio officers had disappeared from most ships and we as deck officers were expected to perform port formalities such as customs, immigration and quarantine clearance which had earlier been part of the radio officers' duties. During the latter part of my sea career I remember stepping ashore only twice during my entire tenure of duty. Seafaring was no longer about seeing foreign ports for many young recruits. Indeed arriving into ports became a nightmare for many because of the increased level of work during the stay in port. Many shipmates were starting to accept these profound changes as the new 'reality' of the shipping industry.

I finally gave up my seafaring career in the year 2005 and entered into academia to study international transport from a business perspective at Cardiff Business School. My particular interest was to learn more about global production and distribution and its impact on the shipping industry. I was starting to form an opinion that seafarers and their knowledge, skills and competencies to handle ships played an important role in the distribution of goods. Upon finding out that nearly 90 per cent of cargo by volume is carried by sea (UNCTAD, 2009) I felt strongly that the role of mariners was crucial in the facilitation of international trade. Moreover, reflecting on the developments so far I felt that future design and operation of ships were bound to become even more complex, thus raising the importance of seafarers and their skills even further in the transport and logistics of goods.

Shortly after finishing my post graduate studies at Cardiff Business School I was offered a PhD scholarship from the Nippon Foundation at the Seafarers International Research Centre. The first task that I faced was to turn my 'curiosity' into an academic study. I started by examining the importance of seafaring skills to international shipping, especially with the

recent advent and implementation of new technologies. I was interested in examining whether the future trajectory of technological advancement at sea would make the seafarers more or less important in global shipping and within the wider distribution network of international transport.

1.1 THE THEORETICAL FRAMEWORK OF THE THESIS

Social science was an entirely new discipline to me. My education and vocational training was technical and hence initially it was challenging to absorb the concepts and theories of 'science' which I admit did not come easy. Having read some introductory literature in social sciences I was fortunate to be led to Harry Braverman's thesis – Labour and Monopoly Capital – by my supervisor. This was fortunate, given my interest in examining skill issues in the maritime sector.

Braverman (1974) explained in his work the intentional deskilling of workers by the employers to maximise profits and enhance control in labour processes. Technology, according to Braverman, was a powerful instrument to enhance control over labour. Braverman's (1974) study, often termed as the deskilling thesis in social science literature, was based on an investigation of Frederick Winslow Taylor, an American mechanical engineer and a management consultant who popularised the idea of scientific management in the early twentieth century. Taylor's principles of scientific management consisted of a rigorous and scientific study of work, the use of scientific methods in the training and management of employees (rather than relying on intuitive knowledge of workers), fragmentation of work into discrete tasks through detailed instructions and supervision, and division of labour consisting of a clear distinction between those who manage work and those who actually perform the work.

But the underlying principles of the deskilling thesis are no different from Marx's antagonist relationship between capital and labour. Workers must always be strictly monitored, never trusted and their skills should be kept to a minimum in the labour process. The role of management according to Marx was to relocate the knowledge of workers into machinery. Once the knowledge and skills of workers can be reduced in the labour processes less skilled workers can be employed at cheaper rates thus reducing costs for the employers.

Having grasped an initial understanding of the deskilling thesis, I examined contrasting theories of technological changes that support the notion of upskilling. The upskilling thesis became particularly influential with the introduction of computer based technologies in work places. Towards the end of the 1970s Henry Ford's mass production was seen to be redundant with the rising demand for customised goods and increasing global competition especially from Japan and the South-East. The application of computer technologies in production systems introduced the possibility to customise the design and operation of products most suited to the needs of consumers. The shift from Ford's mass production towards flexible specialisation together with the wealth of information used in production strategies led many to believe that new technologies would increase the demand for educated and skilled workers (Piore and Sabel, 1984). Thus, it was argued that scientific education will be on the rise and highly educated workforce will be rewarded with better wages and employment conditions than their counterparts (Kerr *et al.*, 1962, Bell, 1974).

Increasingly the competitive position of industrial nations would be based on their power to innovate, requiring an increased level of education and skills amongst their citizens. Thus, it was posited that new technologies were central to individual and national prosperity. This theory questions the previous theories of crude deskilling and the exploitation of workers through management and technological control, raised by Braverman (1974) in his earlier work. The rise of the United States as a political and economic superpower was put down to the country's ability to advance new technologies and its educational policies that aimed to create a highly skilled workforce (Goldin and Katz, 2008).

Overall, the upskilling thesis presents a positive image of new technologies. While the workers enjoy better wages and employment conditions the nation as a whole experiences economic growth and prosperity. The deskilling thesis on the other hand suggests otherwise: technological advancements are aimed at serving the interests of the capitalist who owns and designs new technologies. The workers should never be allowed to rise above technology, and the manipulation and control of the skills of workers are essential for businesses to generate profits.

Being an Indian and having witnessed the country's recent economic growth, in large part due to an educated workforce, I found the arguments of the upskilling thesis plausible in many ways. At the same time with my seafaring background I found the deskilling thesis

equally persuasive and worthy of further investigation. I chose therefore to design the theoretical framework of the thesis based on a discussion between the upskilling and the deskilling thesis. This doctoral thesis is a qualitative enquiry aimed at understanding the business challenges and the underlying reasons to promote new technologies in work places from the employers' perspective. The business challenges combined with technological changes are bound to impact upon the nature of work and the workers who perform it. Thus, to obtain a comprehensive understanding of the impact of new technologies the thesis examines the views and perceptions of workers about the changing nature of work and skills.

1.2 THE MARITIME INDUSTRY

Besides personal interest, the empirical focus on the maritime sector was considered appropriate for the objectives of the study. The maritime industry, because of its close linkage with international trade, provides an appropriate ground for researching the dynamism of market competition (see figure below). The advancement of maritime technology has played a significant role in driving economic growth in the past two decades. Hoffman and Kumar (2002) have identified transport as one of the four cornerstones of globalisation; the others being trade liberalisation, telecommunications and international standardisation. Within the transport sector, sea transport has historically proved the most powerful and cost effective means to move goods especially over longer distances. The increase in international trade puts direct pressure on innovations in the maritime sector. One example to demonstrate the relationship between international trade and the pace of technological advancement in the maritime sector is the exponential growth of the container industry vis-à-vis trade liberalisation in the early 1990s (UNCTAD, 2009). Other examples of innovation include the proliferation of ships into different sizes and commodity types, sophisticated propulsion and steering mechanisms to facilitate manoeuvre in confined areas of traffic and congested waters, advanced navigation systems and cargo handling devices aimed at performing autonomous operations, and most importantly vast improvements in communication technologies leading to the 'death of physical distance' between ships and shore side offices.

Moreover, due to the growth in international trade maritime transport is no longer a standalone transport sector but an integral part of global production and distribution systems. This puts maritime transport in a paradoxical position. On the one hand, the management and operation of merchant ships is largely dictated by international trade policies and market trends (Sletmo, 2001); on the other hand, by virtue of their role in transporting goods and

facilitating global production the same ships acquire a privileged position in the smooth functioning of international trade (Marlow and Paixao, 2003). Maritime technologies thus play an important role not least for the operation of ships but also for 'seamless' integration of maritime transport within the so called global supply chain networks.

Figure 1.1   The significance of maritime transport for international trade (Source: UNCTAD, 2009)

Indices for world economic growth (GDP), OECD Industrial Production Index
and world seaborne trade (volume), 1994–2009
(1994 = 100)
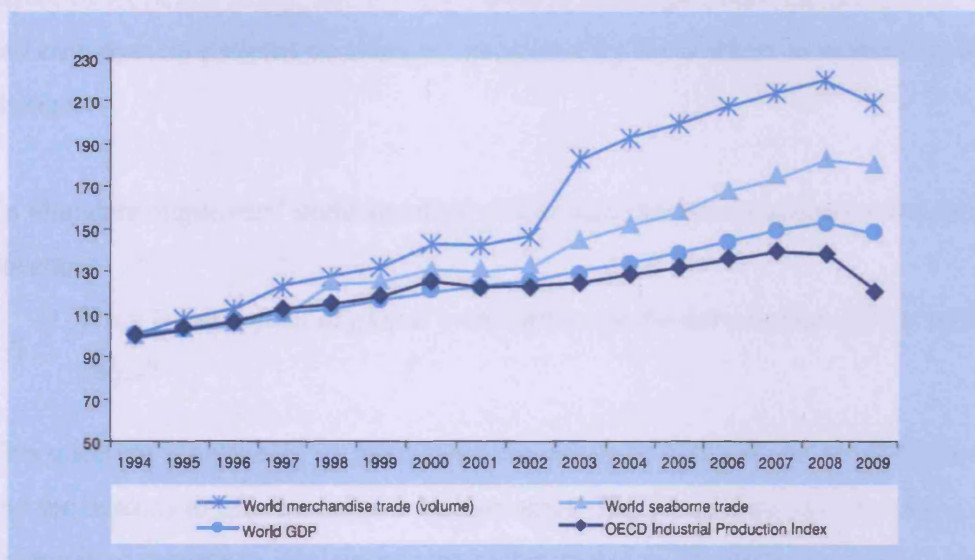
The above figure highlights the strong interdependence between industrial production, economic growth and the demand for maritime transport Source UNCTAD 2009

As in the case of the assimilation of maritime transport within global trade, the labour markets experienced structural changes. The shipping industry suffered significant economic losses as a result of the oil crisis during the 1970s. A number of shipping companies in the traditional maritime nations closed down operations. Others turned to alternative means of survival such as flagging out their fleets to tax havens (termed 'flags of convenience') and sourcing seafarers from new countries. Traditionally, the seafarers were mainly sourced from countries embedded in ship owning, ship operations and the supply of labour, but the opening up of global labour markets allowed ship owners to employ seafarers from non-established countries with very little or no connection with the shipping industry.

1.3 RESEARCH AIMS AND QUESTIONS

In the context of this study, the linkage between technological developments and the access of seafaring labour from non-established countries is of crucial importance. The existing literature suggests that new countries were seen as potential sources of seafarer supply because of the cost savings that could be made by sourcing labour in this way (Alderton *et al.,* 2004). An immediate question that arises here is how technology is being deployed in combination with access to low cost labour to achieve the competition objectives of employers. Furthermore, the introduction of technology is also bound to impact upon the nature of work and skills. The research aims to investigate how the changes to work, skills and employment patterns on ships are perceived by the workers as opposed to the actual changes.

To elucidate employers' understanding of this topic the thesis addresses the following question:

> *1) What is the impact of global competition on the introduction of new technologies on ships?*

This question is answered by examining the nature of competition, the business challenges and the reasons to implement new technologies. The focus is on understanding the competitive reasons to implement new technologies in line with the business challenges and requirements of shipping companies. The main themes of inquiry included the nature of competition in the maritime industry, the dominant reasons to implement new technologies on ships, the challenges faced by the employers as a result of implementing new technologies, the changing skill requirements, and the main factors informing the labour sourcing, training and employment strategies of shipping companies.

Similarly, to elucidate the understanding of seafarers the thesis raises the following question:

> *2) What are the implications of new technologies for work, skills and the professional identities of seafarers?*

This question was raised to examine the views of seafarers' about the changing nature of work and skills as a result of technological changes implemented by shipping companies. The themes of enquiry included the impact of new technologies on work and seafaring skills, the

benefits of and the challenges faced as a result of new technologies, and the views of seafarers about training, skills and the profession of the whole.

For the purpose of analysis and discussions the thesis compares the views and perceptions of employers and seafarers. More generally, the thesis provides evidence for and against the existing theories of technology.

1.4 OUTLINE OF THE CHAPTERS

Chapter 2 is a review of the existing theories of technology. The chapter entails a detailed description of the upskilling and the deskilling thesis and introduces the key concepts of each perspective in relation to the aims and objectives of this study. Nevertheless , considering that the two theories of technology emerged during the 1970s, the strengths and weaknesses of each one is examined in the current climate of global competition and the outsourcing of work to emerging and less developed economies.

There exists a vast literature about the changing demand for skills as a result of technological changes. While some have argued a general rise in education level of workers and the global access to skilled workers as evidence of the general trend towards upskilling of workers (Leitch, 2006, Acemoglu, 1998, Drucker, 1986), others question the relationship between the increased level of education and the employment conditions of workers. A recent study by Brown *et al.,* (2011) shows that there is no perceptible linkage between the education level of workers and the application of knowledge in work, let alone the employment conditions offered by the employers to the workers. These conflicting perspectives are critically assessed in this chapter. More importantly, the review pointed out that less is known about the workers' responses to new technologies and the changing nature of work and skills. This raises questions about the perceptions of workers and their identity as skilled professionals. The chapter ends with identifying the gaps in the literature for the purpose of investigation.

Given the empirical focus of the thesis on the maritime sector, Chapter 3 is specifically focused on a review of literature in the maritime sector. The chapter begins with an overview of technological changes in the maritime sector. It illustrates the impact of global production and the rise of competition in the shipping industry and shows the integration of maritime transport within global distribution networks. The review highlights the role of new technologies in enhancing the efficiencies, reliability and safety of ships. In doing so, the

review also includes a specific overview of shipboard technologies: navigation, communication and propulsion technologies at sea designed with the view to improve the safety and reliability of ship operations. The latter part of this chapter is dedicated to the outline of labour reforms within the maritime sector as a result of the globalisation of labour markets. Finally the chapter raises questions about the parallels between technological advancement and the globalisation of maritime labour markets. These questions are later answered through an empirical investigation of the maritime industry.

Chapter 4 discusses the methods of research. This chapter, unlike other chapters, is written in the first person as a reflection of my experiences during the fieldwork, analysis and write up. I saw this chapter as a particularly useful exercise in articulating the challenges of a practitioner carrying out academic research. The chapter outlines the research methods, research design, data sources, data analysis, ethical considerations and the issue of reflexivity mainly due to my involvement in the maritime industry for more than eleven years.

Chapter 5 presents the findings of market competition within the shipping industry and the dominant reasons to implement new technologies from the employers' perspective. This chapter examines the intense competition in the maritime sector and the employment and labour sourcing strategies employed by the shipping companies to reduce costs. The chapter elicits the views of the employers about the potential benefits and the challenges faced as a result of implementing new technologies. The chapter highlights the need for cost reduction in the maritime industry as a result of global competition and the resulting tensions between the ship and shore staff. It also presents the views of employers about the changing demand for skills and the potential benefits of using new technologies in crew training.

Chapter 6 also presents the findings but from the seafarers' perspective. It begins with an overview of the traditions, culture and work practices at sea that informs the seafaring identity. In this background the latter sections illustrate the changes to work, skills and seafaring identity as a result of technological advancements at sea. It also shows the responses of the seafarers to the globalisation of labour markets. In all, the chapter is a manifestation of the myriad views and perceptions of seafarers based on their professional identity and their experiences and challenges in working with new technologies.

The penultimate chapter is a comparison of the views of employers and seafarers for the purpose of discussion and analysis. In general, this chapter outlines the relationships between the rationalisation strategies of employers and the behaviour and attitude of the seafarers and their understanding of seafaring as a profession. Where possible, an attempt is made to relate to the broader concepts and theories both within and outside the maritime sector.

The final chapter answers the research questions raised in this chapter. This chapter summarises the discussion and the contribution of the thesis to the theories of technology. The later sections of this chapter outline policy recommendations and areas for future research.

CHAPTER 2   THE DESKILLING VERSUS UPSKILLING DEBATE: WORK, SKILLS AND IDENTITY

2.1   INTRODUCTION

This chapter reviews the implications of new technologies for work, skills and identity based on two dominant theories of technology in the social sciences. If examined from the viewpoint of the upskilling thesis, new technologies result in an increased demand for high skilled workers. The advocates of the upskilling thesis find uneducated and unskilled workers an impediment to the innovation and operation of new technologies and economic prosperity. In order that a company and country make progress it is argued that new technologies are of paramount importance. In return, the workers are allowed more discretion and responsibility in their work and enjoy improved wages and employment conditions. In contrast, however, the proponents of the deskilling thesis suggest that new technologies are used for obviating the workers and their skills in the labour processes. The dependence of capital on the knowledge and skills of labour is seen as a threat to the survival of capital. Both perspectives, as we shall see in this chapter, are supported by evidence and have acquired a recognised position in the existing literature.

The chapter begins with a detailed description of the deskilling thesis followed by the upskilling thesis. Given that both perspectives gained popularity about three decades ago the strengths and weaknesses of each approach will be assessed in the context of global competition in the following section. The main factors considered in the section include global competition, the need to introduce new technologies from the employers' perspective and the changing nature of work and skills. Finally, the competing theories of technology will be tested by examining the perceptions and views of workers about the changing nature of work, skills and the profession rather than relying on the actual changes in work places. The chapter ends by identifying the gaps in the literature and raising questions for further investigation.

2.2   THE DESKILLING THESIS

The starting point of the deskilling thesis is the underlying tension between labour and capital and the use of technology not least to increase productivity but also to exercise control over labour. The proponents of the deskilling thesis argue that the tacit knowledge and craft skills possessed by workers allow them a certain degree of discretion in the labour processes. In

other words, capital must surrender control to workers in order to generate production and profits. If the knowledge and skills of workers could, however, be captured through the use of technology this would allow the employers to enhance control over work processes and ultimately reduce the demand for skills.

To understand the need to enhance control over workers' knowledge and skills we need to go back to the technological advancements during the industrial era; the time when Britain led Europe and the rest of the world as the most powerful industrial power of its time. According to Jeremy (1977) at the time the two main strengths of the country were its technological know-how and the vast pool of skilled labour in major industries such as wool, steel, iron, brass and watch-making. For obvious reasons Britain was not willing to give away its competitive edge in these industries. To avoid a brain drain of skilled workers the government introduced a ban on the migration of skilled workforce to the outside world (Jeremy, 1977). To achieve competitiveness the alternative for other countries was to emulate the technologies of Britain. But realising their technological prowess Britain introduced another ban, this time on the export of 'tools and utensils', by introducing the 'Tools Act' of 1785 (Harris, 1998). By this time, however, it was clear to the rest of the world that technology was imperative for future economic development.

As with the availability of skilled labour, the economic historian Chang (2007) noticed that a major problem with the technologies of the industrial era was the embodiment of technology within the workers (p. 127). The term *embodiment* of technology was used to describe the social division of labour where skills and techniques were socially integrated between workers and their work. What a worker knew implicitly and intuitively was deemed important for a company's and country's progress. Nevertheless:

> "by the end of the century, the nature of game changed fundamentally with the increasing importance of disembodied knowledge – that is, knowledge that can be separated from the workers and machines that used to hold them. The development of science meant that a lot of – although not all – knowledge could be written down in a (scientific) language that could be understood by anyone with appropriate training. An engineer who understood the principles of physics and mechanics could reproduce a machine simply by looking at the technical drawings. Similarly, if a chemical formula could be acquired, medicines could be easily reproduced by trained chemists." (Chang 2007: 130)

With new technologies Chang (2007) argued that there was a shift towards 'disembodied knowledge'. The term disembodied knowledge was used to explain the shift from a worker's

specialist knowledge and craftsman's skills in the earlier social division of labour towards scientific and objective knowledge which could be comfortably divorced from technologies. The deskilling thesis suggests that the shift away from the embodied knowledge and craftsman skills towards disembodied knowledge was aimed at reducing the skills of workers to the extent that, if required, labour could be replaced by technology. Harry Braverman's thesis could be considered as the appropriate starting point to understand the deskilling thesis in further detail. Braverman's thesis was premised on the wider concepts of class struggle evident in Karl Marx's theories. Marx was of the view that the capitalist aim was not only to extract more surplus but also to exercise control over the working classes through the use of technology. According to Marx:

> "Machinery does not just act as a superior competitor to the worker, always on the point of making him superfluous. It is a power inimical to him, and capital proclaims this fact loudly and deliberately, as well as making use of it." (Marx, 1867: 562)

Braverman illustrates the relationship between technology and workers through Frederick W. Taylor's concept of Scientific Management, a management strategy aimed at a complete overhaul of the social relationship between technology and labour.

2.3   SCIENTIFIC MANAGEMENT

From a theoretical perspective the earlier proponents of a detailed division of labour included Adam Smith, Charles Babbage and Andrew Ure who sensed the need to adopt a highly structured approach to work. The high error rates in production encouraged the classical economists to examine ways in which human intervention could be reduced to a minimum. Charles Babbage, much known for the 'Babbage principle' in his classic *On the Economy of Machine and Manufacture*, examined an inherent problem with the division of labour. Babbage argued that much of the work assigned to high skilled workers could be comfortably re-allocated to labourers with lower skills through a detailed division of labour. Babbage recommended a strictly objective approach to the organisation of work aimed at reducing labour costs.

In practice, however, and nearly half a century later, it was the endeavours of the American mechanical engineer, Frederick Winslow Taylor, that the theory gained popularity in the management of work. During this period capital became increasingly concentrated and ownership transformed from family run businesses towards an entrepreneurship model. Taylor observed that the management of work could no longer be trusted to the workers

themselves. Taylor's idea was to conduct a systematic study of work using the rigours of science to intensify control over workers.

Even at that stage, control over workers was not new in the management of work. The evidence for disciplining workers, and surveillance and monitoring emerged long before the industrial revolution but Taylor was perhaps the first to redefine and revolutionise the notion of *control* using the tools of scientific management. Note that the term 'scientific management' should not be mistaken as an impartial scientific experiment aimed at improving our understanding of work. Rather, it was the introduction of the principles of objective science to serve the most important capitalist purpose: subordinating workers to the hands of management (Braverman 1974).

From an operational viewpoint the chief instruments of scientific management rested on the following three assumptions:

1) That the internalised knowledge and skills resident in the workers are of economic value to Capital;

2) That concentration of knowledge and intellectual skills should be placed in the hands of management;

3) That management and control of workers is essential to extract maximum surplus from labour.

Taylor found that gaining insight into the workers' specialised knowledge and their work practices, by recording their time and motion in factory work, could be used as a powerful business strategy to exploit labour power. If the tacit knowledge and trade secrets of workers could be made explicit in the scientific manuals then, Taylor found, there was tremendous scope to improve upon their work efficiencies.

Nevertheless, Taylor's ambitions were not limited to the advancement of technology or increasing productivity by recording the implicit and explicit knowledge of workers as Braverman (1974) writes:

> "As I have already pointed out, Taylor was not primarily concerned with the advance of technology ... He did make significant contributions to the technical knowledge of a machine-shop practice (high speed to steel, in particular), but these were chiefly by-products of his efforts to study this practice with an eye to systematizing and

classifying it. His concern was with the control of labor at any given level of technology..." (p.110)

Taylor's aim was to concentrate knowledge and skills, and shift control to the management through the use of technology. Once detailed information about work and work practices was obtained the next stage was to reconfigure the existing division of labour by separating the mental work from low skilled manual work. Braverman does not use the terms 'mental' and 'manual' work but rather replaces them with the conception and execution of work; the justification being that even mental work could be further sub-divided into cognitive thinking and menial tasks, and the management concern was mainly to limit the thinking abilities of labour. The responsibility for conception and planning was assigned to a small group of scientifically educated workers, mainly the engineers and designers involved in machinery design. Based on the ingenious design of machinery their job was to reconfigure the earlier social division of labour into a detailed division of labour. Once the intellect and brainpower could be concentrated and located within machinery the specialised skills possessed by the workers could then be simplified leaving them to perform dull, mundane and repetitive tasks.

The simplification of work was desirable, namely for the purposes of control and increased output in the labour processes. Less training and skills were required and hence cheaper, semi-skilled workers could be used instead of high skilled labour. The simplification of work was furthered towards the next stage of work reduction which meant some of the jobs earlier assigned to workers could now be performed using automated technologies. With this new division of labour the employer need not excessively depend upon the skills of workers, and at the same time "hire and fire" became easier without disrupting labour processes in production. In addition, the same technology could be used as a mechanism to enhance the surveillance of workers' activities.

The simplification of work had far-reaching consequences for workers. During the industrial era craftsmen were the primary managers of production. With their specialised knowledge workers were left to learn and improvise their tasks and use their knowledge and skills at their own discretion. But according to Braverman the reconfiguration of the social division of labour into detailed divisions resulted in the *degradation* of work. Concerning the separation between conception and execution of work, or in other words by limiting the cognitive abilities of workers, Braverman argued that work lost its humanist meaning:

"... in the setting of antagonistic social relations, of alienated labour, hand and brain become not just separated, but divided and hostile, and the human unity of hand and brain into its opposite, something less than a human." (p. 125)

The dehumanisation of work according to Braverman was used to reduce human beings to economic commodities in the labour processes. This new form of labour led to dissatisfaction amongst the workers, as the dull and repetitive work failed to stimulate the workers or engage their interest.

The deskilling thesis assumes a lack of trust between capital and labour. The need for management control over workers rested on the assumption that workers must never be trusted due to their 'natural laziness', a term used by Frederick Taylor. The underlying principle of capital accumulation was to reduce dependence on skilled labour.

The concepts of Taylorism (and the deskilling thesis) were particularly influential in the 1970s and early 1980s in the academic literature (Braverman, 1974, Blauner, 1964, Wallace and Kalleberg, 1982). Partly, this was because Fordist (mass) production strategies were widely adopted, at least in Britain and the United States. But the oil crisis of the 1970s and increased competition from Japan followed by South East Asian countries marked a decline in the popularity of the deskilling thesis. Mass production of goods through a detailed division of labour became uncompetitive in the face of global competition (Amin, 1994, Beynon and Nichols, 2006). The advent of computer based technologies in production strategies required flexibility and speed in the manufacturing and distribution of goods and services. The production techniques were shifting from mass production towards flexible specialisation. This according to Piore and Sabel (1984) placed a premium on the skills of workers. According to Heisig (2009), Braverman's detailed division of labour and crude deskilling was coming to an end in the face of post-Fordism where the workers would increasingly be rewarded for their skills. A formally educated workforce was required to optimise output using knowledge-based technologies for companies to remain competitive.

Technology has moved at a much more rapid pace in the past thirty years. It is claimed that whereas scientific management was mainly concerned with destroying the skills of the workers in order to gain control over labour processes, modern management strategies increasingly aim to exploit the skills of workers to improve productivity and competitiveness in a global economy. But in doing so, the conceptual tools of the deskilling thesis and more

generally the antagonist relationship between capital and labour still remains powerful, as we shall see in the next section.

2.4 DIGITAL TAYLORISM

There exists a vast body of literature to suggest that technological advances have placed a premium on the skills of workers. This discourse has gained even more popularity because of the rapid changes to technologies whereby the ability of workers to adjust swiftly with technological changes is considered a crucial asset by businesses. Schumpeter, however, suggested that the increases in wages and skills induced by new technologies are rarely permanent as they often result from innovative 'explosions'. In the past, steam engines and computer technologies resulted in a brief period of high wages for workers but this was only because the skills were not immediately available in the market. Perez (2002) called this pattern *techno-economic paradigm shifts* whereas Joseph Schumpeter labelled it as 'creative destruction'. Perez (2002) argues that for a while this *techno-economic paradigm* may appear to raise living standards but gradually with time these skills could be produced in large numbers through mass education and training with the view to reducing labour costs.

Digital Taylorism provides a vivid explanation of the tenuous linkage between new technologies and the 'increased demand' for skills. There is no doubt that innovative 'explosions' put a temporary onus on skills and discretion of workers but as technologies become more widely available in the market it gives rise to a new round of standardisation (Brown *et al.,* 2007). According to Brown *et al.,* (2007) therefore, a temporary rise in skills should not be mistaken for upskilling of workers. Indeed, it is an alternative route to deskilling by incorporating the knowledge and skills of workers in the intelligent designs of new technologies. How this is achieved is explained below.

Unlike the case of traditional scientific management, Digital Taylorism no longer considers the skills and knowledge of educated workers as threats to capital. Although the overall objective is to reduce the costs of operations, this new approach considers educated workers and their skills as a source of value addition. The availability of cheaper educated workers in competitive locations plays an important role here. The workers are encouraged to incorporate their knowledge and skills in the process of designing and operating new technologies. Their knowledge is captured, codified and standardised as an alternative strategy to reduce costs.

Since the starting point for modern management is still anchored in Frederick Taylor's idea of recording the implicit and explicit knowledge of workers and recording this knowledge into new (digital) technologies it is termed 'Digital Taylorism'.

> "If the twentieth century brought what can be described as mechanical Taylorism characterised by the Fordist production line, where the knowledge of craft workers was captured by management, codified and re-engineered in the shape of the moving assembly line, the twenty-first century is the age of digital Taylorism. This involves translating knowledge work into working knowledge, through the extraction, codification and digitisation of knowledge into software prescripts." (Brown *et al.*, 2007).

Brown *et al.*, (2007) suggest that digital technologies, by virtue of their complex design and operations, can be far more influential in reducing the need for intellectual work than preceding mechanical inventions. The engineering and brainwork involved in the design and construction of digital technologies facilitates task simplification and standardisation of work processes to the extent that less skilled workers with minimum training are able to perform the same jobs earlier assigned to high skilled workers.

The standardization of work processes as a means of deskilling and control has been discussed in the McDonaldization of work by George Ritzer (1998). But McDonaldization of work is rather limited to low skilled work such as in the case of fast food chains, the hotel industry and tourism sector to name a few. In contrast, Digital Taylorism focuses on the deskilling of high skilled jobs which previously demanded educated workers and where work processes were difficult to capture because of the unpredictable and uncertain nature of work.

The evidence for control over discretion in high skilled work has emerged in a number of studies. Simon Head (2003) in his book *The New Ruthless Economy* describes the use of digital technologies to explain 'skill debilitation' – a management strategy aimed at the codification and routinization of knowledge work particularly in high skilled jobs (p.10). Head examined the division of labour between the consultants and physicians in the U.S. health care management, with the former directed more towards understanding management skills where "knowledge of medicine is no more required of the health care consultant than knowledge of meatpacking is required of those having to sort out Burger King" (p. 123). In the case of physicians he observed that their autonomy and control in the treatment of patients was severely impeded by detailed guidelines and standards encrypted in databases

and manuals (p. 125). Using software prescription in contemporary health care practices Head (2003) argues that the prime motive was to remove the judgement and knowledge of physicians in the diagnosis and treatment of patients.

A recent study by Ehrbeck *et al.* (2010) suggests a case for Digital Taylorism:

> "Whenever possible, successful innovators use highly standardized operating procedures to minimize waste and improve the utilization of labor and assets. The use of standardized clinical protocols also raises the quality of care and facilitates the transfer of knowledge. In India, Aravind Eye Care System, which provides cataract operations to the blind and the near-blind, standardizes the entire end-to-end patient pathway—from initial diagnosis to surgery, recovery, and discharge—with ruthless efficiency. Also in India, Narayana Hrudayalaya hospitals can offer high-quality cardiac care at dramatically lower prices than its competitors because it employs a high-volume, highly standardized model of care. Both organizations use a form of production specialization (a factory-like approach to delivering care), borrowing process flow, management, and improvement techniques from manufacturing industries." (Ehrbeck *et al.* 2010, unnumbered)

According to Digital Taylorism although management control is essential for businesses to remain competitive:

> "… it is important not to emphasize control for its own sake as in Harry Braverman's classic study of Taylorism because it should be seen as the latest attempt to boost productivity and profit growth" (Brown *et al.*, 2011: 80).

The rationale for control is linked with cost and market competition and not so much with the *intention* to deskill the workers as illustrated in the quote above.

The convergence between scientific management and modern management based on Digital Taylorism is the inherent tension between creativity, control and commodification as pointed out originally by Karl Marx. The divergence occurs, however, as the result of the increased importance of knowledge and skills of workers as a source of competitiveness in modern management. Partly, this shift in thinking, in the case of the latter, arises from the availability of formally educated workers not least in developed nations but also in the developing countries where talent is available at relatively cheaper prices (Brown *et al.*, 2011). This is accompanied with the outsourcing and off-shoring of production and services, advancements in information, communication and transport technologies and global competition.

2.5 THE UPSKILLING THESIS

The importance of the embodied knowledge of workers during the industrial era highlighted earlier is worth revisiting in order to explain the ideological difference between the upskilling and the deskilling thesis. The proponents of the deskilling thesis begin from the positive view that the social division of labour entailed the employment of skilled workers during the industrial era. The detailed division of labour as a result of the disembodiment of knowledge from workers is seen as negative as it results in the deskilling of workers and the degradation of work. Conversely, the upskilling thesis suggests that the disembodiment of knowledge (and technology) from workers was essential to introducing the application of scientific and theoretical knowledge in production. From this perspective the disembodiment of knowledge resulted in the rise of scientific and formal education, the trend towards *upskilling* and the coming of a post industrial society (Bell, 1974).

The earlier work of Kerr *et al.*, (1962) followed by Daniel Bell's (1974) analysed the occupational shift from blue collar manufacturing towards white collar jobs in the US labour markets. They were both seen as influential studies promoting the idea of post industrial society and the general trends towards upskilling of workers. The central thrust of Daniel Bell's study was to explain the shift towards a post industrial era where innovation increasingly depends on scientific knowledge:

> "What is distinctive about the post-industrial society is the change in the character of knowledge itself. What has become necessary for the organisation of decisions and the direction of change is the centrality of theoretical knowledge – the primacy of theory over empiricism ..." (p. 20)

Whereas the deskilling thesis gave due importance to the specialised knowledge gained through experience, observation and on-the-job training, the upskilling thesis considers this knowledge of marginal importance in post industrial societies. The experiential and intuitive knowledge is rather replaced with the theoretical and scientific knowledge gained through formal education and training.

The upskilling process was enhanced by advances in intellectual technologies' based on the rigours of theoretical and scientific knowledge (Bell, 1974). According to Bell (1974) the rise of intellectual technologies resulted in major social transformations. Contrary to the antagonist relations between capital and labour in the industrial era, the new forms of work demanded more co-operative production relations in the new division of labour. For J.K

Galbraith (1962) it was the 'death of entrepreneurship' and the beginning of 'techno-structure' in Capitalist societies (Galbraith, 1962: 212). Bell (1974) elucidates this further by describing it as the beginning of a "technetronic age", a society which would be ruled by technocrats and "will require more societal guidance [and] more expertise" (p. 212).

The upskilling thesis accepts task fragmentation as a necessary element of the division of labour. Nevertheless, it was argued that as work processes are fragmented into simplified tasks the machines take over the repetitive work while the workers move towards furthering innovations:

> "Skills are broken into simpler components, and the artisan of the past is replaced by two new figures – the engineer, who is responsible for the layout and flow of work, and the semi-skilled worker, the human cog between machines – until the technical ingenuity of the engineer creates a new machine which replaces him as well." (Bell, 1974: 127)

The narrowing down of the activities of workers is linked with the notion of highly specialised discrete tasks and the co-ordination and management of discrete and complementary functions. The competitive advantage of businesses is based on the ability to analyse and synthesise the complex information flows between departments and workers. Interestingly, Bell pays equal attention to the technical character of scientific knowledge (mathematics, science and engineering) and at the same time the ability to co-ordinate this knowledge (economics and management science) to make rational judgements which thus underpin the demand for both management and technical skills in post industrial societies (p. 274).

The upskilling thesis raised the merits of responsibility and discretion for workers because of the complex nature of work. Since work processes could be physically isolated from planning and control, the new division of labour raised the importance of management and planning skills. Business performances were increasingly dependent upon the optimization of resources with least cost and effort. The ability to exploit information-based technologies to drive efficiencies and profitability raised the importance of workers in production. There was exponential scope to add value in the process of turning raw materials into end products if the intuitive judgements and tacit knowledge of workers could be replaced with informed decisions based on rational knowledge and the language of 'algorithms (problem-solving rules)' (Bell, 1974: 29).

The entire approach to work became scientific, critical, driven by rational choices of algorithms and calculus and 'away from traditional view of aesthetic, intuitive views' (p. 349).

> "The technical intelligentsia must learn to question the often unanalysed assumptions about efficiency and rationality which underlie the technique." (Bell, 1974: 374)

The shift towards high skilled production and services in post industrial societies was linked with the upskilling of workers resulting in higher wages, employment conditions and improved living standards for workers.

> "By producing more goods at less cost, technology has been the chief engine of raising the living standards of the world. The achievement of technology, the late Joseph Schumpeter was fond of saying, was that it brought the price of silk stockings within the reach of every shopgirl, as well as of a queen. But technology has not only been the means of raising the merits of raising levels of living, it has been the chief mechanism of reducing inequality within Western Society." (Bell, 1974: 188-89)

The upskilling thesis suggests that the knowledge and skills of workers is a dominant source of productivity and prosperity not only for individuals but also for national prosperity as technology bridges the gap between the poor and the rich. It is obvious from the claims of the upskilling thesis that technological, social and economic progress increases the demand for skilled workers. Economists use this hypothesis as the basis for substantiating a case for *skill biased* technologies (Katz and Goldin, 2008). The proponents of skill biased technologies draw an optimistic assessment about technological changes and its implications for skill. It is argued that technological advancements are bound to generate an increased demand for skills (Nelson and Winter, 1982, Piva et al., 2005).

The claims of skill biased technologies have been substantiated in a number of studies particularly those claiming chronic shortage of high skill professionals (Kerr *et al.,* 1962). It is claimed that as technological advancement increases, so does the demand for scientific education and technically skilled professionals. During the dotcom boom in the 1990s Acemoglu (1998) saw the relationship between skills and technology as 'complementary'. As businesses made exponential gains because of the proliferation of information and communication technologies Acemoglu (1998) argued that it was mainly as a result of the increased number of skilled workers in the United States.

"When there are more skilled workers, the markets for technologies that compliment skills is larger, and hence more of them will be invented, and new technologies will be complimentary to skills." (Acemoglu, 1998: 1082)

According to the skill bias theory there is persuasive theoretical and empirical evidence to suggest that any improvements in the workers' skills correspond to increased productivity and profits for companies (Nelson and Winter, 1982, Piva *et al.*, 2005, Acemoglu, 1998). The emphasis, though largely technical, is on increasing the skills of workers through training, retraining and higher education which reflect in the national policies of many countries.

2.5.1 POLICY IMPLICATIONS OF THE UPSKILLING THESIS

The upskilling thesis and the claim that new technologies exhibit skill bias have attracted much attention in the policy and political arena. In the words of Stephen Uden, Microsoft's head of skills and economic affairs, 'IT now accounts for half the rise in EU productivity and has contributed to more than a quarter of EU GDP growth. In today's world, IT not only helps us live our lives – it's also the backbone of our prosperity. Furthermore, it offers huge employment opportunities for workers across the world following the most job-destroying recession since the 1930s' (Uden, 2010).

The policy and academic debates have claimed that future technologies will create more jobs and at the same time demand more technical skills. The EU, the World Bank and various other international agencies have consistently warned of a severe shortage of technical skills in the future, specifically due to the changing landscapes of production and the emergence of developing countries as new sources of capital accumulation and consumption. In the European Commission various studies have put GDP and information and communication technologies (ICT) at the centre of the policy agendas to promote 'e-skills' (ICT skills) as careers for the future. A recent report in the European Conference focusing at developing e-skills stated:

> "... once the economy recovers, demand for e-skills will again reach beyond supply in most scenarios ... Even though the most negative scenarios do show oversupply of ICT professionals for a few upcoming years, it is still less than the oversupply of other occupations ... Even during the recession there is demand for education, but the right kind of education. Higher skills are needed more. In addition to technical skills, critical thinking and collaboration are important for 21st century, and people need to be able to deploy them in technological environments." (Ala-Mutka, 2009: 8)

Numerous policy papers examined the importance of ICT skills and its implications for regional and national prosperity (Korte *et al.,* 2007, Selhofer, 2009, Kolding *et al.,* 2009). One such policy research examining the current situation and the future demand for skills in the EU labour markets stated:

> "The main expectations are to identify and recommend appropriate financial and fiscal incentives for Europe related to e-skills training, in order to improve the e-skills of the European workforce (with a focus on ICT practitioners), and to reduce e-skills shortages, gaps and mismatches." (Korte *et al.,* 2010: 13)

The paper concludes:

> "The role of national policies and European policy are ... critical, both to sustain innovation investments and to make sure that e-skills shortages do not become a bottleneck for innovative enterprises and organisations in the private and public sector. Appropriate responses could include awareness-raising activities at European and national level and the improvement of ICT education quality along the lines set out in this study." (Korte *et al.,* 2010: 13)

Likewise, in the case of many emerging economies and least developed countries (LDCs) the education policies are now shifting focus to address the 'shortage' of technical skills. As the Information Economy Report states:

> "There is no way around proper ICT education and training if governments wish their companies to be competitive and connected to the global economy. Many developing countries, and especially LDCs, still lack the necessary capacity to take advantage of ICTs and should make the development of human resources a priority. People with ICT training generally have a higher chance of finding employment and can help companies and countries participate better in the knowledge-based economy. Governments can enhance digital literacy by using the basic education system, beginning at primary school level, as well as by emphasizing lifelong learning through adult training programmes." (Fredriksson, 2009: 57)

Even though Bell's thesis was centred on the US alone, when today's emerging countries boast their GDP increases and economic prosperity based on their technical abilities, it is salutary to consider Bell's futuristic vision of post industrial societies.

2.6 THE STRENGTHS AND WEAKNESSES OF THE UPSKILLING AND THE DESKILLING THESIS

This section reviews the strengths and weaknesses of the upskilling and deskilling thesis. Our previous discussion raises several questions which will be dealt with in this section. The concepts and assumptions used in the upskilling and deskilling theses were primarily drawn on the basis of the (mechanical) technologies of the past. It does not take into account the

introduction of new computer-based technologies and its impact on work and skills in the past two decades. This will be dealt with in the first section. The second section examines the claims of the deskilling thesis within the context of global competition. This section also raises questions about the underlying assumptions of the upskilling thesis. To begin with, the claims that new technologies demand higher skills will be assessed in the light of the emerging literature which illustrates the trends towards outsourcing and off-shoring of jobs from developed countries towards emerging economies. Next in this section, the hypothesis that new technologies create a positive impact on the general employment conditions of workers will be examined. The third section presents a critical perspective of the deskilling thesis and aims to understand the meaning of the terms *deskilling* of workers and the *degradation* of work based on the theoretical framework of this approach. The fourth section presents a critique of the limitations of the deskilling thesis outlined in the previous section and attempts to explore the understanding of workers about technology, work and skills from wider perspectives.

2.6.1 NEW TECHNOLOGIES: SKILL ENHANCING OR LABOUR DISPLACING?

During the 1980s the relationship between technological advancements and the demand for highly skilled workers became a contested issue in the literature with the advancement of computer technologies. Shoshana Zuboff (1988) suggests in her book *In the Age of the Smart Machine* that automating tasks should balance with 'informating' the workers. Zuboff (1988) argued that as organisations moved from bureaucratic centralised management towards decentralised operations fast thinking workers with the ability to make informed decisions were required at all levels of organisations. As work became increasingly intellectual and challenging, the workers were exposed to higher level of information. Zuboff saw the introduction of computer technologies as a strong reason for upskilling the workforce to meet the changing demand of work and skills.

The introduction of computers and information based technologies has played an important role in production strategies. Global sourcing and the pressure to optimise resources forced production systems through significant overhaul. The warehouses were no longer required to stock inventories 'just-in-case' as the businesses shifted to 'just-in-time' production to reduce costs and minimise financial liabilities. The production systems became increasingly fragile as mass production was no longer a viable production strategy in certain industries highly contingent upon the rapidly changing consumption patterns. An alternative production

strategy, termed as 'mass customization', was deployed in such sectors (automobile, apparel, electronics and communication technologies etc.) to adapt with uncertain market conditions.

The management guru Tom Peters (1989) explains this approach further in his book *Thriving on Chaos*. Peters (1989) proposed a flexible internal approach to the organisation and management of work to exploit the benefits of external market conditions (Peters, 1989). Pursuing Zuboff's (1988) argument, Peters (1989) supported the merits of increasing the autonomy and responsibility of workers in response to market competition. Peters (1989) claimed that business decisions should be increasingly based on information based technologies both at tactical and strategic level. Leadbeater (1999) suggested that the use of information based technologies in post industrial production demanded the "smartest people" to make effective decisions (p. 42). Brint (2001) cautioned that since decision making is central to post industrial work the companies should be careful in selecting their employees as 'not all people are capable of mastering disciplines that are innately demanding" (p.114). This raised the demand for formally educated professionals and technically skilled workers. Even with limited training these workers were capable of performing diverse tasks with the objective to manipulate and translate market uncertainty into competitive advantage for businesses. In the bargain to forecast and manipulate the future, the role of information based technologies became increasingly important for business success. It was claimed that whilst the mundane and repetitive work was absorbed by automated technologies, the workers were increasingly exposed to the challenges of intellectual tasks.

Goldin and Katz (2008) argue that the level of skills involved in the innovation and successful operation of new technologies has increased the importance of education and 'innate abilities' of workers (p. 90). The authors state that 'Young workers are often better able to master new-fangled equipment than are older individuals' (p. 90). The employers express the desire to employ workers with the capability to exploit information to improve the competitive advantage of businesses. The authors claim that those finding it difficult to adapt with technological changes and the changing forms of work may face impediments in career progression and their employability remains at stake, as the choices for jobs demanding alternative skills are limited (Goldin and Katz, 2008). If we examine the policy literature discussed earlier in the section – skill biased technologies – it appears that business strategies and national education and training policies coincide with Zuboff's (1988)

argument and focus on increasing the level of education of workers. After all, technological advancements provided a strong basis for economic growth in most developed countries.

If the upskilling thesis posits a positive view, the deskilling thesis on the other hand highlights the negative aspects of computer based technologies. Through much of history, the labour saving characteristics of new technologies and its implications for work and employment have been widely contested originally by Karl Marx and later by many scholars including Braverman (1974), Blauner (1964), Harvey (2010), and Brown *et al.*, (2011). Marx himself was of the view that 'revolutionary' technological changes in future will increasingly endeavour at putting people out of work. According to Marx, new technology aimed at intensifying unemployment rates is essential to the survival of capitalism as it invigorates insecurity in society. More importantly, this surplus labour in what Marx (1867) refers to as a 'disposable industrial reserve army' helps to maintain a check on labour wages:

> "... this surplus-population becomes, conversely, the lever of capitalist accumulation, nay, a condition of existence of the capitalist mode of production. It forms a disposable industrial reserve army, that belongs to capital quite as absolutely as if the latter had bred it at its own cost". (Marx, 1867: 693)

Sennett (1998) describes the implications of new technologies further through the analogy of 'user-friendly' technologies at work; in other words easy- to-use equipment. On the one hand immense intellect, engineering and brainwork are required to locate brainpower in the remote controlled operations and ingenious designs of new technology. On the other hand work is simplified and reduced to the extent that it can be performed through a combination of automated technologies and semi-skilled labour.

The simplification of work allows businesses to remove discretion from labour processes. The knowledge and skills of workers are no longer of primary concern for businesses. Apart from the ability to replace high skilled workers with low waged semi-skilled workers employers also use this as an opportunity to replace high skilled-high waged workers with highly skilled workers at lower wages in domestic as well as international markets. In other cases, as discussed in the section Digital Taylorism, the availability of high skilled workers at relatively low costs is used as the opportunity to improve the productivity and quality standards by capturing, recording and codifying the knowledge and skills of these workers in the existing work processes (Brown *et al.*, 2011).

Work simplification reduces the demand for skills and leads to mass unemployment, job insecurity and polarisation of wealth and skills in labour markets (Sennett, 1998, Webster *et al.*, 2008, Magdoff and Magdoff, 2004). Harvey (2010) suggests that more jobs are lost as the result of labour saving and skill replacing technologies even though the tendency in the literature has been to blame alternative business strategies such as outsourcing and off-shoring and other forms of spatial re-organisation of work.

The analysis shows conflicting perspectives about skill demands based on the design and operation of new technologies. The upskilling thesis suggests that the nature of work is bound to turn complex if more output and productivity is desired from lesser input. The complex work processes driven by uncertainty and market efficiencies require highly skilled technical and professional workers. These claims have also been substantiated in the national skills policies of many countries as we saw earlier in the section – policy implications of the upskilling thesis. The deskilling thesis on the other hand, although acknowledging the complex design of new technologies, uses new technology as the basis to reject the notion of excessive demand for skills. This is based on the concentration of high skilled work for a handful of workers, alongside task simplification for a majority of workers, allowing businesses to bring down labour costs.

2.6.1.1   DESKILLING, UPSKILLING OR RESKILLING
A vast body of literature focused on technological and organizational changes has argued that simply using the term 'upskilling' and 'deskilling' to elucidate the implications of new technologies could oversimplify the complex changes associated with work organisation and skills. Gallie (1991) found that although there was evidence to suggest deskilling, in many occupational structures there was also an expansion of high skilled jobs thus marking the polarisation of skills. Thus, with the introduction of new technologies there were both winners and losers in the labour markets (see also Milkman and Pullman, 1991).

Others including Wood (1982) and Hirschhorn (1984) suggested that the notion of deskilling was excessively engaged with the specialist knowledge and craftsman skills of workers. In this respect, it failed to capture the changing skill requirements of computer based technologies. Wood (1982) argued that the shift from manual skills and experiential knowledge towards more abstract skills and theoretical knowledge does not necessarily result in the deskilling of workforce. It may simply be a case of *reskilling* the workforce to adapt

with technological changes and the new forms of work (see also Adler, 1992, Zuboff, 1988). Similarly, according to Piore and Sabel (1984) certain aspects of craft skills were still required irrespective of the technological advances.

Studies aimed at examining the workers perspective also appeared critical about the term 'deskilling' and 'upskilling'. According to Cockburn (1983) whether technology leads to upskilling or deskilling of workers was largely dependent on the perceptions and subjective experiences of workers, which Braverman (1974) appears not to have focused in his thesis.

2.6.2 THE INTRODUCTION OF NEW TECHNOLOGIES AND ITS IMPLICATIONS ON WORK ORGANIZATION AND SKILLS

According to some studies neither the reasons to adopt new technologies nor the resulting changes to work organization and skills were objectively determined (Kline and Pinch, 1999, Bijker and Pinch, 1987, Wilkinson, 1983, MacKenzie and Wajcman, 1999). In the United States historians and economists argued that the reasons to implement new technologies were primarily to overcome the conflict between employers and workers through management control over labour processes (Zimbalist, 1979, Edwards, 1979). The assumption that new technologies were promoted as a rational response to competitive pressure was rejected by these authors. According to Wilkinson (1983) it was the values and interests of the designers, engineers and workers that influenced the reasons to implement new technologies and its impact on work organization and skills. These claims were further investigated and confirmed by McLoughlin and Clark (1994) who argued that the reasons to introduce new technologies in workplaces extended beyond the rational response to commercial and technical pressure. In most cases, technological changes 'involved a process of choice and negotiation which, within certain constraints, offers scope for managers, unions and workforce to play a significant role in determining whether changes occur at all, and if it does, how it is implemented and what its outcomes are' (McLoughlin and Clark, 1994: 4).

The research on new technologies and the changes to work organization and skills progressed significantly at least until the past two decades. However, in the past few years, few studies have attempted to examine the reasons to implement new technologies particularly in the context of the opportunities and challenges of globalization. The nature of competition and the actual reasons to implement new technologies may change for reasons including rationalisation of costs, the availability of skills in competitive locations and the regulatory

and institutional differences across different geographic locations. Under such circumstances the drivers to promote new technologies and the resulting demand for skills may not be the same as it was in the pre-globalization era.

2.6.3 NEW TECHNOLOGIES AND THE DEMAND FOR SKILLS IN THE GLOBAL CONTEXT

From the upskilling perspective it is argued that post-industrial societies will increasingly be involved in technological advancements which will drive the demand for higher skills. This is not unsurprising if we examine the economic growth in most developed countries and draw comparisons with the past. In the present context, however, the relationship between technological advancements and the increased demand for high skilled jobs calls for careful assessment.

These claims were originally based on an assessment of the US labour markets. The earlier proponents of the upskilling thesis did not contemplate the lifting of trade barriers and the access to international labour markets to the extent that it would override concerns about living standards in the Western society.

The globalisation literature shows that in many cases market competition is played out through the spatial re-organization of work (Harvey, 2000, Harvey, 2005, Gereffi et al., 2005, Reinert, 2008, Bordogna and Perdisini, 1999, Taylor and Bain, 2005). The comparative advantage of shifting jobs from high-waged unionised nations in Europe and US to low waged non-unionised countries allows businesses to operate with a greater degree of flexibility. Past literature suggests that the employers were particularly keen on outsourcing low skilled jobs such as call centre work and administrative tasks to these low waged countries whilst maintaining their core activities such as research and development in home countries (Hirst and Thompson, 1999). It was argued that the new international division of labour in global production and services would create employment opportunities for workers in the developing countries and would make everyone better off at least in relative terms.

The deskilling thesis rejects such claims and suggests that the international division of labour between the economically prosperous North and the less developed South intensifies unemployment in the Southern economies. Based on criticism of Ricardo's comparative theories Reinert (2008) argued that the outsourcing of work was available to poorer countries

only when the maximum potential of innovation was exploited in rich countries and when no more knowledge gains could be squeezed to create further value. Technology according to Reinert (2008) in this international division of labour enhances poverty and unemployment thus making poor countries even poorer.

Both claims however call for careful assessment in the light of intense market competition. Post-recession literature clearly indicates that market competition is a major impetus for businesses to remain competitive. Within the market context the assumption that only low skill jobs will be outsourced lacks any semblance of balance and strength (Brown *et al.,* 2011). Both cost and quality are equally important determinant factors in the relocation of jobs to new locations, as argued by Wadhwa *et al.,* (2010, 2008) in their research in the pharmaceutical sector. Although in the past the firms were mainly keen to outsource low skilled work, recent trends show that many firms are now shifting their core activities to emerging countries to reduce their costs (Jasso *et al.,* 2010). For instance Project Bio-pharm 2020, a research project at the University of Nottingham, is an attempt by the UK Government to retain Indian clients within the high valued pharmaceutical chains. The recent trend indicates that pharmaceutical companies in India are relocating their high skilled R&D activities to China rather than the UK in order to reduce their operational costs and remain competitive (Pawar and Shakesheff, 2010).

In retrospect, however, it is difficult to comment if the business choices are driven primarily by cost issues or search for better talent. In the pharmaceutical industry and finance sector both Gupta (2006) and Wadhwa *et al.,* (2008) suggest that the choices of the firms are mainly influenced by the demand for talent resulting from the shortage of skilled workers in developed countries. In recent years both China and India have emerged as strong bases for research and development due to their increasing desire to compete at the higher end of value chains. Wadhwa *et al.,* (2008) suggest that even though labour costs in the two countries have increased significantly (in relation to other countries in the region), companies still express their willingness to source skilled workers from these countries because of their potential for supplying a technically educated workforce.

2.6.4 NEW TECHNOLOGIES: TOWARDS HIGH SKILL – HIGH WAGED WORK?

The upskilling thesis is based on the idea that individual prosperity will continue to improve based on technological advancements. It is assumed that the workers will continue to obtain

higher wages and improved employment conditions based on their abilities to perform high skilled operations. These claims, unfortunately, fail to consider the impact of intense market competition and the rationalisation of costs resulting in shifting jobs to competitive locations, particularly evident in post-recession literature. Its implications for workers in developed countries appear detrimental as a number of highly skilled professionals face redundancies, lower wages and depreciated employment conditions when competing with low cost labour in the international markets. In a business article McDougall (2009) discusses the fate of American IT professionals facing redundancies vis-à-vis IBM's restructuring strategies aimed at saving labour costs by relocating high skilled jobs to emerging countries:

> "Under a program called Project Match, IBM will help workers laid off from domestic sites obtain travel and visa assistance for countries in which Big Blue has openings. Mostly that's developing markets like India, China, and Brazil." (McDougall, 2009, unnumbered)

The article states that further:

> "... the program is limited to "satisfactory performers who have been notified of separation from IBM US or Canada and are willing to work on local terms and conditions." The latter indicates that workers will be paid according to prevailing norms in the countries to which they relocate. In many cases, that could be substantially less than what they earned in North America." (McDougall, 2009, unnumbered)

Even more alarming are the consequences of technology led outsourcing of work for countries with weak institutional and labour regulations. Bordogna and Pedersini (1999) using space competition theories demonstrate the magnitude of casualisation and intensification of work in the white goods industry in Romania which they argue could not have been achieved in the regulated economies of Europe and US. Some scholars argue that in countries where labour reforms are tenuous the effects of technological innovations may be even more severe for the workers. Cimoli and Katz (2003) demonstrate the deskilling effect of new technologies in the Argentine automotive sector through the case of highly educated Argentine engineers employed in low skilled jobs and in turn offered low wages. The same is also true if one examines the case of Russian scientists offered jobs in tourist information centres and a large number of graduates working in call centres in India and the Philippines. In extreme cases this international division of labour and the absence of state intervention results in serious abuses of workers' rights and the safety issues in their work conditions. There are widespread assertions and anecdotes of workers committing suicide in Southern China in knowledge based work. A recent article on the electronics company Foxconn

Technology supplying components to Apple, Dell and Hewlett Packard shows that the workers in the company were heavily underpaid, over-worked and their work environment was below any definition of 'acceptable conditions'(Barboza, 2010).

The upskilling thesis shows some degree of caution in claiming any broader generalization of new technologies and its positive impact on the wages and employment conditions of workers. According to Daniel Bell (1974) the impact of technological innovations on the work, skills and employment of the workers may vary significantly between technology-producing and technology-using industries. The industries focused on knowledge creation, (generally the research and development units) result in more favourable employment conditions for the workers when compared with industries where knowledge is merely applied in the production of goods and services.

Within the technology using sectors, however, the upskilling thesis makes no attempt to elucidate the differences between high-tech innovation industries and those simply aimed at innovating processes, thereby creating serious differences on the demand for skills and employment. Reinert (2008) argues that it is the nature of competition and the institutional context within which new technologies are located which explains its myriad implications for the wages and employment conditions of workers. He comments:

> "Innovations are generally divided into two categories. Microsoft products provide product innovation, produced under huge increasing returns, huge barriers to entry, huge profits, and an ability to pay high wages. This same innovation hits the hotel industry in Venice as a process innovation, affecting how people book hotels. More perfect information available on the net increases price competition among hotels in Venice and puts pressure on the ability to pay higher wages ... While IT increases wages around Microsoft's headquarters, the same technology puts downward pressure on the wages of air hostesses in Europe." (Reinert, 2008: 188)

Reinert's (2008) distinction between product innovation and process innovation suggests that new technologies create diverse impact across different work sectors and understanding the nature of competition is crucial at the outset. In areas of work safeguarded by intellectual property rights, characterised by higher investment returns and imperfect competition the wage and general employment effects of new technologies may be significantly different from the industries driven by intense market competition.

Intense market competition, globalisation of labour markets and the relentless drive to search for competitive locations to source workers raise questions about the assertion that new technologies result in increased demand for skills, improved wages and employment conditions (as claimed by the proponents of the upskilling thesis). If this is the case, high skilled workers in developed economies such as the United States should experience improved working conditions. However, evidence from existing literature suggests that America is losing its competitive advantage particularly in the service sector (Goldin and Katz, 2008).

On the other hand the theories of space competition, based on the notion that whilst high skilled jobs could be limited to developed economies low-waged and low skilled jobs could be outsourced to emerging countries, fail to capture the emerging trends towards outsourcing high-skilled work to emerging countries due to cost, quality and availability of skilled workers. Clearly a more vivid explanation is required to explain these trends driven by global competition, regulatory reforms and the advances in new technologies.

2.6.5 THE DESKILLING OF WORKERS: A CRITICAL PERSPECTIVE

The deskilling of workers by introducing technology in work is supported by many scholars of technology who argue that class domination was intrinsic to the construction, design and implementation of technology (Bijker *et al.*, 1987, MacKenzie and Wajcman, 1999, Wajcman, 2002). According to these scholars it is not so much about profitability but rather the motives of domination and oppression which appear in almost every aspect of work and life in the capitalist societies. To that end the role of technology is no different from other instruments of class domination. Some even argue that for the capitalists the issue of efficiency and productivity was only secondary to domination and control over labour processes. Winner (1999) writes:

> "If we suppose new technologies are introduced to achieve increased efficiency, the history of technological change shows that we will sometimes be disappointed. Technological change expresses a panoply of human motive, not the least of which is the desire of some to have dominion over others, even though it may require an occasional sacrifice of cost-cutting and some violence to the norm of getting more for less." (Winner, 1999: 31)

But for others the underlying intention to use technology with the view to 'deskill' workers and as a means to intensify control over labour processes appears a simplistic explanation that lacked the rigours of empirical evidence. The deeper problem arises due to the 'prescriptive'

methods used by Braverman in his scientific approach to the study of work. Many scholars saw his methods more as 'quotations from scientific management manuals' based on mathematical observations rather than any real description of workplaces and work practices (Lockwood, 1985: 221, Simpson, 1989). Lockwood suggests that, at times, Braverman's analysis seems like a desperate attempt to illustrate how the work *should* be arranged rather than paying actual attention to work practices. Such an approach to simplify work by allocating the brain work to technology is based on the notion of treating labour as a commodity in the capitalist modes of production. It is based on the assumption that, if required, labour can be interchanged with technology (or less skilled workers).

Such an assumption is criticized for not taking into account the workers' understanding, their resistance and subjective responses to the changing forms of work (although according to the proponents of the deskilling thesis the underlying intention of scientific management was to overcome workers' resistance by examining their behaviour and attitude through the use of surveillance mechanisms).

For many scholars the attempt to turn labour merely into a commodity still remains a challenge and in many ways the most difficult job for capital (Harvey, 2010). Even where it can be achieved it is bound to counter effects and resistance from workers in one way or another. A classic example in history is the famous Luddite Movement in England in the eighteenth century where the workers were coercively made redundant through the use of labour saving technologies. Shortly upon discovering this threat to their jobs the workers took sabotaged and destroyed the machineries and plants in the factories (Thompson, 1991).

The Luddite movement was an extreme example of resistance by the working classes. In most instances such crude form of resistance may not show in the behaviour of the workers. Nonetheless as Harvey (2010) suggests, resistance of the workers need not always take such crude forms. The issue of subtle forms of resistance, both passive and subjective dimensions, ignored in Braverman's labour processes, has been brought to light in many studies in the form of absenteeism, sickness, stress, anxiety, slow working and lower output resulting from increased surveillance and monitoring at work (Ritzer, 1998, Milkman, 1998, Sawchuk, 2006, Baldry *et al.*, 1998, Greenbaum, 1998, Berardi, 2009).

Even where resistance appears missing at the surface level, it cannot be assumed that technology and the new forms of work have been willingly internalised by the workers. Various left wing scholars such as Mario Tronti and Antonio Negri suggest that the dissolution of organised labour unions has left the collective power of workers impotent against capital. Implicitly or explicitly these workers accept their subservience to machinery. But as Berardi (2009) suggests in his book *Soul at Work* in such cases the impact of technological change is observed at an even deeper level as workers take voluntary overtime at work and anti-depressants to cope with the unending pressure of productivity targets and arduous deadlines to maintain their employability. Berardi's (2009) study forces us to look beyond the obvious traits and resistant behaviours apparent at the surface level in work places. Even where the employees seem contented with technological changes it is important to understand the underlying reasons for their consenting behaviours.

Another limitation of deskilling thesis is the conception of skills within the confines of work and workplaces. Degradation of work is implicitly linked with workers' tacit knowledge and the control over a worker's knowledge. It makes perfect sense therefore that once the workers are stripped of their cognitive capacity it would automatically result in the degradation of work and deskilling. This conceptual drawback arises because of a broader problem with Marxian sociology and Braverman's explanation of labour processes. In Marxist theories the term labour is often treated in economic terms at times inter-changeable with capital (machinery) rather than labour as a social entity. Simpson (1989) argues that such shifts in discourses were constructed sometime in the 1980s. During this time 'human relation' studies were deliberately reframed as 'industrial relations' and organisational relations thus confining the sociology of work more specifically to the work places and work practices while ignoring the broader social issues which may penetrate far deeper and influence the lives of workers (Simpson, 1989).

The notion that technological control leads to dissatisfaction at work simply because the workers are not able to apply their mental and cognitive skills has also been confronted in the literature before 1980s. Based on Durkheim's theories Goldthorpe *et al.,* (1968) and Jackall (1978) found that there were many instances where technological control did not play a dominant role in influencing the perception of workers about their satisfaction with work. Burawoy's (1979) study *Manufacturing Consent* shows that it was a sense of solidarity and collective action against management which was far more important to the workers than the

quest for meaning and satisfaction in work. Similar patterns were reported in other studies where the need to exercise mental capabilities or deriving satisfaction from work was not the priority for the workers (see Hamilton and Right (1986) for a study on bureaucratic work of banking clerks).

The industrial sociologist Elton Mayo (1960) found that job satisfaction for the workers meant more than just the application of skills. Mayo (1960) observed and compared the work practices in the mechanised textile industry and the traditional mule spinning. Mayo found that the turn-over of workers was far higher in traditional mule spinning than in the case of mechanised textile industry. This according to him was because of the social isolation in the case of traditional mule spinning, where the workers never came into contact with one another. Once again, Mayo's analysis forces us to examine the understanding of workers about the nature of work rather than implicitly linking between the application of 'skills' and job satisfaction.

Similarly, Chinoy's (1955) classic study about the automobile workers in the United States illustrates that the linkage between discretionary power of workers and their understanding of job satisfaction is questionable. Chinoy (1955) found that the workers were more concerned about steady employment and rising wages which they believed could help them sustain a higher standard of living. Chinoy noted that the workers' perceptions were far more influenced by their consumption styles rather than work related problems. Goldthorpe *et al.*, (1968), as well, found that it was the urge for higher earnings and not discretion which appealed most to the workers. Both Alvin Toffler (1970) and later Zygmunt Bauman (2000) in their respective studies defended the supremacy of material needs of workers over job satisfaction, discretion, or career progression and described its influence in the perception and behaviour of the workers.

2.7 WORK AND IDENTITY

According to the deskilling thesis, if new technologies and a small group of high skilled professionals can perform most of the intellectual work the skills of average workers are no longer important for the employers. But the deskilling thesis appears focused on work rather than examining the experiences of workers possibly because of the methodological limitations highlighted earlier. The upskilling thesis on the other hand emphasises the need to raise the level of skills to improve the competitive advantage of companies and countries.

The two competing theories of technology appear largely concerned with macro-level questions such as those about the changing demand for skills for businesses. But the basic question of workers' understanding about the changing nature of work and skills seems to have been marginalised from both perspectives. Rather, in many cases an implicit connection is drawn between upskilling as a result of improved wages and employment conditions of workers or deskilling simply because the application of skills is reduced in labour processes. In doing so, the perceptions and experiences of workers and their understanding about the changing nature of work and skills appear to have been sidelined.

Clearly, there is need for a detailed analysis not least because of new technologies in work places but also considering the wider issues emerging from market competition driven by global production and sourcing of labour. In the past, studies in industrial sociology have examined the deeper and wider understanding of workers about the nature of work and skills based on theories of social classes. It appears that these studies were mainly a response to a period of rapid economic growth in industrial nations. As mass production and factory work was coming to an end and the occupational composition was shifting from blue collar jobs towards white collar work in the formerly industrial nations, the general impression was that it was the end of dull, mundane work and the beginning of challenging work involving imagination, creativity and discretion and high level of skills in post industrial societies. Although educational policies and economic growth based on technological advancements reflected this change (Bell, 1974), industrial sociology was highly critical about any tangible changes in the workers' perceptions about the changing nature of work and skills.

A number of studies concluded that workers often found themselves in ironic positions. The office jobs of workers did not require much education or skills and in that respect their work was not significantly different from the factory work but these workers were still identified as 'white collar' workers in society. Goldthorpe et al., (1968) study, The Affluent Worker, found that the conflicting views of workers could be described in many different ways such as the social relationship of workers with their work, co-workers, employers and trade unions and also their broader relationship with families, neighbours, their life histories and aspirations. To say the least, it was a rare attempt to examine the workers' understanding and their identity rather than pre-supposing a monolithic path towards 'upskilling' or 'deskilling'. Lockwood (1989) by the same token examined and described the conflicting responses of workers at the level of work situation (the authority and control of workers in the production

processes), market situation (level of income and economic security) and status situation (honour, respect or any form of symbolic reward). Once again, it shows a genuine attempt to understand the workers' understanding and their work identity from different angles.

Given the emerging concern about examining the wider understanding of workers, potential starting point for this investigation should focus on the identity of workers. This would provide the conceptual tools to gain a deeper understanding of what workers think about work and skills and also their relationship with other skilled individuals within the profession (Wenger, 1998). Historically, work appears to be the most important 'delineator' of social identity (Huws, 2006). Huws explains that in the traditional European cultures the occupation of a person reflected in their family names:

> "People called Schmidt, Smith, Herrero, or Lefebvre, for instance, had ancestors who were iron workers. Wainwrights and Wagners are descended from wagon makers, and so on with the Mullers (Millers), Boulangers (Bakers), Guerreros (soldiers), and all the myriad Potters, Butchers, Carters, Coopers, Carpenters, Fishers, Shepherds, and Cooks whose names can be found in any North American phone book." (Huws, 2006, unnumbered)

Huws (2006) also shows in her study that such a strong sense of identity as a result of profession was not limited to the European societies. In the South Asian caste system occupational identity was something an individual was born with as the famous Indian historian Sudheer Birodkar writes:

> "occupational specialisation was the essence of the sub-division of the two lower Varnas (castes) of the Vaishyas and Shudras into the various Jatis (occupational sub-castes)....Infringement of caste rules of vocation could lead to expulsion; thus a Chamar (shoe maker) had to remain a Chamar all his life. If he tried to become a Kumar (potter) or Darji (tailor) he was in danger of being expelled from the Chamar caste and obviously under the caste rules he would not be admitted into any other caste in spite of his having the knowledge of any other vocation." (cited in Huws, 2006, unnumbered)

Work as a source of social identity is based on the theories of social classes. In the social division of labour the workers' identity was a product of their specialised knowledge and skills. Knowing the indeterminacy and the 'secrets of the trade' increased the scope for discretion and the application of tacit knowledge and expertise. If this (specialist) knowledge became scarce it could be used by the workers to negotiate wages, employment conditions or any form of social benefit with their employers. This arrangement worked in favour of the

workers to possess this knowledge in order to shield them against job losses, unemployment or any other form of exploitation from the employers.

The specialised knowledge and skills (in a particular domain) gave further rise to the idea of professional groups - for example lawyers, doctors, engineers etc. The reproduction of these professional groups was confirmed through 'specialised forms of training, credentialism, legal statute, and the wider institutional structures and processes associated with professional socialisation' (Mclaughlin and Webster, 1998: 782).

Moreover, creating this kind of (professional) identity involved acquisition of knowledge through socialization and informal learning. The knowledge acquired was then used as a way to differentiate skilled professionals within one group from another. Within a particular group, the professionals internalised the same values, knowledge, work culture and practice and in this process they become members of a community of practice (Wenger, 1998). Also, the individual's sense of knowledge and skills and those valued by other members of the professional group played an important role in shaping their identity (Fenwick, 2005).

The existing literature shows that, at least until the post war period, profession was considered an important source of social identity within Western Capitalism (Ackroyd, 1996, Freidson, 1973). The instruments of the welfare state ensured the establishment of collective organisations such as trades unions for workers whose primary job was to ensure that the capitalists shared the benefits of mass production fairly with the workers. A certain degree of segmentation was preserved in the labour markets which implied that workers were able to maintain their identity as skilled professionals.

However, the combined impact of global competition and technological changes are bringing about fundamental changes in work organization and skills (Huws, 2006). Work that was once tied to a particular geographical location is now been outsourced to distant locations through the use of technology. In some cases, this involves complete reorganization of work to separate between low skilled work and high skilled jobs (such as in the case of outsourcing industry). In other cases, entire businesses are relocated to countries offering favourable conditions to businesses. Although studies in the past have examined the challenges faced by businesses (Taylor and Bain, 2005, Gereffi et al., 2005) it is not understood how these

profound changes would impact upon the workers understanding and experience of their profession.

Similarly, the experiential knowledge and skills of workers have always been a source of tension for the employers. The management agenda to control, codify and standardise this form of specialised knowledge (as discussed in the section, Digital Taylorism) is bound to erode the notion of profession amongst the workers. The demand for skills and the methods of acquiring the credentials and skills may also undergo transformation from specialised professional knowledge towards generic management skills (Brown et al., 2007). Under such circumstances the understanding of workers and their views and experiences about the profession may be challenged by technological changes and the new forms of work and skills.

2.8 SUMMARY OF DISCUSSION

This chapter aimed to review the existing debates on new technologies and its implications for work and skills. Based on the two dominant theories of technology the literature suggests conflicting and inconclusive evidences.

To begin with, the policy and academic literature shows a strong relationship between new technologies and the demand for skills. The evidence appears convincing if we examine the economic growth in the emerging economies of India and China based on their vast pools of talent. Technological advancements drive the demand for skills as work becomes increasingly complex. The cognitive skills and creativity of individuals are perceived as a source of productivity and economic growth.

The deskilling thesis rejects this technocratic view and argues that new technologies are increasingly aimed at harnessing the knowledge and skills of workers into new technologies with a view to reducing the demand for skills. The underlying motive to implement technology is to reduce labour into an inter-switchable commodity and exploit as necessary to the advantage of capital. Based on the analysis the evidence so far in terms of the implications of new technologies for skill demand remain inconclusive and calls for further investigation.

A key limitation of the upskilling and deskilling thesis is the excessive emphasis on new technologies as a source of competitive advantage for businesses. The wider issues of market competition and the institutional and labour mechanisms which may also influence the business investments decisions in new technologies are not rigorously examined in the literature. Capital intensive technology, when it is not fully utilized because there is insufficient demand, puts pressure on firms resulting from the cost of ownership, expert labour and minimum maintenance even when not in operation. Labour, on the other hand, if obtained at competitive rates and from countries with weak labour regulations serves as a more profitable and 'disposable' alternative to new technology (Magdoff and Magdoff, 2004). In the present context for example it makes little economic sense to invest in capital intensive technologies if cheap and disposable labour can be sourced in abundance from alternative locations. Such strategies to improve the competitive advantage of businesses are not taken into account in the existing theories of technology. In other cases it is not clear whether the labour sourcing strategies are influenced by cost reasons or because of the availability of better talent as we saw in the case of employers' inclination to outsource work to emerging economies such as India and China.

Whereas the deskilling thesis argues that new technologies create a downward pressure on skills, the upskilling thesis uses innovations as the basis to drive the demand for education and training of workers. Both perspectives are centred at national policies and/or business challenges and labour processes in production and services and offer little help in understanding the perspective of workers about new technologies. Moreover, the deskilling thesis takes a very narrow approach to skills. It fails to capture the behavioural responses of workers, their consent and resistance to new technologies and the changes to work organisation. Also, as we saw, in many cases the workers' responses need not come as crude forms of resistance. Indeed in some cases the literature shows that resistance may completely be absent as business strategies increasingly aim to capture the subjective dimensions of workers. Perhaps, it may be that examining resistance and consent of workers to new technologies offers limited understanding of work and skills from the workers' perspective.

Through a review of the literature it was found that focusing on workers' identity will provide an appropriate start to understand the workers responses and their understanding about work. Previous studies in industrial sociology have rigorously analysed and explained the identity of workers based on the theories of social classes and attempted to explain the

views of workers beyond the confines of workplaces. Much of this literature, though, emerged in the mid twentieth century; a period of expansion in the post war period in the industrial societies. Its implications for work, skills and identity of workers are absent in the literature particularly in view of the global competition and the implementation of new technologies.

The analysis raises a number of questions. From the business perspective understanding the market competition is crucial at the outset before we begin to investigate the dominant reasons to implement new technologies in work places. Moreover, the review shows that the underlying reasons to implement new technologies and the demand for skills from the employers' perspective are far from homogeneous in the existing literature. The assumption that new technologies are the mantra for economic success also needs to be assessed in light of the alternative benefits of globalisation to businesses such as access to international labour markets, cost arbitrage and the opportunities for labour exploitation resulting from weak institutional mechanisms, to name a few.

Finally, whether or not technology leads to degradation of work and deskilling of workers requires a careful assessment of the workers' understanding about work and skills and their identity as workers. Questions about work, skills and workers' identity will be raised taking into account the contradictions arising because of the design and operation of new technologies in work places and within the wider context of market competition and the globalisation of labour markets.

To address these issues the thesis turns to an empirical investigation of the maritime sector. But first it is important to review the existing literature to identify the key innovations in the maritime industry and the policy reforms aimed at access to international labour markets in the maritime industry. Amongst other things, the review will provide the justification and background of the maritime industry as the basis for empirical investigation.

CHAPTER 3   TECHNOLOGICAL CHANGES AT SEA AND GLOBALISATION OF MARITIME LABOUR MARKETS

The review of wider literature reveals conflicting evidence about the implications of new technologies on work, skills and identity, and raises a number of questions for further investigation. These questions will be answered in this thesis through an empirical investigation of the maritime industry. The maritime industry exhibits the characteristics of a highly competitive global industry due to its strong linkage with international trade, technological advancements and access to labour from international locations.

This chapter reviews the technological changes and the institution reforms in the maritime sector in the context of global competition. The first section discuses the macro-level changes in maritime transport technologies because of the changing landscape of production and distribution as a result of trade liberalization in recent decades. This is followed by micro-level advances in specific shipboard technologies such as navigation, propulsion and communication systems that facilitated the integration of maritime transport with global production and distribution systems. The following section discusses labour reforms following trade liberalisation in the early 1990s that spurred the formation of a global maritime labour market. The chapter ends with a brief summary of research questions to be raised for empirical investigation.

3.1   TECHNOLOGICAL CHANGES IN THE MARITIME INDUSTRY

During the industrial revolution with technological changes from agriculture to manufacturing a surplus of production in most industrial nations including Britain outweighed the demand for goods in the domestic markets of these countries. The answer to the accumulation of excess inventories was to 'discover' new countries to get rid of stockpiling at home. Moreover, this was also the opportunity for super-powers to expand their military ambitions (Harlaftis and Theotokas, 2002, Harvey, 2000), at the same time as balancing their trade since finished goods exports could be exchanged for raw materials from new countries (Weber, 1968: 914). But all this required a commitment to improve the efficiency and reliability of maritime transport given that much of the trade was carried by sea which in turn was still dependent upon natural conditions as well as geographic and climatic limitations.

One of the breakthrough technologies at sea was the advent of steamships which reduced dependence on sailing vessels during the mid nineteenth century. Steamship technologies were far superior and powerful than sail ships in that the ship voyages were not affected to the same degree by the vagaries of nature. At the same time coal was cheap and available in abundance to power the steam engines. Bigger, power driven ships thus started to replace conventional sail boats. The cargo capacity of the steam ships increased significantly as did their capability to transport cargoes of different types. Gradually during the mid nineteenth century merchant ships were beginning to divide into two main sectors of trade: wet and dry cargo. The former involved the carriage of liquids in bulk whereas the latter consisted of dry cargoes, both as bulk cargoes and packaged units (Talley, 2009, Alderton, 2009).

The next section reviews the technological developments in the wet trade.

3.2 THE EVOLUTION OF WET TRADE

The earlier merchant ships were mainly involved in carrying dry cargoes such as grain, cotton, coal and spices. But soon after the commercial exploration and production of oil in the mid nineteenth century merchant vessels were employed to transport oil, initially in barrels and eventually in bulk quantities using tank ships. In 1872 the tank steamer *Vanderland* was the first ship to carry passengers along with oil in bulk quantities. And shortly afterwards in 1886, the first dedicated German oil tanker *Gluckauf* was launched heralding the beginning of liquid bulk or in other words 'wet cargoes' by sea transport.

During the late nineteenth century the United States was the largest oil producer and exporter of oil, while in the East, Russia dominated the European markets. The world oil trade was organised mainly around these two countries and consequently oil cargoes were shipped over long distances such as the Trans- Atlantic route and from Russia to the Far East. Both coal and oil were the primary energy sources hitherto but during the interwar period oil overtook coal as the primary source of energy (Harlaftis and Theotokas, 2002). Tamvakis (2002) argues that this was partly because larger tanker ships had arrived by this time and oil transport became economic relative to its cost. At the same time there were logistical and economic challenges in obtaining coal from underground mines at competitive rates. As oil gained popularity, diesel powered motor ships were brought in to replace the conventional steam engines (George, 1960).

Shortly after the Second World War as competition heightened between the industrial nations, some countries turned to alternative locations for oil supply. Whilst Europe focused on the Middle East for its energy needs, Japan - due to its rapidly growing economy - targeted Indonesia, and the United States became a net importer of oil from Venezuela.

For economic and political reasons, where possible the exploration and sourcing of oil was spatially distanced from refining and processing. Crude oil was sourced in bulk and the processing and refining was shifted to alternative locations. Subsequently the design and operation of merchant tankers experienced a major overhaul. Very large crude oil carrier ships (VLCCs) were designed to ship crude oil over long distances to achieve economies of scale. On the other hand product ships, designed to carry clean oils and chemicals, were constructed to transport small quantities of miscellaneous grades of liquid cargoes over relatively shorter distances. These product ships, due to the nature of their trade, comprised of small segregated tank units facilitating the carriage of incompatible cargoes, highly complex pipelines and pumping networks to load a multitude of cargoes and rapid change-over mechanisms to switch between different cargoes at short notices.

The post war period witnessed an exponential growth in world trade. By now it was clear that a reliable mechanism was crucial for transporting oil for the industrial nations to increase their competitiveness. The planning, storage and distribution of oil was now gradually shifting from state to non-state owned energy companies; the 'Oil Majors'. The maritime economist Martin Stopford (1994: 305) explains that upon assuming their role in the production and distribution of oil, these Oil Majors introduced significant changes to the transport arrangements at sea. These changes were primarily based on the following three factors:

1) Economies of scale: The increase in the size of ships to reduce the transport costs[1].

2) Transport planning: Since trade continued to grow during this period and oil transport was re-organised into a network of large crude oil carriers and smaller ships, economic success was mainly dependent on vessel efficiencies. New technologies

---

[1] According to Martin Stopford (1997) the savings arising from the economies of scale were exorbitant with a round trip voyage from Rotterdam to Kuwait on a VLCC via Cape costing up to less than 70 per cent of the costs incurred by a smaller tanker.

were designed to improve loading and discharging operations and to minimise the time lost due to breakdown of machineries at sea.

3) Ownership and governance: Politically sensitive maritime incidents such as the sinking of Torrey Canyon and the grounding of Exxon Valdez brought with it huge penalties, compensation claims and reputational risks to the Oil Majors. To mitigate the legal claims the Oil Majors decided to sell a huge proportion of the ownership of the ships to independent owners. Once sold these ships were chartered back and re-employed by the same Oil Majors under long term arrangements thus diversifying the financial risks involved in oil transportation.

3.2.1   THE ARRIVAL OF GAS CARRIER SHIPS

The excessive reliance on oil as the primary energy source during the post war period raised questions about the limited supply and depletion of fossil fuels. This notion opened up the potential of using natural gases as an alternative source of energy. But, unlike oil production and exploration primarily driven by economic demands and political interests, the supply of natural gases depends to a large degree upon geo-spatial factors. There are both, geographic distance and infrastructural limitations in connecting between the gas exporting countries and the import countries in gas markets (Faridany, 1972). The former include Qatar, Malaysia, Indonesia, Algeria, Nigeria, Australia, and Trinidad and Tobago whereas the latter consist mainly of Japan, the United States, the Republic of South Korea, Spain and France (UNCTAD, 2008: 31). Whilst in some cases pipeline arrangements can be built to transfer gas, in many cases sea transport is still considered the most cost effective means of transporting gases (Wooler, 1975). Thus liquefied natural gas carriers (LNG) and Liquefied Petroleum Gas carriers (LPG) were launched with a view to transport gas cargoes by sea. These ships consist of a highly sophisticated transport system involving a series of liquefaction, refrigeration, and regasification plants for transport between ships and shore terminals thus making the carriage of gas by sea a costly affair[2].

3.3   THE EVOLUTION OF DRY TRADE

The dry sector trade largely comprises of bulk cargoes and break bulk (in other words general cargoes). Bulk ships, often termed as bulk carriers, are used in the transport of low cost

---

[2] The LNG ships cost at least three times more than an oil tankers of equivalent size (Source; UNCTAD 2008: Table 20).

commodities. The profits are largely achieved based on economies of scale by carrying cargoes in bulk as opposed to packaged goods. The earlier bulk cargoes consisted of low cost commodities such as grain, coal and iron ore. In most cases a full ship load of a single commodity is preferred for the shipment of bulk cargoes.

The loading and discharging of bulk cargoes is relatively straightforward using belt conveyor systems and cranes from the shore side. Due to the nature of trade bulk ships did not experience any significant innovations. The only major technological changes resulted from the diversification of bulk commodities into sugar, fertilizers, cement, and timber in 1960s (Lawrence, 1972). Due to these relatively higher cost commodities there was to some extent a shift from generic design bulk ship designs towards commodity specific ships such as timber carriers and cement ships. Another focus of innovation in this sector was the structural strength of bulk ships. The suspected break-up of the Derbyshire in 1980 and later the Kowloon Bridge in 1986 at sea raised serious concerns about the structural strength and seaworthiness of bulk carrier ships designed to carry heavy cargoes. New regulations were adopted by the International Maritime Organization (IMO) to ensure the structural strength of bulk ships.

Moreover the operational arrangements in the bulk sector are not as time constrained as in the case of container sector where the movement of ships is highly contingent upon wider supply chain requirements. The onus on reliability and speed is not the same as containerised cargoes (as we shall see in the next sub-sections). Hence, innovations in this sector are largely focused on improving the design and construction of ships with the overall aim to transport commodities in bulk volumes at cheaper rates to achieve economies of scale.

By contrast the carriage of break bulk experienced revolutionary changes as a result of technological changes. The primary concern in this sector has been on reliability and speed to maintain ship schedule in transporting cargoes. Dry ships have largely operated under the liner shipping trade conditions with the exception of tramp general cargo ships[3]. The earliest dry cargo ships were designed keeping in mind the trade imbalance and the heterogeneous

---

[3]Liner shipping is characterised by regular and repeated sailing and the liners are distinguished by consistent repetitive voyages. An inherent inflexibility in the operation of liner ships is that irrespective of the availability of cargo the ships must dock in and sail out of port to maintain their schedules.

nature of cargoes shipped between the developed nations and their colonies in Asia, Africa and South America.

However, what appeared compatible and flexible during the colonial era became counter-productive as the colonies gained independence during the twentieth century. The economic boom resulting from the emerging economic patterns between the industrial nations rendered the conventional designs unsuitable for trade. The labour intensive technologies of the past, originally built along the lines of colonial trade, resulted in higher port handling costs at a time when labour costs in most industrial nations was on the increase due to the post war economic growth.

At this stage the shipbuilding industry went through major technological changes. A significant proportion of allied merchant fleets were destroyed during the two world wars. Thus, with the pressure to maintain a supply of merchant fleets to maintain economic growth Ford's assembly line manufacturing concepts were introduced in the construction and design of new ships. For the first time 'standard ships' were built in British and later in American, Norwegian, Greek and the Japanese shipyards. The literature suggests that besides the issue of expediting shipbuilding, labour cost in the handling of cargoes was an escalating concern during the post war period. Hence, the issue of manual labour was carefully incorporated into the designs of the new 'standard' ships. As Daniel Todd (1985) in his book *The World Shipbuilding Industry* comments:

> The impetus for standard ships did, in truth, derive from the urgency to build replacements for wartime losses. In 1917 the UK Shipbuilding Advisory Committee formulated five standard designs which were to be partly pre-fabricated with structural items prepared in steel works prior to shipyard delivery so to speed up construction. Rapidity of construction as a result of simplified blueprints, advance ordering of standard parts, mass production and re-enforcement of 'learning curve' among the workers, was the prime advantage of standardisation (p. 174).

Todd (1985) further explains the economic advantage of standard ships in saving labour costs as follows:

> In 1968 the first SD14 [standard series] was built by A&P as a Liberty Successor ... it could be operated with a crew of 31 instead of the 45 required by the earlier vessel: a saving in labour cost of almost 50 per cent (p. 176).

In the following years the United States introduced the use of intermodal transport in cargo loading mechanisms to bring down labour costs and improve productivity in the handing of

cargoes. Through the use of generic units detachable from its transport vehicle the same cargoes could now be carried across different mediums - air, water and land (hence the term 'intermodal') thus reducing the handling costs and resources in the transport of goods.

But the concept of intermodal transport, even though it is alive today, lost popularity during the next major technological advancement in the liner shipping: the unitization of cargoes. During the Second World War the American army devised a standard unit of transport which they termed a 'transporter'. These standard sized cargo units were mainly used to avoid the delay of ships and pilferage of military cargoes in port[4]. However it was during the Vietnam War that the trucking firm turned shipping company Sea-Land Container Services exploited this idea and introduced containerisation into commercial shipping. Subsequently, these standard sized units were built on a large scale and dedicated container ships were constructed to carry unitised cargoes. From intermodal transport this was the beginning of 'multi-modal' transport and supply chain networks.

3.3.1 FROM MARITIME TRANSPORT TOWARDS GLOBAL SUPPLY CHAINS

The transition from intermodal transport to multi-modal transport was in some ways historic in the maritime industry. It is termed multi-modal transport as irrespective of the mode of transport deployed in transporting cargoes the unit of carriage remains the same and the physical dimensions of the unit are kept uniform worldwide. The standard unit for carrying cargoes is popularly termed as a container. The containerization of cargo initially began between the industrial nations and the trend continued through to the 1970s and 1980s. But during the 1990s, following a reduction in trade barriers, the trend towards containerisation increased significantly (see figure 3.1 for actual and projected growth of container traffic) as containerised cargoes found their way into the newly industrialising and developing countries (Comtois, 1994, UNCTAD, 2009).

Up to this time the shipbuilding capacity, on the rise, continued to feed the insatiable demands of post war economic growth. But during the 1980s the slowdown of the world economy, the collective impact of the oil crisis and technological interventions led to significant improvements in cargo capacities and resulted in freight rate declines. Adding to this there was additional output of ship supply from the emerging shipyards of East European

---

[4]At Port of Pusan, Korean stevedores were dropping and breaking almost 90% of the off-loaded crates. Theft and pilferage became a daily occurrence. The Army was losing 10% of all substance coming through the port.

countries and South Asia now in direct competition with the traditional European and American shipyards. As a result the container market suffered a huge blow from the overcapacity of ships. The problem of overcapacity met with shrinking freight rates and therefore the fixed costs in maintaining scheduled liner services forced the container shipping companies into consolidation and mergers. *To win or to disappear* became the mantra for many ship owners to survive business competition.

Figure 3.1   **The growth of container trade between 1990 and 2020 (including future projection) (Source: UNCTAD, 2009)**

Figure 7
Global container trade, 1990–2020
(TEUs and percentage change)
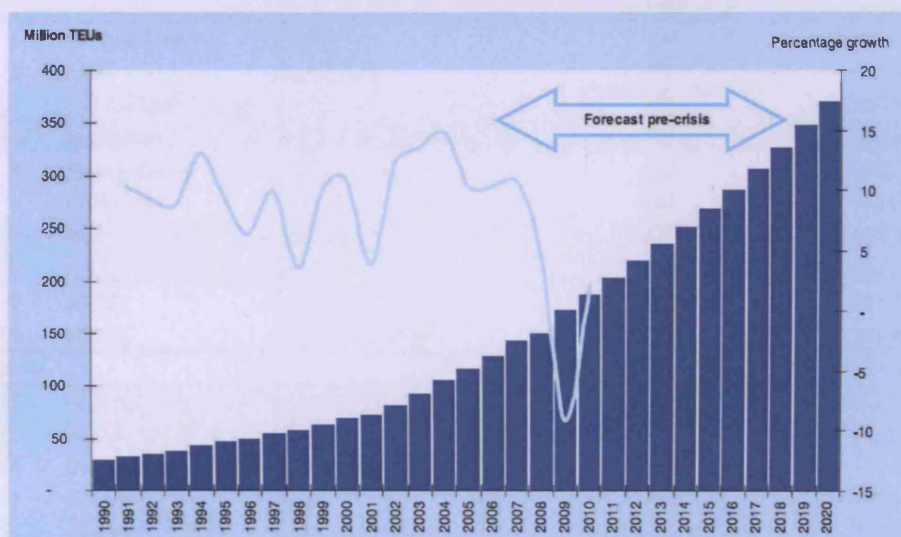
Source: Drewry Shipping Consultants. *Container Market Review and Forecast 2006/2007* and *2008/2009*, and Clarkson Research Services Limited, *Container Intelligence Monthly*, September 2009.

Notes: Forecasts of container trade volumes for 2009–2020 were made in 2006/2007 and precede the global financial and economic crisis of late 2008. Annual percentages changes for 2008–2010 are obtained from *Container Intelligence Monthly*, September 2009.

Once consolidated the container industry was now becoming highly concentrated (see figure 3.2). The majority of these companies diversified businesses to include port handling operations either vertically through mergers and acquisitions or horizontally through collaborative partnership arrangements. The timing was ideal as in the aftermath of the economic recession of the 1980s the budget deficits in most countries could no longer afford the excessive public investments in port development programs (Worldbank, 2001). Ports around the world were privatized through a build-operate-transfer arrangement between the public and private sector (Brooks 2004). Here, the role of the public sector was restricted to general administration and the maintenance of port infrastructure whereas the port operations and superstructure installation was taken over by transnational companies. This model of

ownership and governance was termed the 'landlord model' operated by Global Terminal Operators (GTOs) (Brooks, 2004, Baird, 2002, Baird, 2006). The GTOs, either through direct ownership or in close partnership with the shipping companies, carefully advanced the port expansion programs with complimentary changes to both ship design and port operations.

Figure 3.2   The concentration of fleet capacity in container shipping (Source: UNCTAD, 2009)

Table 32

The 20 leading service operators of container ships at the beginning of 2009
(number of ships and total shipboard capacity deployed (TEUs))

Ranking	Operator	Country/territory	Number of ships in 2009	TEU capacity in 2009
1	Maersk Line	Denmark	426	1 740 936
2	MSC	Switzerland	431	1 510 720
3	CMA-CGM Group	France	280	864 893
4	Evergreen	Taiwan Province of China	181	629 615
5	Hapag-Lloyd	Germany	132	496 724
6	COSCON	China	141	491 580
7	APL	Singapore	128	470 901
8	CSCL	China	121	431 582
9	MOL	Japan	109	387 107
10	Hanjin	Republic of Korea	83	365 605
Subtotal			**2 032**	**7 389 663**
11	OOCL	Hong Kong (China)	90	364 384
12	NYK	Japan	82	358 094
13	Yang Ming	Taiwan Province of China	85	317 473
14	K Line	Japan	99	309 496
15	HMM	Republic of Korea	58	258 648
16	Hamburg Sud	Germany	81	256 513
17	Zim	Israel	82	251 717
18	UASC	Kuwait	43	155 462
19	PIL	Singapore	76	147 985
20	CSAV	Chile	56	141 957
Total 1–20			**2 784**	**9 951 392**
World container cellular fleet at 1 January 2009			**9 447**	**14 429 080**

Source UNCTAD 2009, based on Containerisation International

For the first time ships without derricks and cranes were introduced (and hence the name 'ugly' ships and 'box' ships came from there) thus shifting the onus of the co-ordination, planning and control of cargo operations from the ship's crew towards the port terminals. The capital intensive scale of operations along with the restructuring of port ownership made port development a political as much as an economic affair. Selected ports from around the world were chosen based on the institutional support and restructured as 'hub' ports (Baird, 2006, Lim, 1998). Positioned in strategic geographic locations these hub ports were equipped with

state-of-the-art technologies: high speed cranes, automatic loading devices, modern warehouses, and the necessary infrastructure to perform processing and handling of cargoes within port premises.

The mechanisation of work in port terminals allowed ships to enter and depart ports any time of the day with 24*7 cargo handling facilities. Whilst major ports (hub ports) were connected by large mega sized ships the less developed adjacent ports clustered around the hub ports were served by smaller feeder (trunk) ships. This arrangement, like in the case of aviation sector, was operated as a hub-and-spoke distribution system (Lim, 1998): a complex transport network the success of which rested upon the synchronous arrival and departure of mega sized ships and feeder ships in ports. It allows the exploitation of scale economies (of mega ships) and at the same time on-time delivery of cargoes using smaller feeder ships. Ship sizes on trans-ocean voyages experienced dramatic increases in cargo capacity. With this new arrangement high valued, time sensitive and high risk cargoes earlier shipped through air transport could now be shipped more economically and reliably using sea transport (Notteboom and Rodrique, 2008).

Following trade liberalisation the demand for container shipping gained ever more importance. This was due to the increased movement of semi-finished and unfinished merchandise to cheap locations for final assembly work and value addition (Hoffman and Kumar, 2002). Thus, containerisation was attuned with the new componentisation of work in global production and distribution. Unlike the conventional methods of handling cargoes, standard sized containers were relatively easy to move between different modes of transport (rail, road and sea) even in developing countries with basic transport infrastructure. Lim (1998) makes a useful comment that in economic terms "it [was] now possible to make almost anything anywhere and ship it to almost anywhere without affecting the price" (Lim, 1998: 369). Lim's comment illustrates the importance of cost efficient transport technologies allowing companies to relocate production to cheaper locations. Many scholars at this point framed the notion of 'death of distance' (Smith and Meiksins, 1995) or the 'progressive annihilation of space by time'. Fancy transport and logistics models such as "ore-to-store", "farm-to-fork", and "door-to-door logistics" emerged in the management literature to describe the significance of transport technologies in the 'seamless' outsourcing of work to far off locations (Notteboom, 2002).

The existing literature shows that the advent of multi-modal transport has had a severe impact on the organisation of work at the waterfront. Historically seaports have been an important node in the maritime transport linking between sea and inland transport. Within the entrepot trade conditions that prevailed in most European ports during the industrial era seaports offered warehousing facilities as well as the loading and discharging of cargoes. As the arrival and departure of ships in ports could not always be pre-determined the earlier dock workers, due to their permanent employment status, were expected to perform multi-skilled operations both on docks as well as in port warehouses (Barton and Turnbull, 2002). However through containerisation and the use of new technologies the Global Terminal Operators (GTO) pushed for further rationalisation and control over port labour. Various attempts were made to bring down the wages, employment conditions and union status of dock workers.

The dock workers in most countries responded to these pressures through strikes and closedown of work in ports causing significant delays to ships in ports thus inducing vulnerability in international trade. On the other hand, large warehousing and storage areas were required close to the quayside to facilitate the quick turn-around of ships. To resolve these problems the GTOs came up with the idea to relocate most dock work outside the immediate boundaries of ports. In countries where the state approved of the reforms and management practices of the GTOs the stripping and stuffing of containers was relocated outside the peripheries of port limits thus leaving dock workers with the basic job of loading and securing container units to the ships.

> "The relocation of cargo handling activities outside the port and the standardization of labour process inside the port, lead to questions of jurisdiction over longshoring and in many countries the very definition of dock work." (Turnbull, 2000: 374)

Even within the port limits, dock work was further sub-divided between high skilled workers and semi-skilled labour (World Bank, 2001). Whilst the crane operators were offered superior employment conditions due to their skills in handling sophisticated cranes and loading devices, the work on the quay side was assigned to casual labour with minimum wages. In the UK for example the port of Felixstowe, after being owned by Hutchison Port Terminals, reduced the basic wages of the majority of dock workers by almost 40 per cent and brought them in line with the local labour markets (Turnbull, 2000).

The significance of technological changes in the liner industry, unlike the transport models outlined earlier, is the light that it sheds on the character of global competition and the intensification of technological control over transport chains (Silver, 2003: 101). It is evident from the discussion that by now global shipping was maturing into diversified trade sectors. Each trade sector, due to the difference between the commodities, was marked with its own idiosyncrasies, at least in terms of maritime innovations. The wet sector, because of the challenges faced in transporting high risk cargoes, was in large part focused on safety and environmental concerns. By contrast, the bulk sector was focused mainly on economies of scale and maintaining the structural strength of ships. Liner shipping on the other hand was primarily concerned with the reliability and speed of ship movements to serve the interests of global production strategies and supply chain networks.

Having sifted through the evolution of technology in different sectors of trade let us now examine the development and purposes of implementing shipboard technologies in general.

3.4 NAVIGATION AND PROPULSION TECHNOLOGIES

Kemp (2011) argued that until the 1970s the traditional technologies and practices of navigation such as chronometers, dead reckoning based on compass and logs, physical sounding in shallow waters, compass bearing of landmarks and the use of sextant when out of sight were commonly used by the navigators. Although gyro compasses were introduced as early as 1920's most ships until the mid-20th century still relied on the magnetic compasses to ascertain direction. As Kemp wrote about the state of technological advances at that stage:

> "Christopher Columbus would have felt perfectly at home with most of the instrument we used. He might have been mildly surprised by our chronometers, but not much else." (Kem, 2011: 533)

However, in the years following the trade liberalization maritime transport technologies advanced rapidly in the wider areas of navigation, communication, propulsion, and management technologies to name the major ones. The idea was to address the reliability and safety issues at sea given the increased importance of merchant ships to the world trade.

On the navigation front, the IMO passed a resolution for the mandatory adoption of Global Position System (GPS) on merchant ships in 1995 (IMO, 1995). The GPS was approved as the primary means of navigation on ships. The use of GPS as a primary navigation device brought significant changes to the navigation jobs at sea. So far the navigation technologies

including Decca, Loran and Direction Finders required a degree of training and skills from the operators. But with GPS, as Vulfovich (2007) noted, anyone with basic understanding of transferring readings to a paper chart could now claim to perform a navigator's job.

The use of GPS as the primary means of navigation has been questioned in many studies especially because of the lack of immediate alternatives to navigation should the GPS technology fail to function. However despite the absence of suitable alternatives for more than a decade the GPS has been widely adopted and implemented on merchant ships. Clearly, the benefit of simplification of one of the most skilled jobs of mariners – position fixing – seems to be a major impetus to promote this technology. Other factors include the unprecedented increase in maritime traffic, increased fuel costs, traffic congestion and the pressure to arrive and depart port in time which often demands precision and accuracy in planning voyage and hence the need for satellite navigation systems. Put simply, the economic gains far outweigh the risks associated with the malfunctioning of GPS technologies.

In recent years, the GPS receivers have been integrated with other navigation devices on ships such as auto-pilot systems, radars and echo sounders. More recently, GPS has been integrated with electronic charts (Electronic Chart Display and Information System) for navigation. With sufficient back-up and equipment duplication the IMO has now exempted ship owners from carrying conventional navigational paper charts earlier used for navigation at sea (Eason, 2008).

The increased level of automation on the ship's bridge meant that some of the traditional 'head' work of mariners could now be allocated to new technologies. In this respect King (2000) argued that whilst certain technologies such as marine radars were principally implemented as an aide to navigation and as such did not make much difference to manning levels on ships, others such as the gyro compasses and auto-pilots resulted in significant reduction in crew sizes as human helmsmen were no longer required to steer the ships at least in open seas. It remains questionable however if the latter were 'aimed' at reducing labour costs or merely to improve safety and efficiency at sea. Moreover, this could also be seen as a move to automate low skilled work whilst assigning more high skilled jobs to seafarers.

King (2000) argued, nevertheless, that unmanned machinery spaces, first introduced in the 1960s, gained popularity in the early nineties following the ship owners' desperate attempts to save operating costs by implementing new technologies. Advances in propulsion technologies reduced fuel consumption and streamlined the skilled maintenance jobs carried out by engineers at sea. In regard to the latter Kendra (1998) noted the occasional on-site outsourcing of work by appointing riding crews on ships to carry out maintenance work whilst at sea. At the same time major overhauls and advanced technical repairs could now be performed by the maintenance specialists and technicians ashore. In recent times the advent of electronic engine management systems has claimed significant changes to the propulsion and engineering designs on merchant ships. Besides efficient fuel consumption these engines are designed to run for longer periods with minimum maintenance and intervention from ship crew. Kendra (1998) argued that the above navigation, propulsion and engineering technologies resulted in significant reduction in crew sizes on ships.

3.4.1 INFORMATION AND COMMUNICATION TECHNOLOGIES

A major breakthrough innovation in mid 1990s was the advancement in communication technologies at sea. The conventional radio transmitters and Morse code equipment, earlier used for ship to shore communication, were replaced with satellite telecommunication technologies and standard maritime based distress and safety systems. Consequently, skilled radio operators lost their jobs at sea since communication was simplified and re-assigned to deck officers and ship masters (Kendra, 1998). The advances in communication technologies were exploited also for commercial purposes. A reduction in communication costs allowed ship owners to use technology for information transfer between ship and shore and enhance control of shore management in shipboard operations (Morris and Don 2000).

The advent of multi-modal transport shifted the onus of cargo planning to the shore side. This was desired not only for the purpose of minimising the turn-around of ships in ports but also for ports to synchronise and control the movement of ships with other interfaces in managing the network of multi-modal transport (Alderton, 2008). As a result the role of seafarers on ships was mainly reduced to supervisory functions. Furthermore, many shipping companies aiming to improve the safety and efficiency of ships during their ocean transits outsourced the planning of ocean passages to weather routeing agencies (Kopacz *et al.,* 2003). These weather routeing agencies were better positioned to assess the weather conditions at sea thus

minimising the impact of adverse weather on ship performance. Likewise a detailed overview of inventory controls, cargo information and crew personal records could be maintained at the shore end with advanced communication technologies.

Peters (2001) noted that due to the availability of global finance many ship owners were turning to emerging shipyards in South Asian markets for shipbuilding. The new shipyards in the emerging markets offered new ships at competitive prices, however, the average operating age of these new ships came down due to the cheaper quality of steel used in shipbuilding (UNCTAD, 2008). As a result ship management and operation strategies shifted from detailed and rigorous maintenance towards lighter maintenance. These new ships, partly due to their lighter maintenance at sea, could be operated with reduced manpower thus allowing further reduction in crew sizes on ships.

The ease of availability of finance in the shipping markets also attracted asset players without any background and understanding of the management and running of ships (Stopford, 1999). Merchant ships, so far managed and owned single-handedly by traditional ownership companies, were now shifting towards third party management companies (Mitroussi, 2004). These third party management companies provided the technical expertise to operate ships cost effectively. As ownership separated from the management and operation of ships the role of communication technologies enhanced further to facilitate communication between the operators, managers and ship owners.

Certain technologies, it appears, were implemented for contingent reasons. The security concerns following terrorism attacks in the United States in the year 2001, for instance, saw an increase in security and safety technologies at sea. The recent introductions include Automated Ship Identification Systems (AIS) and Long Range Identification Technologies (LRIT) as a way of monitoring ship movements at sea on a continuous basis. But again, once implemented, these technologies were exploited also for commercial purposes as the tracking of ship movement was made available to shipping companies and cargo owners (Source: International Maritime Organization).

In all, the analysis suggests that global production strategies played an important role in driving technological advancements within the maritime sector. New technologies were implemented to facilitate safe and efficient movement of cargoes with the aim to improve the

reliability of transport by sea, and due to the wider ambitions to integrate maritime transport within global production and sourcing. This is particularly evident in the case of the container sector which underwent significant transformations as a result of globalisation and new technologies.

The technological advancements aimed at providing safe and reliable movement of cargoes by sea resulted in a significant increase in maritime traffic (UNCTAD, 2009). As a result the demand for seafarers to operate the ships increased significantly and in order to address their manpower requirements ship owners were forced to source labour from new countries without much history in supplying maritime labour. Although some scholars saw this shift in labour sourcing mainly due to the lack of available skills in traditional seafarers' supplying nations (Leggate, 2004), others argued that the shift was predominantly driven by the availability of low cost labour in new countries (Tsamourgelis, 2009, Leggate and McConville, 2002)

The global sourcing of labour is of particular interest within the context of this study. For a long time the traditional maritime labour supply countries maintained a vast pool of skills and the training infrastructure required for seafarers' training. A rapid and significant shift in the sourcing of labour raises questions about the capability of new countries to meet the training and skill demand. The existing literature suggests that the training standards in new countries remain questionable (Sampson and Bloor, 2009). It raises serious questions within the context of this study and requires us to examine whether new technologies were implemented to substitute seafaring skills, reduce costs or to decentralise operations and devolve more autonomy and control to the seafarers in the running of ships. We will consider these issues in the course of the thesis, but for now let us turn to examining the institutional and labour reforms implemented to maintain a supply of seafarers.

3.5 GLOBALISATION OF MARITIME LABOUR MARKETS

For many scholars the increased trend towards sourcing of labour from new countries heralded the globalisation of maritime labour market (Alderton *et al.,* 2004, Kumar and Hoffman, 2002). The competitive requirements to source labour from new countries compelled the implementation and enforcement of institutional and labour reforms to exploit the benefits of cheaper labour. Parallel developments were being undertaken in many international work sectors such as the telecommunications, information and communication

technologies (ICT) and financial services industry (Taylor and Bain, 2005; Gereffi *et al.,* 2005). Capital was being relocated to cost-effective locations in response to competitive pressures, and the drive for profits and cheaper labour costs. Whereas transnational companies turned to tax havens (Harvey, 2005), the shipping companies sought economic advantage by relocating their ships from national registers to 'flags of conveniences' (FOC's) (Alderton and Winchester, 2002).

3.5.1 FLAGS OF CONVENIENCES (FOC)

The nationality of merchant ships is determined by the State where the ship is registered. A ship registered under a particular state is entitled to fly the national flag of the state and the state becomes the 'flag of registry' of the ship (UNCLOS, 1982). Although merchant ships are allowed the freedom of navigation through high seas since the ships must also enter into foreign ports, coastal and territorial zones it is mandatory to demonstrate compliance with statutory regulations and international conventions. The primary responsibility of compliance rests with the ship's flag of registry.

Historically, it is not uncommon for merchant ship owners to register their ships with flags of registry outside their own state. As early as the twelfth century, when the Holy Roman Empire was split into smaller nations, ships have been flagged out to foreign states. In the aftermath of political wars and economic rivalries the ship owners were forced to conceal their ownership and national identity by flagging out their ships to foreign flags. In more recent times Alderton and Winchester (2002) argue that the decision to flag out ships to the countries other than the owner's domicile emerges from the motive to escape hefty taxes in the home countries of ship owners and a relaxed approach to regulations. Flagging out ships also offered a way to reduce crew costs since shipping companies were now able to source seafarers from non-domicile countries.

The past two decades have seen a significant increase in the flagging out of ships to flags of conveniences (FOCs) and second registers[5]. The rationale to flag out ships appears to be particularly driven by competitive reasons followed by laissez faire economic policies. The freight rate crisis during the 1980s, the soaring fuel costs and the volatile market conditions

---

[5] Second registers – Second registers also termed as the quasi-Flags of Convenience is a group of Flag States in the Western European traditional maritime nations which allow ship owners to register their ships within the same country with most benefits of the FOC's.

put pressure on ship owners to flag out ships to the flags of conveniences (Bergantino and Marlow, 1998). With less control over the running costs of ships, it is argued that the owners sought to bring down crewing costs as a measure to improve profits. Flags of convenience thus became a convenient means (or 'crews of convenience') for companies to avail low cost labour from non-established maritime countries (Alderton et al., 2004, Carlisle, 1981)

Another observation made by Stopford (1997) in the context of the increased popularity of the FOCs is that many ship owners, in the aftermath of the oil crisis, could no longer afford to run their ships profitably on their own. Flagging out ships to the FOCs (to achieve lower operating costs) resulted in the transfer of management of ships to third party management companies by the ship owners. Thus, ship owners were no longer directly involved in the routine operation of ships and the employment of seafarers. On the other hand, third party management companies, because of the increased flexibility offered by FOCs' in terms of regulatory enforcement and compliance were able to employ seafarers from competitive global locations (Mitroussi, 2004). Thus, unlike national flag registers that statutorily require the ship owners to employ seafarers from home countries, the FOCs facilitated the employment of seafarers from what is now perceived as global maritime labour market. That is to say that the seafarers could be recruited irrespective of their nationality so long as the training and certification requirements of the seafarers comply with the international standards and conventions (explained below in the section Standards of Training, Certification and Watchkeeping STCW).

However, there are no grounds to conclude that flagging out of ships to the FOCs automatically leads to poor operating standards of ships or that low cost labour can be treated as poor quality in terms of their training standards. De Sombre (2006) posits that although competition strategies may exert downward pressure on the company operating standards it may, on the other hand, undermine safety and prove expensive for indirect costs such as those arising from accidents and higher insurance premiums Moreover a significant proportion of ships registered under FOCs are now owned and operated by reputable international companies. Poor operating standards may result in undermining the reputation of these companies (Walters, 2009, Dirks, 2001).

The discussion so far illustrates the role played by the FOCs to facilitate the sourcing of seafarers from new countries. A considerable shift in the sourcing of labour from non

established countries raised concerns about the safe management of maritime transport and the competencies and skills of seafarers. It is argued that to avoid the ship owners from adopting a race to the bottom approach in sourcing labour from new countries the International Maritime Organisation (explained below) introduced a set of institutional and labour reforms.

3.6 THE ROLE OF INTERNATIONAL STANDARDS

This section reviews the key policy reforms introduced in response to the formation of global maritime labour market. In large part, these reforms were implemented by the International Maritime Organisation (IMO), the UN agency responsible for maintaining technical and training standards in international shipping on matters related with safety, security and environmental protection at sea[6]. Unlike supra-national agencies where the international laws and conventions are enforced upon the member states (for instance EU cooperation relating to the internal market, agriculture, fisheries etc) the IMO acts merely as an intergovernmental body seeking international co-operation between the member states on matters pertaining to safety and environmental issues at sea. Thus it is solely left to the member states to adopt international conventions and incorporate legislative changes into their national laws.

3.6.1 STANDARDS OF TRAINING, CERTIFICATION AND WATCHKEEPING (STCW)

Maritime accidents have historically played an important role in influencing policy decisions in the shipping industry. It was the sinking of the Titanic that led to the introduction of the first safety convention, Safety of Life at Sea (SOLAS), a descriptive code outlining the technical requirements for navigation, radio communication, life saving appliances and machineries and installations on merchant ships.

Gradually, maritime accidents became the basis to push reforms in the training standards of seafarers. The environmental damage to the UK coast as a consequence of the grounding of Torrey Canyon in the year 1967 followed by the grounding of the *Exxon Valdez* and the *Braer* raised serious questions about the competencies of foreign crews entering international ports (Dirks, 2001). Technological advancements meant that merchant ships were now able to

---

[6] The reforms related with the living conditions of seafarers on ships are implemented by the International Labour Organisation (ILO)

carry high risk cargoes (in relatively large quantities) hence posing increased threat to marine environment and safety.

By the mid twentieth century the IMO had gained acceptance as an international maritime agency of the United Nations and its position to intervene in technical and safety matters at sea had gained momentum (Source: IMO history). Thus an international convention was passed to address the issue of training of seafarers under the STCW 78 convention. The aim was to:

> ... establish basic requirements of training, certification and Watchkeeping for seafarers on an international level. Previously the standards of certification and Watchkeeping of officers and ratings were established by individual governments, usually without reference to practices and procedures varied widely, even though shipping is the most international of all industries (IMO 2003 cited in Sampson, 2004: 249).

At its initial stages of implementation it was argued that STCW was lacking a clear structure. For many scholars the entire approach to certification standards and the training curriculum was excessively prescriptive (Rojas, 2002, Sletner, 2000). According to Lewarn (2002) the entire purpose of vocational education was to address the skill requirements of the businesses. Lewarn (2000) asserted that the STCW 78 was far too 'rigid' in its approach to address the skill requirements of the maritime industry. Thus, only the knowledge and skills directly relevant to the needs of businesses were given importance rather than learning for its own sake.

Stratton (1994) noted that the STCW 78 lacked the flexibility to incorporate innovative methods of training. A more appropriate methodology was proposed as a shift away from knowledge based assessment towards competency based assessment of the training and certification of seafarers. A comprehensive amendment was introduced in the form of the Standards of Training, Certification and Watchkeeping 1978 *as amended* in 1995 (henceforth STCW 95).

The objective of the STCW amendment was to standardise the education and training (MET) of seafarers at the international level. Once this could be agreed and achieved, the seafarers from non-established countries could be trained and sourced at competitive prices. The standardization of training and certification standards, it was argued, would minimise the

differences in the quality of training of workers irrespective of their nationality and hence facilitate the sourcing of labour from competitive locations.

The new STCW 95 training and certification model demonstrated a competence based approach in the education and training of seafarers. Broader literature confirms that the success of this new model was based on 'outcomes assessed against industry and enterprise standards, rather than consistency in curricula' (Mulcahy, 2000, James and Mulcahy, 1998, Stopford, 1988). The efficacy of the STCW 95, nevertheless, has come under attack recently by Bloor and Sampson (2009) through a case study of a non-traditional labour supplying country. The study raised the issue of 'paper-mill' approach to the certification processes of seafarers (in other words fraudulent certification) and highlights serious failings in the training standards in the country under observation. The authors argued that a flexible approach to education and training poses numerous challenges in terms of quality and compliance when it is left to the market correcting mechanisms. In the absence of state intervention and control, both maritime colleges and ship operators are inclined to adopt lower standards of training and an expedient approach to crew training. These issues raise serious concerns for the maritime industry.

In all, when the modus operandi of the STCW 95 is compared against training reforms in the wider sectors of work it shows that the objective was mainly to create a level playing field in the training standards of seafarers to exploit the opportunities of a global labour market.

3.6.2 INTERNATIONAL SAFETY MANAGEMENT CODE (ISM)

The International Safety Management Code (ISM) was first implemented in the year 1998 and came into force in 2002. The Code was developed and implemented to address the management issues of ships in response to the safety and quality concerns faced by the maritime industry. Hence, it is worth shedding some light on the historical developments that necessitated the implementation of the ISM code.

Beginning with the oil crisis of 1980s and the resulting decline in world trade, the shipbuilding activity was on the decline in the European shipyards. Partly, the pressure on European shipyards also resulted from emerging shipyards in South Asia (Stopford, 1988). Adding to this, the protracted delay in shipbuilding, i.e. the time taken in building the ships from the time new building orders are placed, creates severe imbalances in the demand and

supply of maritime transport (see Stopford, 1997). In effect these two factors together resulted in a 'flood[ing] of new and cheap ships launched from the subsidized and protected yards of the world in the late 1970s and onwards into the mid-1980s [which] undoubtedly made the bad trading period worse' (Alderton *et al.,* 2004: 7). The ship operators in their endeavours to cut down on operating costs took to 'lighter' maintenance and sub-standard operation of ships with ramifications for the safety of ships (Carlisle, 1981). The impact of substandard operations of ships resulted in increased accidents and maritime casualties at sea (various MAIB Reports, UK).

Labour cost was another cause of concern for ship owners. Many ship owners were now shifting to new countries to source labour. Anderson (2003: 17) noted that highly skilled seafarers from established maritime nations were being replaced by cheaper seafarers with 'little basic education and even less maritime education and training' thus compounding the safety issues in the maritime sector. Although exact statistical evidences are unavailable, several industry reports demonstrated the ship owners approach to management and operations that led to accidents at sea (MAIB reports, UK P&I Club 1991).

The ISM Code is also an offspring of the ISO 9000 series belonging to the International Organisation of Standards (ISO) family (Horck, 2007). The ISO 9000 series, adopted in the late 1980s in the British Standards Institutions, was an initiative to increase the competitive advantage of the UK in the international markets following trade liberalisation (Tate, 2001). In part therefore, the roots of the ISM code in the ISO series serves to explain the proclivity for policies of free market 'laissez faire' entering into the shipping industry during the 1990s.

From this perspective, the focus on improving the management of ships was primarily to safeguard the interests of cargo owners. After all, as Horck (2007: 3) points out 'a happy consignee and consignor' makes shipping a profitable business. The issue of customer focus gained increased attention during the early nineties. The proliferation of transport services due to the increase in multi-modal transport meant that the same cargo could now be transported through various combinations of rail, road, air and sea transport services. Various logistics service providers and non vessel owned cargo carriers emerged during this time to compete with shipping companies (EC Report, 2005). At the same time emerging South Asian countries developed their own fleets of ships. The cargo owners now had more choices to ship their cargoes using alternative services. Studies in maritime economics noted the

changing dynamics of power relations between cargo owners and traditional ship owners from established maritime countries (Sletmo, 2001, Kumar and Hoffman, 2002, EC, 2005). Since market forces now placed cargo owners in privileged position with alternative choices of shipping services, customer satisfaction in other words providing safe and reliable shipping services to the consumer became crucial for shipping companies to survive competition (Fairplay, 2010). All this obviously required improved management standards from ship operators.

To sum up, the ISM Code was a policy initiative to improve the management systems onboard ships. In essence, as Anderson (2005) suggests the Code did not introduce any new changes; it was merely an instrument to ensure that the ship owners and operators complied with existing regulations and conventions. The Code offered guidelines for ship owners to adopt a formal approach to work organisation. It also stressed the importance of maintaining documented evidence in the form of detailed records of shipboard activities. A detailed record keeping of work on ships was much desired both for cargo owners and ship owners to eschew the legal penalties as well as the commercial claims arising due to cargo contamination, vessel delays or casualties at sea. Each task, no matter how small or big, was required to be documented to demonstrate compliance with company procedures and regulatory requirements.

As a consequence, onboard jobs became highly bureaucratised. Even for critical and non-routine operations protocols were established for the detailed guidance of ship's crews. A comprehensive maintenance program was required for ships to demonstrate compliance with the safety and environmental regulations. Both Anderson (2005) and more recently Knudsen (2009) suggest that many seafarers perceived the introduction of the ISM code as wasteful increase in administrative work on ships.

The underlying philosophies of the ISM Code were to adopt a formal approach to the management of ships and allocate increased control to the shore side. Although ships were, so far, treated as mobile floating assets solely relying on the discretion and knowledge of seafarers the revised approach to the management of ships (as required by the ISM Code) placed the shore side at par and equally participating in the routine day-to-day running of ships. A 'defined level of authority' was established between the company and ship crew. A round the clock shore assistance was established by companies by assigning a designated

person ashore (DPA) to each ship. Parallel developments in communication and management technologies also played an important role. The communication costs reduced tremendously with satellite communication technologies thus allowing shipping companies' remote access to manage their ships in cost effective manner.

3.6.3 PORT STATE CONTROL

Under normal circumstances the responsibility for enforcement and compliance with regulations concerning merchant ships rests with the flag state. However, as pointed out by Sampson and Bloor (2007), the problem of a global industry is that the regulatory issues tend to take a backseat in the face of market competition. In this respect, the flagging out of ships to flags of convenience was considered one of the most important factors to set up an additional global policing mechanism in the shipping industry.

Although flags of convenience have been around for many years its widespread usage in the post war period has raised questions about the operating standards of ships registered under flags of convenience. The modern flags of convenience have become increasingly known for reasons of relaxed regulations and tax havens and have been commonly perceived in the literature as 'no-questions-asked-system' (Carlisle, 1981). Such attributes, it is argued, would particularly appeal to those ship owners seeking minimum regulatory interventions in pursuit of profit maximization.

In the years following the oil crisis during 1980s, the frequency of accidents and maritime casualties increased significantly according to various industry reports (various P&I and UK MAIB reports). Port states became increasingly sensitive to the safety standards of foreign ships and hence demanded a secondary enforcement mechanism as a result of the failure of many flag states to comply with international safety standards (Vorbach, 2001). As a backup therefore, the port state control became increasingly involved in the inspection of foreign ships although it should be made clear that the statutory rights of port states to action against non-compliance of foreign ships is well established in the international law. For ship operators a failure to comply with the port state requirements resulted in operational delays and commercial losses because of ships being arrested and delayed in foreign ports.

Gradually, the port state component in the international shipping started to show a positive impact on the safety of shipping through close monitoring of sub-standard ships (DeSombre,

2006). Regional port states came together and started to share information using jointly held data bases (see for example www.equasis.org). Starting in 1982, Paris Memorandum of Understanding (MoU) was the first such initiative of North European ports to share information on sub-standard ships plying in regional waters later followed by memorandum of understanding between regional port state controls in other parts of the world. As Vorbach (2001) states, the efficacy of information sharing between regional ports was that it eschewed the 'delays and implementation difficulties that would have been a part of a formal treaty negotiation' (p. 35).

It is not the intention to enter into a detailed discussion about the Port State Control. The aim here is to understand the limiting structures imposed by a global regulatory instrument as a response to market competition and the opening of labour market.

3.7 SUMMARY OF DISCUSSION AND RESEARCH QUESTIONS

The first section of the chapter discussed the advancement of technology in the maritime sector. The review indicates that amongst the various trade sectors the container sector was most affected by technological changes. The rapid advancements in this sector were principally a result of the relocation of manufacturing and sourcing from competitive locations in response to trade liberalisation in the early 1990s. In the wet trade the innovations were focused on safe and cost efficient movement of oil products and alternative sources of energy. In the bulk sector technological changes remained slow mainly focusing on the construction and design of ships to exploit the economies of scale. The discussion also shows that both ship designs and cargo operations in ports became integrated and were increasingly designed to rationalise costs and improve efficiencies. A series of micro-level (technological) changes were introduced to navigation, communication and propulsion technologies to facilitate the safety and efficiencies within maritime transport.

The next section outlined the major reforms that played an important role in the formation of a global maritime labour market. The reforms included the outsourcing of ship management and crewing functions, and the development of international standards and regulatory mechanisms. These reforms were introduced as an attempt to regulate unfettered market competition driven by the globalisation of labour markets.

Examining the combined effects of technological advancements and the institutional reforms in the maritime industry (in response to the globalization of labour markets) is crucial in the context of this study. As discussed earlier in the previous chapter, it raises questions about the underlying reasons and the implications of new technologies both from the employers' and seafarers perspective. The competing theories of technology discussed in the previous chapters have illustrated that the implications of new technologies on the nature of work, skills and employment of workers depend on a range of factors such as the nature of competition, the institutional and labour mechanisms (to protect the interests of workers) and more importantly the perceptions and views of workers about their work and profession.

From the ship owners perspective it is important to examine how the competition strategies are influenced by access to labour from competitive locations and technological advances. The thesis therefore seeks to answer the following question:

Q.1)   What is the impact of global competition on the introduction of new technologies on ships?

This question will be answered by examining the changes to the competition strategies of shipping companies as a result of the institutional and technological changes resulting from global competition. Next, it is important to find out how new technologies are being introduced and implemented by shipping companies to remain competitive. This includes understanding the potential benefits and challenges of implementing new technologies, the re-organisation of work, the changing demand for training and skills and the changes to employment conditions and labour sourcing strategies of companies.

From the workers perspective it is important to understand how the above changes impact upon their perceptions and views about work, skills and profession. The thesis seeks to elucidate the answer to the following question from the workers' perspective:

Q.2)   What are the implications of new technologies for work, skills and professional identity of seafarers?

This involves looking beyond the obvious issues of consent and resistance of workers as has been the case in existing studies and examining the views of workers, both positive and

negative, about the changing nature of work, skills and the seafaring profession. For instance, what is considered a pure economic gain from the employers' perspective may translate into wider social issues for the workers. Past studies have reported that highly time constrained just-in-time operations translate into negative impact on the well-being of workers especially because the seafarers work and live in the same settings for extended periods. It is important also to understand and examine how the shift from traditional maritime nations towards non-established countries is viewed by the workers. Finally, as discussed in the previous chapter whether technology leads to deskilling or upskilling of workers will be assessed by examining the views of the workers about the importance of knowledge, skills, discretion and their wider understanding about the profession and not necessarily by examining the *application* of knowledge and the *demand* for skills. The perspectives of workers have been less discussed because of the excess focus on businesses challenges and employers' perspectives in the existing literature.

It is therefore with these questions that the thesis turns to the next chapter to discuss the methods of data collection and analysis in this study.

CHAPTER 4   METHODOLOGY

This thesis is aimed at examining the implications of new technologies for work, skills and identity in the maritime sector. The focus is on examining how the workers perceive the changing nature of work and skills as a result of technological advances driven by global competition. In order to address these issues the thesis is designed within the theoretical framework of discussion between the upskilling and deskilling thesis.

The review of literature suggest that to illustrate the upskilling and deskilling effects of new technologies, past studies have increasingly relied upon statistical data such as the relationship between new technologies, wages, employment rates, employee turnover etc. From the workers' perspective scholars have examined technological changes in workplaces and focused mainly on the resistance, consciousness and consent of workers to new technologies (Berardi, 2009, Ritzer, 1998, Milkman, 1998, Sawchuk, 2006, Baldry *et al.,* 1998, Thompson and Warhurst, 1998). Others have examined the application of knowledge and skills in the labour process given that new technologies can be assigned much of the intellectual work (Braverman, 1974, Blauner, 1964, Wallace and Kalleberg, 1982, Stinchcombe, 1959). Nevertheless, the question of how technological changes affect the nature of work and skills more broadly from a worker's perspective seem to have been overlooked in the literature.

To avoid any prior assumption, this thesis examines the thesis of upskilling and deskilling through an elucidation of the impact of technology on work as experienced by the workers themselves. This research is therefore designed as a qualitative enquiry and the methods of research rely mainly on opinions, perceptions, interpretations, and experiences of participants. The 'meanings' are important as it is in the manifestation of how people exist and relate themselves to the social world (Gadamer, 1975, Maanen, 1997). In other words, the implications of technological advancements in the maritime industry will be examined by investigating the ways in which the workers perceive the changes to their work, skills and profession in relation to the actual changes that have taken place. This is also the reason that the use of jargon, lingo, and local language as a form of expression has been consciously encouraged during data collection to understand the *views* of participants.

An exclusive focus either on the employers' perspective or the accounts of workers about technological changes is bound to generate biased explanations. To avoid this, the study incorporated the views of both employers and employees. Such an equation was considered important to ensure that a balanced view was obtained about new technologies, work and skills by comparing the business challenges and employees' reactions to market competition.

This chapter outlines the methods used in answering the research questions. I will outline the research process including the techniques used in the sampling of data sources, the negotiation of access to the participants and the interview procedure. I will then present a brief discussion of the data analysis process. The following section discusses the ethical considerations and challenges encountered during the course of research. The penultimate section highlights the importance of reflexivity in the study particularly as a result of my position as an ex-seafarer. The chapter ends with a brief summary of the overall discussion.

4.1 PURPOSIVE SAMPLING

A purposive sampling strategy was employed to identify the required data sources in order to answer the research questions. The views of shipping company managers and seafarers on ships were considered crucial to addressing the research questions and therefore included in this study. Whilst the shipping company managers can shed light on the underlying reasons for implementing new technologies, skill demands and labour sourcing strategies, the actual nature of work, skills and the issue of workers' identity are best answered by the seafarers themselves. A third group of research participants were the training faculty in the maritime colleges and training managers in shipping companies. It was not earlier planned to include this group but at a later stage it became apparent that the views of the training staff were equally important to understanding the issue of professional identity (as explained below).

4.2 DATA SOURCES

4.2.1 SHIPPING COMPANIES

A total of eight shipping companies were included in this study (see table 4.1 for company details). When identifying the shipping companies the primary concerns were the ease of access and their willingness to participate in the research. There were of course practical and economic concerns in accessing international companies dispersed in distant locations, especially given the funding and resource constraints. A further limiting problem was the

need to identify companies within accessible geographic locations preferably those with regional offices in the UK / Europe region.

Only those shipping companies with a global presence, both in terms of shipping offices as well as sourcing of employees (seafarers) were considered appropriate for sampling. Thus the focus was mainly on the upper strata of shipping companies primarily those operating at large scale with the aim to access these companies (and their employees) in international locations. Small companies were therefore not included in this study. While some companies operated as comprehensive owners and managers, others were purely third party management companies. During data collection, it was found that third party management companies faced even more pressure to reduce crewing costs as crew sourcing, supply and training formed their core competitive strength. Having said this, there were no significant differences observed in the sourcing and training strategies of the eight companies and their general approach to seafarers' employment and welfare.

When selecting the shipping companies my aim was to introduce some degree of variation in terms of technological advancements. The literature suggests that the level of innovation in the container sector and in the case of high valued and high risk cargoes such as oil and gas is relatively higher than those ships involved in the transport of cheaper commodities in bulk (for example oil, coal, steel, iron ore etc) (Stopford, 1997, Alderton, 2008). It was therefore my aim to include major trading patterns and ship types – containers, oil tankers, dry bulk carrier ships and liquefied natural gas ships in the sample. Equally important was to find out how the technological advancements across different sectors of trade impact upon the demand for skills and the labour sourcing strategies of employers.

Table 4.1 Shipping Company Profile

S.No	Company Code	Company type / Key areas of operation	Types of ships	Fleet capacity (approximate number of ships and seafarers employed)
1	Company A	Ship ownership, technical management, crew management, crew training, logistics and value added services	Containers, Car carriers, Tankers, Gas carriers	60 / 3500 seafarers
2	Company B	Ship ownership, technical management, crew management	Containers	55 / 3300 seafarers
3	Company C	Third party technical management, crew management, crew training	Containers, Car carriers, Tankers, Bulk carriers, Gas carriers	280 / 10,000 seafarers
4	Company D	Third party technical management, crew management, ship operations, chartering, logistics and value added services	Containers, Car carriers, Tankers, Bulk carriers, Gas carriers	To be confirmed
5	Company E	Third party technical management, crew management, ship operations, chartering, logistics and value added services	Containers, Car carriers, Tankers, Bulk carriers, Gas carriers.	To be confirmed
6	Company F	Ship ownership and management	Tankers	16 / 1050
7	Company G	Third party technical management, crew management, chartering and insurance services	Containers, Car carriers, Tankers, Bulk carriers, Gas carriers, Off shore vessels, Cruise ships	700 / 17000
8	Company H	Third party technical management, crew management, crew training	Tankers, Bulk carriers	17 / 1200

During data collection, I observed some differences in the crewing and employment strategies of shipping companies based on the different sectors of trade. In general, the companies involved in operating high risk cargo ships (tankers, gas carriers) showed more sensitivity to crew training and competence. On the other hand, purely container carrier companies were mainly aiming to reduce crew costs by shifting to cheaper locations to source seafarers. Another observation I made was the relationship between cargo owners and ship operators. Where ships operated under long term commitment from cargo owners the general employment conditions were slightly more favourable and stable than transactional and uncertain markets (for example one-off spot market and container business).

At the organisational level, since the research was aimed to examine the views and perceptions of participants, my intention was to include shipping managers from almost all departments and levels of seniority. Senior directors and managers from various divisions (safety, crewing, nautical, commercial, training, and technical) and even those departments with only limited interaction with the ship's crews were interviewed as part of the data collection process to obtain a multi-faceted view of the research problem. During data analysis it was interesting to note how managers, who claimed limited engagement with ships, have formed strong opinions about the seafaring profession.

4.2.2 SEAFARERS

The choice of seafarers was influenced by the same factors as the shipping companies. But more importantly the seafarers working in the same shipping companies (targeted in the earlier section) were included in the study. This was important in order to obtain comparable views between the employers and the seafarers about themes such as new technologies, employment and labour sourcing strategies, training and skill demands that may vary across organisations.

My aim was to interview seafarers of all ranks. Given the hierarchical organisation of crew structures on ships and a clear division of labour between nautical and engine departments, the literature suggests that management control, technological changes and its impact on work are understood differently by different ranks (Vickers and Walsh, 1999, Allen, 2009, Alderton *et al.*, 2004). Moreover, past studies illustrate that new technologies have blurred the existing division of labour between deck and engine department through the use of flexible labour at sea (Kendra, 1998). I was interested in examining how new technology may lead to an overlap of responsibilities and duties across departments and how this may influence the understanding of seafarers about their work. Thus, in lieu of targeting any one department, my aim was to obtain an overall assessment of shipboard technologies and its impact on seafarers of all ranks across nautical and engine department.

The shipmaster (also termed ship captain), chief officer, second officer, third officer and deck cadet, and deck ratings belong to the deck department. The chief engineer, second engineer, third engineer, and fourth engineer, engine cadet and engine ratings fall within the engine department. As a norm within the industry shipmasters, chief officers, chief engineers and

second engineers are termed as 'senior officers'. The second officers, third officers, third engineers, fourth engineers, engine cadets and deck cadets are termed 'junior officers'. For each department there is also support staff (also termed as ratings): Boatswain, Able Body seamen and ordinary seamen in the deck department and oilers and greasers in the engine department. Chief cook and stewards also form part of support staff (See shipboard organisation chart: Annex 3).

The study draws mainly from a small sample of seafarer officers, mainly from India. The selection of Indian seafarers in the study was based on the country's dominant position as a seafaring supply nation for more than a century (Broeze, 2001, Desai, 1940). For this reason it was felt that it would be easier to locate and access seafarers in India. At the same time the review suggests that there has not been much research on Indian seafarers in the past. Being an Indian, I was very interested to learn about the views of the seafarers from my own country. In line with the research objectives I was interested to examine how the workforce from a dominant maritime labour supply nation would respond to the globalisation of labour markets. Additionally, in my own understanding, access to the seafarers from my own country would have been far easier than searching for seafarers in foreign settings.

The existing literature highlights the challenges faced by the researchers undertaking research in foreign settings without appropriate language skills (see for example Taylor and Bain, 2005 on 'linguistic difficulties'; Fuller and Petch, 1995). It is of course entirely possible to conduct interviews in foreign settings through local assistance but in this case it was a deliberate choice to focus on Indian seafarers because of time and budget constraints.

During the later part of data collection five seafarers from the UK and four seafarers from non-established countries (NEC) were also included as part of the data collection process. Altogether, 41 seafarers were interviewed in this study (see Annex – 2A).

4.2.3 MARITIME TRAINING COLLEGES AND PRIVATE TRAINING CENTRES

At the outset the reason to include maritime colleges was mainly to gain access to seafarers without seeking assistance from employers so as to protect the anonymity of seafarers (for details see section 4.6 ethical considerations). For this I identified all the major maritime colleges located in different parts of India to interview the seafarers. It was, however, only

during my first visit to a private training institution in New Delhi, India that I started to realise the importance of incorporating the views of the training staff employed in the colleges as part of my empirical investigation. Sayer (1992: 244) suggests that in qualitative research it is not always the case that the 'who and what' is pre-determined in social research. In answering the research questions one sample may lead to another to build a lucid picture of the research problem.

The views of training staff echoed a strong desire to minimise training costs through the use of simulation technologies and computer based training. In some colleges, in close partnerships with shipping companies, customised solutions were being provided to the companies to address their training and skill requirements. The training personnel in these colleges and training centres appeared extremely supportive of the free market views in adopting flexible training techniques in seafarers training. This I witnessed not only in the outlook of participants towards training but also in their teaching and training strategies. In contrast, my visit to a state-operated training college within the country offered a different perspective of maritime training. The views of the training faculties in state colleges were embedded in the ethos and traditions of the seafaring profession. The colleges exhibited an embodiment of seafaring traditions with the images and models of sail ships, conventional ships with derricks and cranes, picture frames of rope knots, rope and wire splices almost everywhere around the premises. Subsequently, these contradicting views and observations from the field between private training centres and state colleges encouraged me to explore training issues further.

The selection of Indian training colleges added to the complexity of data in this study. In the past the country has maintained relatively high standards of training and certification in the maritime industry. This is because almost all the training colleges in the past were owned and hence tightly monitored by the state. Nevertheless the privatization trend, evident in the wider literature, reflected in the management of private maritime training centres and the country's transforming position in supplying low cost labour to the maritime sector.

A total of three state owned colleges and four private training institutions from India were included in the sampling. I have deliberately used the term 'training faculty' in the former case and the term 'training manager' in the case of private training institutions to differentiate between the public and private sector participants.

Within the UK only one maritime college was targeted for data collection since much of the data on training had already been gathered in India. The data collection within the UK maritime college was principally focused on interviewing the seafarers as the data gathered from India was insufficient to answer the research questions adequately. The recording of informal discussions and field notes with various training faculty in the UK maritime college became part of the data collected. During analysis, the data proved very useful to compare between the views of seafarers trained in established maritime nations (irrespective of their nationality) and those trained in private colleges in India.

In all, 24 shipping company managers, 17 Training managers, 5 Training faculty staff and 41 seafarers were interviewed in this study (see Annex 2-A and 2-B for details of participants).

4.3 ACCESS NEGOTIATION

For industry specific research, Punch (1986) suggests that the backing of relevant professional bodies can be very useful to gain smooth access to the participants. During my first year as a research student I obtained membership to the Nautical Institute UK and the Royal Institute of Navigation UK. Both institutions hold regular seminars, conferences and maritime events. I attended various seminars and conferences arranged by the Nautical Institute in India and UK and managed to establish contacts with a few shipping companies. Moreover, having worked in the industry for a long period I was able to exploit my own network to establish contact with some companies.

Access to the participants did not cause many problems in my case. During the initial stages I travelled to India to attend a seminar – 'Modern Watch Keeping and the Human Element' arranged by the Nautical Institute UK. As I understood from the seminar discussions the implementation of new technologies was a growing concern amongst shipping companies. It is likely therefore that my area of research was topical and at the same time my position as an ex-practitioner researcher may have raised the interest of companies, encouraging them to participate in the study. Moreover, my name was familiar to some employers because of my past employment within the maritime industry, which facilitated access to some companies. Finally, the Seafarers International Research Centre (SIRC) and Cardiff University's contribution to maritime research is perceived to be of a very high standard by the industry.

Most employers were familiar with the research undertaken by SIRC in recent years and expressed their willingness to participate in the study.

Most shipping companies and training colleges responded to my emails within a short duration and expressed willingness to participate in the study. With at least two shipping companies the commitment to participate in the study was also dependent on *mutual gain*. As a senior manager from one company asked me upfront – 'How would it benefit us'? My response in each case was to agree to provide a copy of the executive summary of the research at the end of the study. This I believe was very useful in gaining access to these companies.

In the case of seafarers, since my aim was to seek minimum assistance from the employers to obtain access to the seafarers (to protect their identity) I decided to sample the seafarers directly from the maritime colleges in India and the UK. I met the staff at maritime colleges and requested to arrange for a suitable time, preferably during lecture breaks, to meet the seafarers, introduce my research topic and seek their participation in my study.

I noticed that the willingness of seafarers to participate in the study was in part as a result of my position as an ex-seafarer. Fuller and Petch (1995) suggest that in practitioner research access is not so much a concern for the practitioner as a certain degree of co-operation and encouragement is gained from the participants simply because of the researcher's old roots in the profession. Also, many participating in the study appeared under the impression that the study may bring 'success' and thus contribute to the welfare of the seafaring community. In one case for instance a seafarer commented:

> "Take care my man; hope the study will bring success to seafarers"

Since I have myself been a seafarer, the above quote suggests that this seafarer raised his expectations that my research would serve the interest of the seafaring community. It should be made clear that at no time were any implicit or explicit promises made to raise such expectations. When such expectations were raised, my immediate response was that the purpose of a PhD is not to influence policy but to contribute to existing literature. Based on the wider perceptions about *research, however,* I believe that the implicit hope that the findings of the study would influence policy in favour of the seafarers was an important reason, at least for some seafarers, to take part in the study.

4.4 SEMI-STRUCTURED INTERVIEWS

The research was designed so as to examine the reasons for the implementation of new technologies on ships and its impact on work, skills and the seafaring identity The main themes of investigation included the nature of competition in the shipping industry, the reasons for implementing new technologies, the nature of skills required to work on ships and the employment and labour sourcing strategies of shipping companies. The aim was to examine the perceptions and views of workers about the technological changes introduced by the employers to remain competitive.

Semi-structured interviews were used as the primary tools of data collection. There were many reasons to opt for semi-structured interviews. As explained above, the research draws a comparison between the views of the employers and the seafarers. As far as possible therefore the themes discussed with the employers should match those with the seafarers. It was thus important to outline a set of guiding questions to facilitate an effective comparison between the employers and employees.

In qualitative interviews the role of the researcher is that of *facilitator*, to ensure appropriate interaction during interviewing (Janesick, 2000). At the same time, however, some degree of control and intervention is important to avoid drifting into matters of marginal relevance to the study (Spradley, 1979). In that respect, semi-structured interviews are appropriately suited to the design of the study in that it allows a flexible interview structure backed with probing and prompting from the interviewer allowing him/her to steer the direction of interviews (Rubin and Rubin, 2005). At the same time it gives to the participant the freedom to express their views rather than imposing one's own presumptions and values on the interview data.

As the process of data collection progressed I found this technique extremely useful. It allowed for the incorporation of new ideas and concepts, in turn modifying the research design and questions. Research in the past suggests that a semi-structured interview guide proves very useful when conducting interviews with elite groups – in this case senior managers working in shipping companies. A guided set of research questions proved effective to maximise the use of limited time available in interviewing shipping company managers (Burgess, 1984, Gubrium and Holstein, 1997). At the same time careful wording and phrasing of questions was very useful to avoid raising any sensitive issues during

interaction with senior managers. At one stage for example the unintended use of the term 'cheap labour' with a senior Human Resources manager was not received in a positive manner. Such sensitive terms were therefore removed through careful phrasing of interview questions. In all, semi-structured interviews served the aims and objectives of the research.

4.4.1 INTERVIEWS

Prior to the interviews a research information package was sent out to the employers and the training centres, requesting a suitable date and time of interview. This included a general outline of the study, a formal letter of access, research ethics and a consent form to be signed to participate in the study (see Annex – 4 and 5 for details on research information package). A written consent was obtained in each case prior to the commencement of the interview. In the case of seafarers, however, since the initial contact was established face to face in maritime colleges through lecturers, the research information was passed on only at the beginning of each interview with the participants.

Although each participant was given the research information package, as a general practice before the interview I verbally assured the participants about the confidentiality and anonymity of the data. I introduced my own background as a seafarer and explained the objectives of the research. Most importantly, I stressed the importance of seeing me as a researcher and not as practitioner. For this I stated verbatim to each participant:

> "Through this research I aim to understand your views and opinions, for, if I already knew, there would be no point in doing the research. I would request you to explain everything as you would do to someone without a seafaring background."

At the beginning of each interview I also spent a few minutes in getting to know about the background of the participants so as to develop a rapport. Spending a few moments getting to know the participants helps tremendously when engaging with the participants at a deeper level and creates openness in the discussion (Rubin and Rubin 1995). Nonetheless, care must be taken not to overstress this technique. As Seale (2004) suggests, excessive 'befriending' with participants in the beginning of the interview may induce bias in the study. For instance the participants may choose to answer the questions only to please the researcher and not upset him/her if the researcher becomes too friendly at the beginning of the interview.

4.4.2   THE INTERVIEW SESSION

With the permission of participants each interview was recorded for the purpose of transcription and analysis. Each interview lasted between 45 minutes and an hour. An interview guide was used to facilitate the interviews but in most cases the guide was used only as *aide memoir* to keep the interview structure flexible. In lieu of any sequential guide the participants randomly touched upon various themes. For instance the issue of inappropriate use of technology by the young seafarers and the training standards of new recruits ran parallel throughout the interviews with other themes in the case of training managers and the seafarers in senior positions. With the older seafarers occasionally it felt more like a counselling session. The old seafarers, in many cases, showed signs of helplessness, frustration and anger because of perceived micro-management by employers. But this is where a flexible approach backed with appropriate probing proved effective in interviewing the participants. It allowed me to eschew repetitive themes of discussions and make effective use of interview time.

There were, however, some challenges encountered in the course of the interviews. No matter how much I tried to maintain distance some seafarers still saw me as a practitioner. As is evident from the interview with a shipmaster below:

> Researcher: "According to you what are those skills which you want people to have onboard the ship to be able to work in an efficient manner?"
> Shipmaster: "You know you have been onboard yourself, the chief officer should have the basic skills."
> Researcher: "As I said earlier please treat me as if I don't know anything"
> Shipmaster: "[laughs] I can't really treat you, because I know you know that."

From the beginning I did not plan to conceal my own identity as an ex-seafarer but to use it to gain the credibility of the participants. Eventually, I found a way to overcome this problem. At the beginning of the interviews I would say 'since I quit the sea a long while ago and things may have changed since then please treat me as someone without the background knowledge of the shipping industry'. The participants now had a reason to drop their presumption about my background and experience and it worked!

Another challenge relating directly to the previous one was to avoid excessively discussing the technical issues especially as the focus was on new technologies. The study is about technological changes and so it was difficult for many participants to avoid using industry

jargon and their technical views, given my background as a practitioner. On many occasions, especially in the interviews with technical managers and engineers the conversation drifted into highly technical problems and solutions to those problems. To avoid this I asked for non-technical explanations during the interviews. (I had earlier observed this strategy used by Stephen Sackur in BBC Hard Talk in his interviews with elite technocrats).

Some employers in senior positions and older shipmasters attempted to drive the direction of the interview once they learnt my position at sea as a junior officer. One such example was the suggestion to change the entire focus of the study in what a senior technical manager believed was more worthy of investigation to the maritime sector. As he said in an authoritative tone:

> "You should try and compare with the aviation sector and see where the problem lies. I think that would be a more meaningful study"

In another case a senior fleet manager started to enquire about my background as a seafarer in the middle of the interview. In hindsight, these tensions may not have emerged if I sailed at sea long enough to be promoted as a shipmaster or served ashore in a senior position given a strong culture of hierarchy within the industry. I was aware of these potential problems through a review of literature on interviewing the elites and powerful (Kezar, 2003, Richards, 1996, Conti and O'Neil, 2007). In such cases, as the interview experts often recommend, the use of diplomacy and careful phrasing of interview questions proves useful to stay in control of the discussions and to avoid as much as possible its influence on the findings (Janesick, 2000).

4.4.3 INFORMAL INTERVIEWS

Informal interviews proved very effective and a powerful technique in understanding the social world of the participants, particularly in obtaining the non-technical data relevant to my research questions. Not much has been documented on the importance of informal discussions in the literature given its strength in complementing the formal interview data and introducing rigour in the research.

In most cases informal interviews entailed spending a few extra minutes with the participants at the end of the formal interview session. For instance it was not uncommon for the participants to offer a cup of tea at the start of the interview. But within the first few

interviews, realising how important it was to exchange words at the end of the interview, I generally deferred the tea sessions to the end of the interview.

I noticed that as the (formal) interview sessions came to an end and the voice recorder was turned off it created more relaxation and openness for the participant. Understanding the perceptions of participants and tapping into their social world was far easier at this stage. Where the views of the participants appeared useful I recorded in the research diary with the consent of the participants. On many occasions it took the participants by surprise how simple statements could become 'data' for research.

Apart from the 'tea talks' informal data was elicited on many other occasions – in the corridors of the MET colleges, during lunch time and tea time with seafarers in the colleges, during training exercises with the training staff etc. Besides, as the literature in qualitative research suggests, it would be a mistake to treat data as a commodity waiting *there* to be gathered. It is important therefore to look beyond the bracketed formal interview sessions if the aim is to gain a deeper understanding of the social issues (Mason, 2002, Fuller and Petch, 1995, Hammersley and Atkinson, 1995).

The informal interviews were also very helpful in cases where the employers claimed that their knowledge was limited only to their specialised departments of work. Although I insisted that their views were still important, many employers expressed hesitation to comment on issues beyond what they saw as their expert areas. Again where time permitted, the tea sessions at the end of the interviews played an important role in incorporating the understanding of these managers, especially on the wider issues beyond their departmental knowledge. In one such case, for instance, a middle manager who explicitly stated that his job did not involve dealing with the ship's crew (and hence was unable to comment with much depth on the seafarers) made a comment about the ship captain's status – 'there's no big deal to wear four stripes these days, after 9/11 you'll see these uniform people everywhere' (pointing at the proliferation of private security services). The potency of such statements, i.e. how the professional status of a shipmaster was perceived by the shore side, was realised only at a later stage during the analysis of data.

4.4.4   RESEARCH DIARY

As a qualitative researcher I found that the most important of all tools is the disciplined maintenance of a research diary through the entire course of fieldwork. I produced copious field notes in three research diaries recording almost every detail of the events in the field. On one occasion for instance I made the following observation in the research diary:

> "Most young seafarers in India at the end of the interview sessions appeared keen to obtain further information about higher education in the UK" (Field notes March 09).

Besides, I made mixed observation using symbols, diagrams, and pictures in research diaries. I discovered that capturing such details in the fieldwork, although not directly relevant at that stage, proved extremely useful at the later stage to introduce rigour and quality in the research.

After interviewing the participants I always spent some time reflecting upon my experiences and recorded the same in my diary. Since perceptions and views play an important role in the study I recalled and reflected upon the moments of stress, frustration, laughter or any emotion expressed by the participants and recorded in the research diary. In one case for example a shipmaster laughed for a good two minutes when asked 'What are the career aspirations of the junior officers?' This strange response of the shipmaster was recorded in the research diary:

> "I wonder why the captain found my question so funny. I should have probed him further" (Field notes Feb 2009).

It became clear only at the stage of the analysis why the shipmaster found this question ludicrous.

4.4.5   TELEPHONE INTERVIEWS

In all, eight shipping companies agreed to participate in the study. But the problem was the geographically diverse location of these companies worldwide in North America, Europe, South Asia and the Far East. In many cases although these companies operated with branch offices in the UK, not much activity beyond purely logistical and commercial operations was performed in the UK branch offices. I was advised therefore to contact their branch offices in Singapore, Hong Kong, Rotterdam, Vancouver, Glasgow, London, Mumbai and Los Angeles. In the case of the UK and India all the interviews with the employers were conducted in person face to face. Since travel to multiple international and dispersed

locations posed financial constraints, however, the alternative was to establish remote access to the employers through telephone interviews. In all, the study involved eight telephone interviews.

There exists a vast body of literature on the tradeoffs between using telephone interviews and in-person interviews in qualitative research. In most cases qualitative studies support in-person face to face interviews since the unspoken words (gestures, emotions and provocations) play an equally (or even more) important role in understanding the social nature of the problem (Creswell, 1998, Denzin and Lincoln, 1994). Contrariwise, therefore, it is argued that remote access using telephone interviews could easily miss out this crucial dimension of qualitative data (Rubin and Rubin, 1995, Mason, 2002).Nonetheless, as Shuy (2001) suggests, in some cases telephone interviews if used appropriately may even outweigh the quality of data elicited through in-person interviews. If based on careful consideration of sampling, the depth of information required, the type of questions to be raised (standardised against sensitive or open ended questions) and the cost savings in reaching the appropriate samples from distant locations it is possible that telephone interviews can prove very effective in social research (Frey and Oish, 1995, Shuy, 2001, Miller, 1995, Tausig and Freeman, 1988).

There are, however, some factors to be considered in using telephone interviews for data collection. Unlike in-person interviews, the lack of opportunity to build rapport with participants means that a major drawback of using telephone interviews is the initial hesitation of the participants to talk openly with an unknown researcher (Rubin and Rubin, 2005). At the same time, the fear of being interrogated and recorded may restrict some individuals from opening up beyond a certain level to the researchers. To avoid this from affecting the quality of research data I established prior communication with the participants before the scheduled time of interview. The first telephone call to the participants was generally kept to their background and professional experience. At this stage I also took the opportunity to introduce myself to put the participants at ease and build a certain degree of familiarity before the scheduled interview time. Where initial contact could not be established I dispatched an additional sheet on my professional background and my research profile along with standard research information to the participants. Rubin and Rubin (2005) suggest that information sharing helps to gain the credibility of the participants about the research and the researchers.

All the participants interviewed by telephone were sent a copy of the research information sheet, ethics and consent form at least one week in advance. Once a convenient time and date for the interview was agreed the participants were sent a reminder at least two days prior to the scheduled time of the interviews. Most employers appeared comfortable with the idea of telephone interviews and some even suggested using video conference and web-cameras (if I desired to use one). This was because of the nature of their jobs as the employers claimed that it was common to use telephones and videophones in interacting with ship crew and personnel from remote locations and regional offices.

Against much of the literature in qualitative studies, which appears inclined towards in-person interviewing techniques, I found telephone interviews extremely useful in my research. What I found unique about the telephone interviews (unlike in the case of in-person interviews) was the exceptional level of commitment from almost all employers to their allocated time for interview. In most cases the employers spoke uninterruptedly with great interest without showing any signs of exhaustion or distraction from work. Similarly, as in the case of in-person interviews, the telephone interviews proved equally interactive generating a high level of interaction from the participants. The employers spoke in detail, at times reflecting on their experiences, laughed, felt excited, provoked and even cross-questioned to seek more clarity when required. Since the tone of the employers was the next best alternative at my disposal to their facial expressions I paid careful attention to this aspect of data. In one case for example I sensed that the voice of a manager was constricted suggesting a certain degree of fear when he narrated an incident about a maritime casualty in the fleet over the telephone.

Unfortunately what was missing in the telephone interviews was the informal 'tea sessions' at the end of the interview. Most interviewees were keen to end the telephone calls at the end of the formal interviews because of their work pressures. In one case however, where the participant was interviewed on a weekend whilst at home, in a more relaxed mood the participant stayed on the telephone for an additional 20 minutes after the interview ended to discuss the general issues.

Overall, since telephone interviews were used only as a complementary strategy the benefits of locating and interviewing the appropriate sample outweighed the loss of quality of data in

face to face interviews. Moreover, since the interviews were conducted using internet telephony the voice quality of the data was far superior to some of the in-person interviews conducted in busy office environment. This was particularly helpful in examining the variations in the tone and the energy level of participants in responding to the questions.

In part, the successful use of telephone interviews could also have been as a result of my communication skills as a seafarer. For more than a decade, I have interacted with multi-lingual seafarers and port officials using radio-telephony. As a deck cadet I was trained to speak 'loud and clear' over the radio pausing after each word and sentence to ensure good communication. This I believe could have been a contributing factor in telephone interviews.

It is important to note here that the existing literature fails to capture the potential advantages of using telephone interviews as a major strength in qualitative studies. If the research design allows and if used appropriately and complementarily it can prove very useful to researchers.

4.4.6 FOLLOW UP INTERVIEWS

The telephone interviews were also used at a later stage for at least eight follow up interviews; three with the seafarers and the remaining five interviews with the employers. The follow up interviews were conducted mainly to seek a more lucid understanding of the emerging themes and in some cases merely to put certain analytic concepts to further testing. The follow up with employers and seafarers was conducted mainly to examine further the aspirations of young seafarers to progress further as this emerged as an important theme during the analysis stage.

4.5 DATA ANALYSIS

The purpose of the analysis was to generate an understanding based on the views of a small sample of participants. In examining their views and perceptions due consideration was given to the background and work experience of the participants. Likewise, listening carefully to their past experiences and anecdotes was central to the analysis since historical and social events play an important role in shaping the perceptions of individuals (Mason, 2002).

In qualitative studies, the process of analysis does not necessarily have to wait until data collection comes to an end (Hammersley and Atkinson, 1995, Atkinson *et al.*, 2003). For this reason the preliminary analysis began as early as the start of the field work. At the end of

each day in the field I took some time to revisit the data. Listening carefully to the interviews and comparing with post interview discussions and field notes was useful not only for the future trajectory of the research but also to develop a critical sense of how to question even my basic assumptions.

As part of the field work I also made a brief report at the end of each week to communicate my understandings to my PhD supervisors. Later, this helped me tremendously to reflect upon the data and to relate my findings with the research questions. Adding to this I wrote at least seven detailed analysis reports (which I have termed 'preliminary analysis' reports) during the period of fieldwork and analysis. These reports were written based on my understanding of the data gathered so far in answering the research questions and the consistencies and contradictions observed with the background theories. Towards the end I felt strongly that data collection cannot be unravelled from the analysis and I agree with Rubin and Rubin (2005) that qualitative data analysis is a gradual *process* that involves continuous evolution.

Although the initial orientation of empirical investigation was derived from a theoretical framework based on existing literature this does not imply that only those themes emerging from the background theories were investigated. Instead the approach to the analysis was grounded in the empirical findings of the study. Adopting a theoretical framework assisted with maintaining a discipline and focus in the study. But the objective of the study was to offer a fresh perspective on the existing theories of technology. For this, a vast literature on social theories in work, skills and employment was reviewed and tested against the findings of the study at various stages thus avoiding falling into a static approach to the analysis of data. At the same time since the research was conducted during a time of economic recession, meaning the temporal impact of economic recession on empirical data had to be carefully considered through a review of emerging discussions in the post-recession literature.

All the interviews were recorded and transcribed for the purpose of analysis. The transcribed data was then compared against the informal data and field notes as part of the analysis. The actual analysis involved a cross contextual thematic analysis. I started with 'data reduction' by simplifying and breaking down the data into various codes and categories. The choice of organising data by coding and categorising was adopted because of the relatively large number of participants and the copious data from the field as it helped in data management in

a more systematic manner (Rubin and Rubin, 2005, Mason, 2002). It was also helpful to compare more readily between the data sources and themes.

Because of the voluminous information from different sources I initially considered the use of Computer Aided Qualitative Data Analysis Software (CAQDAS) packages in the management and organisation of data. As the thesis progressed, however, I realised that a good CAQDAS Software package in qualitative studies was as good as my ability to organise and manage the data effectively. Moreover, proficiency in using the CAQDAS also required investing time to familiarise with the operation of a particular software system. Although I started using NVivo to code some of my initial interviews I did not find it particularly useful for organising the data.

Rather, my inclination was towards using Microsoft Excel to manage the data. For many years I have used this program effectively in my professional career to manage my administrative work. I have also used this program to manage data for my former master's degree dissertation and found it very useful and convenient. Through this standard software I was able to devise my own drop- down menus, filter codes, links, hyperlinks, and colour codes to organise the text. I also found that basic functions such as linking and moving between different cells proved very useful to juxtapose and corroborate information whilst cross examining the data from different sources. The software was, in any case, readily accessible throughout my fieldwork in India and backing up and transferring the information between my personal computer and office was far easier than in the case of NVivo. As Seidman (1998) suggests technology after all is only an aide and it is eventually the craftsman skills of a researcher which count more than any CAQDAS when working with qualitative information.

Initially the codes were more detailed and closely guided by the research questions (Coffey and Atkinson, 1994). Next, I adopted an 'inductive approach'. This involved analysing and comparing the codes and categories to generate some meaningful information in relation to the research questions. New themes emerged which demanded further investigation and challenged some of the existing themes. As an example 'the reasons to promote technology', 'crew costs' and 'demanning' (reduced crew sizes) from the employers' perspective led to the theme of 'social isolation' as witnessed in the accounts of seafarers (because of limited crew sizes on ships). Similarly, on the issue of seafarers' training, the benefits of using 'training

technologies' to expedite the training of seafarers from the employers' perspective contrasted with themes such as 'experience based learning' and 'shipboard training' that emerged from seafarers' data in their responses to improving the quality of training on ships.

The analysis of data was based on a triangulation of the perceptions of participants using interpretive strategies in comparing between and across different themes, individuals and groups of participants (Flick, 2002, Denzin and Lincoln, 1998). The use of interpretive strategies meant that some of the texts, as a result of their multi-faceted meanings, were coded under more than one category in the organisation and management of data. For instance when highlighting the strategies to reduce crewing costs on ships the ship managers touched upon various themes such as detailed monitoring from the shore side, reducing crew sizes on ships and employing a combination of highly skilled seafarers in higher ranks and cheaper less skilled seafarers from new countries. Such a response could be grouped in at least three different codes such as 'demanning' (crew reduction), 'detailed monitoring' and 'skill polarisation' on ships.

Drawing on a small sample of participants the issue of quality and rigour was not premised on the generalizability of the findings. The investigation did not simply end on the pretext that the responses of participants appeared consistent (Denzin, 1989, Guba and Lincoln, 1989, Mason, 2002). My emphasis was to examine *how* and *why* the responses of the participants coincided. Likewise, where the participants came up with conflicting views on a particular issue the analysis aimed to investigate the source of contradictions and tensions within the data (Hammersley and Atkinson, 1995). The analysis was based on a careful juxtaposition of opinions including emotions, experiences and anecdotes from different perspectives. Even the views of each participant were checked carefully for internal validity. For instance, although the employers may claim that the demand for skills has increased with new technologies their approach to crew training and labour sourcing suggested otherwise.

I found that field notes proved very useful to introduce rigour in the analysis. Many times during the analysis I revisited my research diaries to examine contradictions and consistencies of the analysis and my reflections from the field work. On one occasion during my visit to a private training centre I recorded in my field notes:

"I don't see many seafarers undertaking training in the centre. Also the manager told me that these days the company has reduced training budgets" (Field notes March 2009).

These field notes were later compared against the data elicited from a shipmaster within the same company who says:

"The cost on training has drastically reduced in past two years across the industry. There used to be courses conducted for training during leave which we used to dedicate for 10 days in a year for our training, I find that missing. Probably the budgets are being curtailed which is not a good sign."

During the final stages of data collection rigour was obtained by putting emerging concepts to the participants and asking for their input (Sayer, 1992). During follow up interviews I purposely raised certain hypothetical questions to the seafarers and employers to test their responses in relation to my understanding of the research.

Being an ex-seafarer I have many colleagues and friends working at sea and ashore. With social networking websites such as Facebook, it is not uncommon to come across blogs, 'tweets', photographs and videos from friends and colleagues. Although none of this information was part of the data collection I found it very useful at times to compare with my empirical data. On many occasions I observed young seafarers posting photographs with new technologies in the background, working on computers wearing uniform, and displaying photographs of what they perceived as 'real' work during many interviews (such as rope splicing, painting, machinery maintenance on deck – see chapter 6 for details). On one occasion a seafarer blogged to his friends on a social networking website:

"Oh! you people never believe that I work on the ship. Tomorrow I'll take a picture with my boiler suit soaked in dirty water, grease and paint. Then you'll believe me that I am working on the ship. Just because I'm wearing a clean white shirt no one believes that I'm working." (Note: Translated in English and used only after permission from the seafarer)

It should however be noted that the above approach was not part of the formal data, neither was it intended for use in the study at any stage of data collection or analysis. It became useful only during the concluding stages of the study by observing trends in the wider context.

4.6 ETHICAL CONSIDERATIONS

The data collection was initiated only after approval from Cardiff School of Social Science Research Ethics Committee (SREC). In addition to the School's Ethics Committee guidelines the instructions and guidelines from various institutions such as the (BSA, 2002) and (SRA, 2003) were also reviewed to avoid crossing the ethical boundaries of social research.

All the interviews therefore were carried out in accordance with the ethical guidelines. The objectives and ethics of the study were clearly explained to the participants at the beginning of each interview (see annex 4 and 5 for details). As part of the pre-interview checks the participants were assured of the confidentiality and anonymity of the data. Prior to switching on the voice recorder the consent of the participants was obtained. In the case of telephone interviews the participants were explicitly informed during the switching on and off of the recording device.

Where sensitive issues were discussed over the telephone – especially since the facial expressions of the interviewees could not be observed - I was careful to warn the participants of the sensitivity of the questions to assess their willingness and comfort before investigating any further. For instance I would say:

> "Would it be alright for you to give me some more detail on X as it is quite relevant to my study?"

Rubin and Rubin (2005) suggest that in telephone interviews it is advisable to warn the participants before raising any sensitive issues.

As mentioned earlier there were many occasions when post-interview discussions became increasingly relevant and hence necessary for recording as part of data gathering, but each time when the recorder was turned on/off prior consent of the participants was obtained.

Since data collection involved a comparison between the views of employers and the seafarers' confidentiality the anonymity of either party was a sensitive and crucial element in the study. In each case pseudonyms were used in order to conceal the identity of participants. In the case of shipping companies a major challenge was the international scale of operations and the corporate image which makes them identifiable and at the same time vulnerable to public attention (especially to those within the maritime industry). For such reasons not much

detail could be revealed about these organisations except their ownership, ship types and the approximate fleet capacity.

An alternate problem faced in this study was the participants' desire to gain an insight of the views of 'others' given that the study entailed a comparison between employers and employees. Most commonly this trend appeared at the level of employers seeking information about the seafarers. It was not uncommon for some crewing managers to question what the seafarers felt about the company policies and strategies. When faced with such situations I adopted a candid approach and reminded the participants of my duty to maintain the confidentiality of the data for ethical reasons.

The issue of confidentiality and anonymity was even more crucial for the seafarers because of their vulnerable positions as employees. In the beginning I approached the employers to obtain a sample of seafarers available on leave for the purpose of interviewing seafarers. But after two interviews I realised an element of insecurity and hesitation in one case. In another case there was excessive appreciation for the company in response to almost every question in the data from a 'company recommended' ship master. To avoid this I changed my sampling technique and relied on maritime colleges and training centres to gain access to the seafarers. In a wider sense such responses indicate the indirect control of employers over their workers and how these individuals chose to alter their opinions in aligning with the interests of employers.

Apart from the university ethics guidelines and the academic norms, ethical considerations were also guided by the corporate policies of the participating (MET) institutions and organisations. The accident rates in the fleet, injuries to crew personnel, collisions, groundings, and future crew sourcing strategies although disclosed on some occasions were treated as highly sensitive information by the employers. For ethical reasons therefore such sensitive information has either been blurred or removed from the data.

With voluminous data to hand I have been careful to ensure that none of the data from the participants is distorted from its contextual meaning in the process of juxtaposing information during the stage of analysis and write-up.

Finally as part of my assurance to the companies I am presently working towards an executive summary of the study. It is important that any promises made during the fieldwork are fulfilled as failure to do so may jeopardise the reputation of the institution with implication for future access to the SIRC – Nippon Fellows.

4.7 THE ISSUE OF REFLEXIVITY

> "Men relate to their world in a critical way. They apprehend the objective data of their reality (as well as the ties that link one datum to another) through reflection – not reflex, as do animals. And in the act of critical perception, men discover their own temporality (Freire, 1974: 3)."

Hammersley and Atkinson (1995) argue that a qualitative researcher should be able to make the familiar strange by adopting a reflexive approach to the data.

The difficulty of setting aside my seafaring identity and my own values and assumptions during the interviews has already been highlighted in the previous section. A practitioner identity was, however, only one amongst the multiple identities I wore in my research. When collecting data in India, because of my national identity, there was a tendency amongst the Indians to use colloquial language and local lingo to express their views. This was encouraged even more from my side because my intention was to understand the *meanings* of technological changes to the participants. Also, despite my best efforts the use of technical jargon was inevitable amongst many participants considering my professional identity. From the employers' perspective I believe that my research profile as a practitioner-researcher appeared more as a problem solver and therefore an important reason to show interest in the study. On the seafarers' part there was an implicit assumption that the research was aimed at the welfare of the seafaring community. Also because of the qualitative nature of research I was forced to incorporate my own understanding of the research problem at almost each stage of the study.

Clearly, the solution to the problem was to use my multiple identities in different ways to suit the purpose of the study and introduce rigour in the data. For instance, to gain access and establish credibility with the participants it was important to draw on my acquaintances within the shipping industry and make use of my identity as an ex-seafarer. But at the same time a conscious effort and a critical approach was required during the stage of interviewing and analysis to avoid contaminating the data with any biased inclinations. There is no doubt

that own experiences and prior knowledge as an ex-practitioner cannot be avoided but the objective was to use this knowledge more critically through self-reflection.

This was not always easy in my case especially when some of the views and opinions expressed by the participants have been a part of my own professional experiences. But this was a unique research skill that I have acquired to question my beliefs and assumptions at every stage as a way of clarifying my thoughts in making sense of the data. I found this strategy powerful as it gave me the opportunity to challenge my own assumptions at many stages during the study and even during PhD supervisions.

4.8 SUMMARY OF DISCUSSION

The methods of enquiry outlined above are only one of the various available methods of researching in social sciences. The broader question of the study aims to understand the implications of new technologies for work, skills and employment. My approach relied on understanding the meaning of technological changes to the employers and employees. The choice of methods therefore rested upon perceptions and views of participants.

The sampling of participants was influenced by methodological as well as practical reasons. The issues of consideration involved employers and seafarers from the same companies, ease of access, travel costs, common language of interaction etc. Some degree of variation was achieved in the sampling by including companies operating in different trades and ships types and a small number of seafarers from the UK and those from non- established countries.

Semi-structured interviews were used as the primary tools of data collection. The interview data was further complemented with post interview discussions and field notes in research diaries. For practical reasons a small number of interviews were conducted over the telephone. Nonetheless background literature on telephone interviews was consulted and all the necessary precautions were observed to obtain quality in telephone interviews. In the end the use of telephone interviews proved very effective in reaching the appropriate samples to answer the research questions.

The analysis of data was aimed at generating a detailed understanding from a small sample of participants. Quality and rigour was obtained rather by observing patterns of consistencies, regularities and contradictions within a rich data set. In this regard the detailed information

recorded in field notes and post interview discussions proved effective to complement the interview data. Nevertheless, from the seafarers' perspective since the data was drawn from a small sample of participants mainly from India the explanations may not be consistent with alternative samples from other countries or regions.

Finally, my identity as a seafarer played an important role at every stage of data collection. Thus in my experience reflection of past memories and experiences and using them consciously and critically to arrive at meanings was far more effective than creating a false sense of artificial curiosity of a naive researcher.

CHAPTER 5 TECHNOLOGY, WORK AND SKILLS IN THE MARITIME SECTOR – THE EMPLOYERS' PERSPECTIVE

This chapter examines the employers' views about new technologies and their impact on seafarers' work, skills and employment. The focus is on understanding the opportunities and challenges that result from implementing new technologies on ships.

The chapter begins with an overview of market competition within the maritime industry. It describes the crew sourcing and employment strategies aimed at minimising costs and improving efficiencies from a business perspective. Next, the reasons for and the challenges faced as a result of implementing new technologies will be outlined from the employers' perspective. The following section discusses the changing demand for skills - both technical as well as non-technical - as a result of technological changes on ships. The final section discusses the benefits of and the underlying reasons to use new technologies in the training of seafarers.

5.1 GLOBAL COMPETITION – THE EMPLOYERS' PERSPECTIVE

This section illustrates the views of employers about market competition, the issue of crew costs, crew sourcing and the importance of crew competencies and skills in the sourcing of seafarers.

5.1.1 INTENSE MARKET COMPETITION AND THE ISSUE OF LABOUR COST

The employers were asked to reflect upon the nature of competition in the maritime sector. In most cases the employers suggested intense competition and a persistent pressure to reduce costs to remain competitive. As a fleet technical director commented:

> "Extremely knife edge competition! Cost effectiveness is the keyword. Cost efficiency or cost effectiveness. Optimization of resources, managing vessels in a manner which does justice to the regulatory and customer requirements and at the same time in a manner which provides safe operations give all this under the gambit of economic, given this economic downturn right now under an extremely tight umbrella." (Technical director - AK)

When discussing the nature of competition the employers felt that crewing costs took up a significant proportion of operating costs of ships and hence their focus, it appears, was mainly on minimising crewing costs. As a training manager stated:

"If you see the running expenses, 50-70% of running expense of a ship is crew wages. So basically he is trying to - because you see you can't reduce pilotage dues, you can't reduce insurance, you can't reduce port dues these are things that keep going up or he still has to pay. The only thing that is flexible is the crew." (Training Manager – TM5)

Another operations manager adds to this:
"With the freight rates going down the biggest cost, I mean, is the crewing issues. Obviously this is the most important part since crewing is a major part of the cost."(Operations Manager – OM6)

5.1.2 CREW SOURCING STRATEGIES

The employers suggested that labour sourcing was largely influenced by cost, 'availability' and the communication skills of seafarers. Labour cost was highlighted as a primary concern by the employers and hence, crew sourcing decisions were based on identifying locations offering cheaper supply of seafarers. Faced with market competition the employers explained their shift from established maritime nations (EMNs) towards non-established countries (NECs) to source seafarers. The managing director in one company said:

"You know we have some historical decisions where we had a lot of ships with XX flag, lot of ships with YY flag, lot of ships with - flag. You know for XX and YY flag we have a requirement to keep a certain number of political or whatever you want to call it and some legal requirement to keep a certain number of domicile seafarers working onboard the ships. And you know the cost to the company is at least 50% higher than what you would see if you have to go to any other competitive nationality today and even though the competencies are high in these countries I mean you also have very high competencies in other countries. And in fact I can see the trend that your nationality is not important any more. It's more about your competencies and your capabilities that are important. And you know you have very highly qualified Indians so we have Indians who doesn't have that perseverance. We have the same for all nationalities. We also have the same for YY officers. Some are very good but also some who have difficulties in meeting the requirements that we have today."
(Managing Director – MD1)

[Note: To protect the identity of the shipping company in question the nationality of ships and seafarers has been concealed. The acronyms XX and YY in the above quote represent established maritime nations within Europe.]

The same manager felt that nationality was no longer an issue in the sourcing strategies. Rather, the decisions of crew sourcing were primarily based on cost factors:

"We are having challenges. We do need to understand, what is the right sourcing strategy in the right sourcing area, because of salaries pressure. We need to make sure that we are competitive and remain competitive. So that's the challenge that we have. We don't care what nationality you have, we care about the competencies as I

mentioned to you before. We need to find those at the lowest cost because you need to be competitive." (Managing Director – MD1)

Another training manager said:
"Frankly as an operator we are told this is your budget. They would look at the cost and say ok - Chinese crew!" (Training Manager – TM5)

In contrast with the earlier statement, the above quote illustrates that certain countries (and nationalities) are implicitly linked with cheaper destinations for sourcing labour.

Another employer explained the shift towards non-established countries (henceforth NEC) to source cheaper seafarers:

"We believe that it's a natural thing. Maybe I should not use the word natural but in the past we have seen the seafarers from traditional Scandinavian countries to north European countries. We saw a movement towards Asia and then Indian sub-continent as far as we could get to Philippines and areas around Philippines in south East Asia. But as the economic conditions of these countries improved like it happened in Europe or it happened in India, they were seafarers they could earn equivalent salaries ashore. And so we tend to move to countries which are yet to improve their economic conditions and then we examine their opportunities to work at sea as compared to their work ashore. That's what we are doing now in Indonesia, Vietnam, China, Ghana all these countries as they are still coming up. So over a period if we could source seafarers for a couple of years and then we have to move to another country" (Senior Fleet Director – FD1).

Another concern for the shipping companies, because of their scale of operations, was to identify countries where large supplies of seafarers could be maintained over a considerable duration. This was termed as 'availability' of seafarers. A technical director says:
"You look at the general awareness of shipping to start with, and the availability of people. And the training facilities they have and the sustainability because it's not that you take once and there's nothing else but there is a continuous stream of people who are being trained and being made available and that's the reason you go to these places." (Technical Director – TD2)

An important factor in sourcing labour was the maritime training infrastructure and institutional support available in non- established countries (NECs). It was highlighted that comparable infrastructural and training support (as in the case of established maritime nations) was now available in some NECs. As a managing director explains:
"If you have to go to Papua New Guinea and then send them to an academy in India or UK the cost is way too high. But if you go to a country like China for instance and if you go to see the Maritime Universities they have built in China in the last few years. They have built some huge maritime universities with 20,000 students, they got state-of-the-art equipment, they got state-of-the-art libraries. Some of the biggest libraries I have seen in this maritime universities in China. The simulators that they

got I mean I have never seen such advanced simulators anywhere compared to other countries. And this is because their government has decided that this is their focus area, this is important for China so I think they have quite an advantage of education systems in China compared to many other countries." (Managing Director – MD1)

Apart from availability language skills were also a concern for the employers, partly because the problem could not be addressed instantly. As a training manager explained:

"The biggest challenge is to train these people to speak English. That is something you can't teach them overnight. It takes time." (Training Manager – TM7)

Throughout the course of data collection, there were many occasions where the employers underpinned the importance of employing educated seafarers with mathematics and basic science knowledge. The employers were of the view that it was vital to have a strong educational base for seafarers to work on modern ships as a result of the growing importance of technical knowledge on modern ships. As two senior crewing managers suggest:

"Even when we take cadets we put them through a rigour of standards of education of mathematics, physics and chemistry assessment there. So unless those competencies are met we don't think that we will go ahead and recruit people from those places. Of course we have looked at many other places where we felt that no they may be cheaper but it will not be to our standards." (Fleet Director – FD2)

"You do have to look at the core education of people. If the standard of education, you know basic maths and science and that type of education is lacking, then it is very difficult to put technical knowledge on top of the base which is not there." (Senior Fleet Manager – FM1)

But again in almost all cases the issue of education was only secondary to the cost of sourcing seafarers. A senior HR manager says:

"I think basically it's also the education level of people. But of course the prime factor is the cost. The cost of employing these people, the other is the basic education level of these people that they are able to communicate and sort of understand the basic instructions." (Human Resource Director – HRM1)

Another reason to source labour from new locations was the shortage of seafarers in established maritime nations. The employers claimed that this is because the seafaring profession has lost its 'glamour' in most established countries because of the working conditions at sea and better opportunities ashore.

"Developed countries nobody wants to go to sea because there is same money ashore. There is no charm left now. It doesn't happen in Airlines." (Training Manager – TM5)

5.1.3 THE IMPORTANCE OF CREW COMPETENCIES IN LABOUR SOURCING

The employers asserted that established maritime nations maintained relatively higher standards of maritime training when compared with non-established countries. A senior

crewing manager commented on the competence of the seafarers from non-established countries. He said:

> "The level of competence is I would rate low to medium and we need to train the seafarers." (Fleet Director – FD1)

But higher standards of industrial training in EMNs do not seem to appeal to the employers as much as having cheap and flexible labour to work on ships. An operations manager stated:

> "I have seen that East Asian countries are more accommodative whereas if you go to western region of Asia, you go east Europe and all people are more headstrong. There is a clear reason for this because they have been active seafarers for so many years and they have developed certain skills you know. And training in those countries is of a greater standard so the quality of officers that you are getting out is far better and that develops into an issue of superiority which is why they start quoting things and start demanding whereas the east Asians are still entering the market and they still have to form a name for themselves so they are very accommodating." (Operations Manager – OM2)

Some employers, particularly for seafarers working at the operational level, did not appear to expect much in terms of their knowledge, skills and competencies beyond their statutory certification and training requirements to work on ships.

> Interviewee: "Of course as you know the most important thing is to have the certificates. Otherwise how, you can't employ someone if he doesn't have the COC?"
> Researcher: "And what skills do you think are important to work onboard?"
> Interviewee: "An average IQ and common sense I think that is more than sufficient ... at the end of the day if you ask me two root items or one root item that we want I would still say IQ and common sense, you don't need anything more than that. Give me six months with a guy who has a decent IQ and common sense and he can be ready to run a ship, the rest is all experience." (Operations Manager – OM2)

The employers claimed that the company in-house training played an important role in addressing the skill requirements of the seafarers. The employers termed this as 'customised training' which they felt could address their skill requirements more effectively and within a shorter duration of time. Similar training strategies were observed also in some of the private training colleges in India claiming to provide 'tailored training solutions' to shipping companies. During a visit to one such college a training manager explains:

> "The employers expect that the gap between competency assessment and the needs of ship work are addressed. So what we do is we train people on one to one basis. In eight hours of training we teach the person operational aspects, another fellow will teach him technical needs, then you see that room there we give them some personality development course. HR people expect you know try to how to develop yourself so that you present yourself in a way that you are impressive when you deal with people onboard – a total HR course. We have special courses which some

companies want especially for this tier 2, tier 3 and tier 4 people[7]." (Training Manager – TM4)

During fieldwork in a private college in India significant disparities were observed in the training standards of seafarers even within the same college. In one case, for instance, the training centre was divided into two separate floors; whilst the ground floor of the college was used to train seafarers from several 'good companies' the first floor was dedicated to mass training of seafarers from a specific company.

5.1.4 POLARISATION OF SKILLS

In some cases the employers also suggested the importance of maintaining a pool of skilled seafarers from established maritime nations at least in senior positions. This was because of the specific requirements of the customers who insisted that their ships should be manned with experienced senior officers. A fleet director suggested:

> "XX is a Japanese company. We did not have enough Japanese mariners so they had to get their mariners from somewhere else. OK. Our customers were insisting that we got experienced crew anyway so that our staff had LNG [liquefied natural gas carriers] experience so certain part of the key staff had LNG experience." (Fleet Director – FD2)

[Note: Company name is concealed for ethical reasons]

The industry literature confirms that in recent years, these measures have been introduced in the face of declining competencies and experience in the industry. The Oil Majors and insurance firms now demand adequately experienced seafarers on ships because of the hazardous and high-valued cargoes transported on ships (INTERTANKO reports).

The employers also felt that in future the seafarers from NECs will be able to successfully replace the seafarers from EMNs in higher ranks. As a senior crewing manager says:

> "These boys are good [NEC seafarers] and now we are looking at pushing them to senior ranks." (Managing director – MD1)

Another crewing manager adds to this:
> "I do not have any personal experience with Filipino officers but my gut feeling is that they certainly have people who are capable of doing it. I mean Indonesia has people who are capable of doing it. It's about identifying those people that are again at the top end of skills and then bringing them and training them on this type of ship." (Fleet Director – FD2)

---

[7] The term tier 2, tier 3, tier 4 is used to explain the sourcing of seafarers from urban, sub-urban and rural locations in India – a shift away from expensive and demanding seafarers in urban zones in the country

These views reflected in the employment strategies of at least two organisations aiming to replace Indian and European seafarers in higher ranks with cheaper seafarers from NECs. In other cases there were instances where the employers refused to comment on their crew sourcing strategies and maintained 'confidentiality'.

This section highlighted the primary importance of crewing costs in the labour sourcing strategies of shipping. Other issues included economies of scale, language skills of seafarers and the institutional support in labour supply countries. The data also shows that although in the past the employers were not so keen on sourcing seafarers at management level from NEC recent changes to labour sourcing strategies, driven by intense competition, suggests otherwise.

5.2 THE ROLE OF NEW TECHNOLOGIES IN MARKET COMPETITION

This section discusses the reasons to implement new technologies from the employers' viewpoint. The reason to implement technology was closely related with competition and cost reduction, as a senior crewing manager stated:

> "Basically shipping the way at least I see it is a commercial operation and the ships are there to earn money. And we have investors whose interests we need to take care of. And we see technology is a faster and more efficient way of getting more out of the same dollar and that is the reason why we want to have more automation and higher technology onboard at least our vessels." (Fleet Director – FD1)

The employers claimed that new technologies proved particularly useful in reducing crewing costs which they felt took the largest proportion of ship operating costs. As a technical director noted:

> "You know 60% of the daily operating costs is you know the crewing costs. So in that respect automation and technology can be very useful to reduce those costs." (Technical Director – TD1)

5.2.1 'DEMANNING'– REDUCED LEVEL OF MANNING ON SHIPS

When highlighting the importance of technology in cost reduction, the employers claimed that much of the cost savings in the past years had been achieved from increase in ship sizes and at the same time reduction in crew sizes:

> "Technology is very important. Technology in the shipboard arena as I said we still maintain the same number of crew per ship regardless that we have gone from our

smallest ship of 2500 TEU [Twenty foot Equivalent Unit Containers] and largest ship which is 9500. Even though we have four times larger ship each carries almost same number of crew size so that's a huge saving. This has been enabled by the technology and the designs that have been incorporated." (Quality Manager – QM2)

Some managers even highlighted the role of specific technologies (and compared them with the past equipment) in reducing crew sizes and eventually driving down the crewing costs on ships. As two managers noted:

> "Let's take an example from 20 years 30 years or so. We used to have mooring winches which were manual and the complement of the crew was specifically related to the size of the vessel which could run into 60-70 people onboard the vessels. Then with the advent of these motorised winches the crew complement reduced to 40 people and then when we brought in automatic tension winches it reduced the complement to, some of these vessels are running with 10-12 people. I am not trying to say that everything is related to mooring winches but it has got a very large role to play in the reduction of number of people." (Fleet Director – FD1)

> "I think one of the important changes we saw in the nineties was the GMDSS [Global Maritime Distress and Safety System]. Earlier you know we had radio officers onboard who did all this communication and all but now with GMDSS we could afford to have you know one less person. So it's a saving you see." (Technical Manager – TM1)

Although some managers submitted to the economic advantages of reducing crew sizes, there were also those who opposed any further reduction in crew sizes with new technologies. These managers suggested that transport chains have grown increasingly complex in recent times with ships carrying high valued cargoes, and as such reduction in crew sizes is practicable only to a certain extent. A quality manager in the LNG trade sector states:

> "To run the ship effectively efficiently you need more people. Once upon a time we come back from the idea of making less people, 10-11 people. But I think it's scrapped. Especially with this kind of vessels running worldwide you need more people like we have about 30 people onboard." (Quality Manager – QM1)

According to the employers new ships carrying high risk cargoes were equipped with state of the art technologies. Because of the higher level of technology, these ships require technically skilled seafarers such as automation engineers, electronic engineers, and additional cargo officers to conduct safe and efficient operations.

5.2.2 CUSTOMER DEMANDS AND REGULATORY REQUIREMENTS

The employers also claimed that new technologies played an important role in responding to customer demands and statutory requirements:

> "The role of the technology is whatever the regulations or the demands are being pushed by the charterers the technology will help to reduce the burden." (Quality manager – QM2)

According to the employers' new regulations and frequent changes to existing statutory requirements, primarily because of safety, security and environmental requirements, require 'robust administrative support' from the shore side (Field notes – PS). In many companies I found that dedicated departments (termed as Health Safety Environment and Quality HSEQ and Standards and Procedures S&P) have been set up to provide 'live supports' to ships through advanced communication technologies.

A failure to comply with regulatory requirements, according to the employers, results in immense commercial losses for businesses. Generally it is the 'delays' and 'detention' of ships in ports due to non-compliance with regulatory standards which seem to concern the employers. Through office support the employers believe that the reliability of operations can be significantly improved which they asserted was of paramount importance to their clients and customers. Terms such as 'avoiding delays', 'disruptions', 'breakdowns', and 'executing flawless voyages', were frequently brought up by managers to improve customer satisfaction. When explaining the importance of reliable shipping services a manager says:

> "It's primarily because of charterer who is the customer doesn't want any unscheduled downtime with the ship. He wants a reliable ship that day after day, week after week is going to continue to operate." (Fleet Manager – FM1)

Technology to these managers was useful for planning and allocating resources efficiently in order to meet the demands of customers in a timely fashion.

> Technology helps me plan better, ultimately people in the world do not ship their cargo with us because it's the fastest when it comes to deliver their goods, our company is the most reliable when it comes to delivering the good i.e. we will tell them you will get it at this time not earlier not a minute later so that's the whole point that I can maintain scheduled reliability very well." (Operations Manager – OM4)

Another advantage of new technologies, according to the managers, was electronic record-keeping on ships since new technologies were capable of monitoring and recording shipboard information. According to the employers, detailed electronic records were helpful to improve transparency in operations hence leading to increased trust levels between cargo owners and ship operators.

5.2.3 MICRO-MANAGEMENT OF SHIPBOARD OPERATIONS

The employers suggested that with reduced crew sizes onboard ships, customer demands and the statutory requirements, it is now becoming difficult for seafarers to cope with their workload on ships. In such situations it was claimed that shore offices assume a lead role in ship operations by extending support to a ship's crew. A senior crewing manager says:

> "Today there is so much information going back and forth that they [seafarers] are simply not able to cope with it. So the office has to take the lead." (Senior Fleet Manager – FM1)

Faced with commercial pressures the employers often emphasised the need for 'micro-management' of ships. According to the employers, with advances in communication technologies most operations can be co-ordinated and planned from the shore end. The restructuring of work organisation also seems to have raised the profile of middle managers (in most cases termed as ship superintendents or vessel managers) in the management of shipboard operations. During interviews many employers claimed that the overall responsibility of ship operations now rests with the management ashore and not so much with the seafarers. This is illustrated in the quote below:

> Researcher: "You mentioned the selection of superintendents in your company and their training needs. How important is that?"
> Manager: "Very critical, it's very very critical ... We do not call our superintendents as technical superintendents; they are not just associated with the engineering aspect of the ship operation. The superintendent of the vessel is complete(ly) in-charge of the ship ... If anything goes wrong on their ships they are accountable for that."
> (Standards and Procedures Manager – S&P1)

A senior manager shared the same opinion and claimed that most shipboard operations can now be managed from the shore side whilst leaving technical work to the seafarers onboard ships.

> "What we used to call technical superintendents we don't call them technical superintendents in XX [company name concealed]. The role itself speaks for it; we call them *vessel managers* [emphasis in italics]. They are not technical superintendents, they *manage* the vessels [emphasis in italics]. And the voyage manager manages the voyage. So when they manage the vessel they are the owners of the vessel and it's like the management skills which are required out of it. You don't need to be a sound engineer to be able to manage a vessel. You have engineers onboard to do the job." (Operations Manager – OM8)

The employers spoke about various technological changes and subsequent changes to the jobs of seafarers in providing 'information' or 'entering data' from ships to facilitate shore office work.

"We have recently provided a software for performance monitoring of the vessels and you know they fill in data onboard and that data is transported to the office and then somebody in the office can sit down and see how the vessel is performing as far as charter party requirements are concerned." (Standards and Procedures Manager – S&P1)

"Our planned maintenance systems, data can be replicated very easily. If the ship enters data it can be replicated very easily ashore for us to monitor." (Quality Manager – QM3)

5.2.4 TRUST LEVELS BETWEEN CREW AND EMPLOYERS

The employers felt that detailed management was required not least because of market competition but also as a result of the decline in trust in the skills and competencies of seafarers. An operation manager stated:

Manager: "In my department we are installing ECDIS in all our computers, our work computers."
Researcher: "Why so?"
Manager: "To help do the passage planning and to check the geography of a particular area."
Researcher: "But is that your job?"
Manager: "Of course it's not my job but sometime you don't have time, you need to rush things ... or sometimes there could be occasions when you don't want to disturb them."

At a later stage during the interview:
Researcher: "Coming back to the previous question about passage plans for their facilitation. Why do you need to do that?"
Manager: "Sometimes you want to do calculations which don't give you the leisure of time and same time you don't want to disturb ship people because of their time zone or maybe they are busy or you feel that may be they are not competent enough to give you the reply in that given time ..." (Operations Manager – OM3)

The employers emphasised the need to obtain 'accurate and timely responses' from the ships because of 'commercial pressure'. The employers claimed that in many cases the seafarers were not competent enough to provide the information required from the ships thus causing further delays to operations. Faced with intense competition the employers claimed they had no choice but to take control of the seafarers' jobs from the shore side. Eventually some middle managers appeared convinced that the actual accountability of shipboard operations has now shifted to the shore side. Recalling an incident where a chief officer and a shipmaster were unable to carry out cargo operations without shore support, an operation manager furiously stated:

"You two of you are sitting there chief mate and captain and you are not able to do it and I have to do your bloody job which I am not supposed to do but because of this

commercial pressure because the eventual responsibility rests on my shoulder so we have no choice." (Technical Manager – TM1)

Ironically, although some employers asserted that shore offices must take the lead control in ship operations, others used the term 'shore support' and 'back office support' to facilitate seafarers work. The latter felt that the 'seafarers are unable to cope with the information overload' or that 'they are overwhelmed with the information' (Field notes Aug 2009). Thus, it was assumed that the role of management was mainly to 'support' the ships as is illustrative of the quote below:

> "The masters [are] not being able to absorb all these new technologies, new regulations that's coming in, so the back office has to keep providing them detailed information." (Quality Manager – QM2)

Some employers also showed empathy for seafarers and felt that the shore office should avoid the micro-management of ships and allow seafarers the discretion to resolve shipboard issues on their own. A training manager was of the view that although the employers claim that the ships can be managed from the office, when a situation arises at sea it is ultimately left to the shipmasters. He said:

> "There is no secret that decision making is being taken away from Master and chief engineer. Now they have to seek approvals. In other words don't think, just do what we tell you. But the reality is that when the shit hits the fan, when the ship is ten thousand miles away, that time you tell the master – Captain you decide what is best to do and do. Now I am helpless. People ashore have to trust the judgement of the shipmaster to whom they have handed over a million dollar asset." (Training Manager – TM13)

Such views were mainly held by the training managers. As another training manager said:
> "The office should avoid the micro-management of ships and promote the on-scene man to take decisions, not bombard him with so much information. And the worst part is they are not just sending information but also expecting a feedback some of which is superfluous." (Training Manager – TM16)

As an ex-seafarer his views were influenced by his own experiences at sea. Narrating a fire incident on one of the ships he served as a master he said:

> "As a master I was pressurised to give a reply to the emails and the reply would become even harsh. I was not allowed to focus on my task."

An operations manager was also of the same view that where possible the office should avoid excessive intervention in the ship operations. He too felt that the office should trust the judgement of the shipmaster after handing him over a ship worth 'multi- million dollars' (Operations Manager – OM5).

5.2.5 WORK SIMPLIFICATION

Certain technologies, according to the managers, have simplified the skilled jobs at sea. A common example was the introduction of satellite navigation systems (GPS) and the recent introduction of electronic navigation charts as a replacement for paper charts. The satellite navigation systems were often compared with conventional navigation equipment such as sextants, chronometers and magnetic compasses to illustrate their role in simplifying the navigational jobs. As an operations manager said:

> "…we have something known as ECDIS and ECDIS are electronic charts that are for planning voyages and navigating the vessel. This work was previously done on paper charts and they required a lot of paper charts for each particular leg of the sea and it required a lot of man-hours to be put in to correct those charts, to do your work and to plan your voyages and stuff like that. Now we have electronic medium which is become the primary means of navigation and it has removed paper charts completely from ships. Now we had actually had a lot of work reduction from that particular officer who was in charge and he has a lot more time at hand to focus on other things. Nothing is done manually, everything is automated. The computer is uploaded, everything is corrected on its own the charts and the voyages are planned by the press of a button. So everything has become very very simple in those respects."
> (Operations Manager – OM2)

Another operations manager added to this:
> "Look at the commercial aspects technology saves you time and time relates to money and you look at the crew's perspective technology relieves them of a lot of work technically that they are supposed to do which now can be substituted by technology."
> (Operations Manager – OM3).

Being ex-seafarers, it was quite common for many employers to reflect upon their own work experiences at sea to support the notion of work simplification with new technologies. A quality manager says:

> "When I was a second mate I used to start off with a sight, 9 -12 or 1 o clock there used to be sight taking, there was no GPS. So lot of my energy and my work was to make that noon chit and now the noon chit is five minutes so all said and done 3 hours or more you can devote to navigation. Chart correction has become much easier, we used to get bag full of notices, nowadays it's all electronic. So the workload is coming down for sure." (Quality Manager – TM1)

5.2.6 NEW TECHNOLOGIES FOR SAFETY REASONS

There were contradictory views about the implications of new technologies on the safety of ships. The employers believed that one of the main reasons to implement new technologies was to reduce the accident rates at sea which they termed as 'human error'. It was claimed that with reduced manning levels and increased workload the seafarers were bound to make judgemental mistakes which could undermine the safety of ships.

> "I think it [technology] is important because of natural human failing and however good navigator or ship operator you are you are still going to make mistakes. And with reduced manning there isn't necessarily anyone out there to point out that you really made a mistake and so the technology has to help you in this matter."
> (Technical Manager – TD1)

> "Why do we need technology, we need technology to counteract any possible human errors." (Quality Manager – QM2)

The terms 'idiot proof' technologies, 'fool proof' automation systems and 'back up technologies' were frequently used to highlight the quality and reliability of new technologies and improve safety. According to a technical director robustly designed technologies would allow seafarers to place trust upon equipment in carrying out their work. He said:

> "Technology assists the first and foremost element like we would call it is. Like anything and everything onboard needs to be made idiot-proof. That is not meant in a negative manner. It is meant in a manner that people onboard have to face wind and weather, working long hours, odd hours. You cannot prevent the vessel from coming in port at 2 o'clock in the morning, but there are still other work processes which need to go on simultaneously on a vessel, it's an industry by itself right?" (Technical Director – TD2)

But the terms 'idiot proof' or 'fool proof' technologies were also used to describe ways in which technologies could be used to compensate the knowledge and skills of seafarers. A technical manager commented:

> "Shipping has become so international because you have people from various nationalities coming onboard ... what you need is with this kind of system a uniform kind of thing or something that makes things easier and makes things much more comfortable to be with. And automation is basically, I am sorry to use the term is to make it more idiot proof. It doesn't depend on personal skills. The operations are taken away from the human intervention and more towards the automatic on the technology intervention which is much safer and more reliable. So that's one of the major reasons." (Technical Director – TD1)

In some cases it was also meant to emphasise the increased importance of ergonomics in designing new technologies to improve ship safety. A manager stated:

> "The design should be such that a person cannot make the mistake ever because you can never make the mistake of plugging let's say a USB cable into a computer cannot be plugged in a wrong way." (Quality Manager – QM3)

Likewise suggestions for using 'back up' technologies and 'duplication of equipment' on ships came up for improving the reliability of new technologies and enhancing ship safety. The employers felt that such initiatives will improve trust levels of seafarers who often felt apprehensive about equipment failure and found it difficult to rely on new technologies

especially during critical operations. A technical manager suggests adding more equipment on the ships and said:

> "Technology that we have right now is more than enough. What we need is more back up to improve safety. Put two GPS or three GPS if required so that people can rely on equipment because unless there is enough back-up they will not rely on it so easily." (Technical Manager – TM1)

Although statutory regulations in SOLAS Convention (Safety of Life at Sea) make provisions for the duplication and back-up of critical equipment onboard ships (such as steering systems, propulsion and navigation technologies) in some cases the employers expressed the desire to exceed the statutory requirements in order to improve ship safety.

The training managers on the other hand strongly opposed the idea that technology should be used as a means to replace the superiority of human judgement in improving safety on ships. As two training managers noted:

> "Technology should only give you a confirmation to countercheck. Instrumentation should not replace your basic skills." (Training Faculty – TF2)

> "Even if it's 100% reliable and even if there is all the backup you can't just blindly follow it [technology]. Technology can never replace human skills. That can never happen." (Training Manager – TM5)

A training manager felt that any attempt to improve the reliability of the machine to the extent that it could be perceived 'error proof' could result in a dangerous situation. Reflecting upon his own experiences he said:

> "These days they talk of *error proof* technologies [laughs and emphasis in italics]. When we were onboard we were taught everything on the ship can fail you should not fail. But now the situation is such that you can fail but technology can't fail. And that's a very dangerous situation at sea." (Training Manager – TM2)

Similar views were also expressed by some employers. As two managers said:

> "Technology can only assist. It cannot do something which is required by a human being. Technology can never be able to do that. I mean I cannot foresee any such thing which can replace human being." (Operations Manager – OM3)

> "I think IT is a facilitator, it's not something that can replace what we are doing onboard the ships, the people skills. We can make it easier for you to keep a track of things so that they can be spending less time on certain administrative tasks but I don't think IT can replace. No I don't think so. I doubt it, I don't think so." (Managing Director – MD1)

But some employers, even though disregarding the superiority of technology over human skills, felt that the manufacturer's monopoly over knowledge and advanced maintenance

skills of electronics do not require any more than average operating skills from the seafarers. As one manager responded when probed if technology could be used to resolve the safety issues on ships:

> "No, simple answer no. Technology cannot replace knowledge. It can help assist and this is one of the biggest problem, technology that we can't deal with, it's gone too far. If it goes wrong we cannot do anything about it because we haven't got the equivalent knowledge of machine. The technology that we have on ships relies on service engineers because that's the way they have made it." (Technical Manager – TEM1)

On the issue of safety, the employers also claimed that the increase in maritime traffic in the past few years especially in the areas of heavy traffic, and resulting from larger ships and complex ship designs demands increased 'accuracy' and 'precision' in the navigation of ships which was another reason to promote new technologies. Equally the role of technology was considered important for security reasons as new technologies allowed close monitoring of ship movements from the shore side.

To sum up this section, the employers appeared keen to install new technologies on ships. The reduction in crew sizes appears to be the most common and powerful incentive to introduce technology on ships. The employers also believe that technology can lead to simplifying some of the skilled jobs at sea. There are also commercial and regulatory reasons for promoting technology.

The employers also suggested that that they were forced into 'micro-management' of ships. The issue of micro-management of ships arises from the doubts over skills and competencies of seafarers, and the information and communication technologies allow monitoring of shipboard work without much effort.

On the issue of safety the views of employers were disputed. While some believe that technologies can be very useful to improve the safety on ships, others, because of their professional background as seafarers, opposed the idea of replacing seafarers' judgement and skills with technology. But the complex design and advanced skills required in the advanced maintenance of new technologies, according to the managers, do not demand any more knowledge than operational skills from the seafarers.

5.3 NEW TECHNOLOGIES - THE EMERGING CHALLENGES ON SHIPS

This section explores some of the challenges faced by the employers as a result of implementing new technologies.

5.3.1 OVER-RELIANCE AND COMPLACENCY

The employers claimed that one of the biggest problems with the seafarers was their excessive dependence on technology, often termed as 'over-reliance', to perform their work. As two managers noted:

> "The skills of people have gone down tremendously and they are totally reliant on electronic gadget and their own personal skills has really taken a toll." (Operations Manager – OM3)

> "The mindset is that electronics are the ultimate. Over-reliance onboard on the data provided by the automation is so much that they say that would not fail, maybe I will fail." (Training Manager – TM2)

Such behaviour was resented by the training managers as it was considered unsafe and more specifically against what was frequently referred to as the traditional seafaring skills or 'seamanship'. A detailed overview of the traditional knowledge of seafaring and its contextual relevance for this study will be discussed in the following chapter. For the purpose of this discussion it refers to the traditional work practices, work culture and the knowledge, skills and work experiences acquired as a seafarer. A training manager commented:

> "People have forgotten the basics of seamanship, the basics. Technology is there only to assist you but these days people are relying too much on it." (Training Manager – TM5)

When discussing the issue of over-reliance these managers were highly critical about relying on technology because of the unpredictable work environment at sea. As a quality manager noted:

> "I think there is always a danger as I said of over-reliance on technology is probably. It does not leave room for any I mean in case things go wrong. And technology as you know proven technology ashore often fails onboard fails for a host of things. I mean you got vibrations, you got the salt water, spray and all this." (Quality Manager – QM3)

Others used the term 'complacency' to describe the behavioural issues of seafarers as a result of implementing new technologies. When explaining the setbacks of new technologies onboard ships, a training manager says:

I cannot condemn automation - it is good. Officers must learn behavioural skills. Basically if people are not complacent I think. I think that's the biggest problem. I think you have to be in command of the equipment and not the other way round. Most of the times it's the other way round. (Training Manager – TM8)

One of the main reasons for such behaviours was understood as the setbacks in training of seafarers. The training managers and training faculty in the maritime colleges felt that the training of seafarers was not adequate to address the skills required to work with the new instrumentations on ships.

"There is a lot of emphasis on how the equipment works but there's no training on the limitations of the equipment. I think we need to train them that. What can go wrong, the capabilities of the instrument etcetera that is important." (Training Faculty – TF1)

"When machinery is complicated little knowledge is dangerous. The person should have a good knowledge of equipment." (Training Faculty – TF2)

"It's not about operating the machine but a thorough understanding of equipment. The principles of operation, limitations, etc which you must know. What best can you get from the machinery because half of the times we see people are operating the machine without knowing what they are doing." (Training Faculty – TF5)

A technical manager adds to this:

"Technology is being pushed to the limit. As I said, and people rely on the technology, they are not being trained, they don't know the basics, they don't know the basic principles of what they are looking at." (Technical Manager – TEM5)

At times the training staff also advocated that 'over-reliance' on technology was a consequence of the increased administrative work on ships. The training staff claimed that during navigation on the bridge the seafarers were relying on new technologies by setting navigational alarms and pre-warnings and carrying out administrative work. A training faculty said:

"You need to lookout with all your senses but these days there's so much of paper work that it is not possible. So people have to rely on radars and alarms." (Training Faculty – TF2)

Nevertheless there were those who suggested that the problem of over-relying on technology was deeper than any training issues, complex functioning of the equipment or increase in administrative work onboard ships. These managers felt in general that the *attitude* of seafarers' towards work showed a lack of professionalism and over-reliance and complacency at work was an outcome of this behaviour.

Researcher: "What, according to you, is the reason for this over-reliance?"

Interviewee: "There is knowledge as well as carelessness. Because nowadays a seafarer I mean I am not talking about each and every person but I would say the majority of people have gone onboard just to collect their time and get their salary every month and go back home." (Operations Manager – OM3)

Another training manager, in-charge of simulator training, was of the view that 'over-reliance' was mainly a 'recruitment problem'. He says:

Manager: "Over-reliance on technology to give you an idea we have exercises of GPS failure and these people they don't know what to do."
Researcher: "And how do you think the problem of over-reliance can be resolved?"
Manager: "The problem can only be resolved by addressing the recruitment problem. Most people are coming to sea only to make more money, there's no love for profession." (Training manager – TM14)

The same manager felt strongly that the excessive dependence on technology was primarily as a result of the deeper problems of the commitment of seafarers towards their profession. This was a common theme in many discussions where the employers felt that the seafarers were losing interest in the profession and that their main aim was to earn money. In that respect, it was claimed by the employers that any genuine interest or commitment to the job was missing amongst many seafarers.

5.3.2 THE DIGITAL DIVIDE – 'GENERATIONAL GAPS'

The data gathered from the employers and training staff suggest that new technologies create an ideological divide between the seafarers on the use of new technology. When asked about the skills required to work with new technologies the employers felt strongly that computer skills were most crucial to work on ship. The computer skills of *young* seafarers (see footnote below) were reported superior to those of the *old* seafarers[8]. At the same time, however, the employers also suggested that in many cases young seafarers did not understand the limitations and working principles of equipment which they believed was essential for working on ships. As two managers suggest:

"I think one of the skills of course to have all this technology requires computer skills which was the problem with some of the older seafarers because they were not computer savvy but by and large we find that the younger generation is more into computer because they grew up in that computer age so right from their younger age they had a computer around either in a cyber cafe or at home so for them I don't think

---

[8] The term young seafarers and old seafarers will be used frequently henceforth. The differentiation is based on the work experiences of seafarers. Seafarers with less than 8 years of experience at sea have been termed as young seafarers whereas those with more than 15 years experience have been termed as old seafarers (see Appendix – explaining the basis of this calculation). Elsewhere the term junior officer, senior officer or plainly seafarers will be used

technology is much of an issue. The only issue that I would like to highlight is that being over-dependent on technology. The danger is that if there is a malfunction probably these guys will be lost you know." (Quality Manager – QM3)

"Now for ninety per cent of the operators that we have the younger generation is very tech-savvy, tech-savvy to the extent of operations. You give them an ECDIS they will know each and every short cut of how to go about it but then when it comes to the principles and limitations hardly anybody goes through that section. That is the main area where we are trying to concentrate. Because lot of our new ships are coming with a lot of new technology so if you just rely on it without proper knowledge, disaster it's going to be a disaster!" (Training Manager – TM5)

Another training manager explained the same problem from his own experiences as a training instructor. He says:

"To give you an example ECDIS [electronic navigation charts]- some old masters are very paranoid. They will harass me I can't find this button. But young second officers are born with mobile phones, play stations so their eye hand co-ordination is much better than ours. For older one where are the buttons? Where is that knob? But the danger the inherent problem is that the young guys are not bothered about or even know how the machinery is calculating the parameters. They say we only know it is calculating. How we don't know. So far it is working I am OK." (Training Manager – TM8)

The training managers suggested that the young seafarers relied more on digital information rather than using the traditional practices of seafaring skills that encourages on-site physical presence rather virtual information. A training manager says:

"I think it is the sickness of the new generation looking only at the digital parameters." (Training Manager – TM8)

Terms such as 'tech-savvies', 'computer *wallas*' [a term in Hindi which means computer people], 'laptop boys' were commonly used and associated with technologies such as computers, cell phones, Blackberry's, video games, play stations as well as attributes such as 'punching skills', 'knobology', (pressing knobs), keyboard skills, desktop skills to describe the attributes of young seafarers.

It was asserted by the employers that computer operating skills of young seafarers and traditional seamanship skills of old seafarers was by far the best combination to address the skill issues at sea. A training manager in the nautical department says:

"Right now we have two categories of people, one who are 100% over-reliant on ECDIS who will actually not even bother to plot a position and you know countercheck, who just go as per the ECDIS and the other category is who don't know how to use a ECDIS. So you know that average guy who actually knows how much to rely on it and what to do along with it is absent. So we are basically trying to merge

these two categories of officers into an average who would - like guys who would actually make use of the equipment as well as be safe enough to countercheck." (Training Manager – TM1)

The data suggests that the divide between some of the young seafarers and the older ones is accentuated also for a less obvious reason; the implicit assumption that most technologies onboard ships these days are 'user-friendly', in other words easy to use. When asked about the company support to train crew members to operate new technologies, the employers claimed that most technologies onboard ships are based on generic software which does not require much training. This is illustrated in the quotes below:

"Automation has got more to do with computers now and everybody the new generation now they know computers. So that's not an issue at all." (Quality manager – QM2)

"The people with basic understanding will find it not that difficult because primarily the technology onboard is pretty simple. It's not very complicated so you know anybody with a good knowledge or basic knowledge of computers also would and should be able to handle this! (Technical Manager – TM2)

"Most of these programs are very very simple you know plug and play type of things and with the kind of technology that's there anybody who can you know surf the web now can work on it it's as simple as that. All the screens are there, they guide you so well, the questions are yes, no, don't know questions, FAQs and most suppliers who are supplying systems like this they also give along with that you know a kind of demo kind of software or a demo CD and things like that so it's actually quite simple to use, very easy to use program, these are not very difficult." (Technical Director – TD1)

Nonetheless, alongside these perceptions there were also traces of data indicating that some of the old seafarers were facing problems even with the basic operations of computers in their work.

"I would expect that the masters and chief engineers today in the age group of let's say early 40s would be very switched on with IT systems and computers and therefore to all operating systems these days even radars and ECDIS these days which work on windows there is no doubt about it. There is one Windows or the other or Linux which is the basic operating system. And I would have thought that they would have been more switched on and more geared towards things like that but they are not." (Operations Manager – OM6)

"A lot of you know Indian people like the old timers who are above that 55-60 years bracket well some of them I have met like they have adapted really well but some of them do have reluctance when it comes to changing over to newer technologies and like sending emails. You know they will prefer calling up and stuff like that." (Training Manager – TM10).

As illustrated in the quotes above the managers found certain age groups difficult to work with new technologies. More generally, the assumption that new technologies are 'user-friendly' does not always take into consideration the problems faced by some of the older seafarers who struggle even with the fundamental use of computer based technologies as highlighted in the above quotes. The challenges faced by the older seafarers seem to have been largely ignored by shipping companies.

5.3.3 LESS THAN 'OPTIMUM' USE OF NEW TECHNOLOGIES

The employers claimed that new technologies being capital intensive, once implemented, should be maximised in their usage to improve the efficiencies of shipboard work. The employers felt that despite training support some of the older seafarers found it difficult to make effective use of new technologies. The employer pointed out several reasons for this such as lack of computer skills or the changing nature of work and skills, to which the older seafarers resisted because of their intense association with traditional skills. A technical director commented:

> "... there are some people who are scared of automation. They are used to more simple, solid, reliable switches and valves and things and when you get these mouse and screens where you have to do everything on a screen it makes them a little jittery. Because they might not be comfortable with the idea. This would probably be more with the senior and experienced seafarers who might be a little more sceptical about this high-tech automation and might not understand it, might not comprehend it and hence by virtue of ignorance might not be able to operate the equipment to its intended fullest function or capacity." (Technical Director – TD2)

The employers claimed that old seafarers were 'good workers' when it came to experiential knowledge and skills. At the same time, however, the employers also believed that such skills were less important than the proficiency to work effectively with new technologies. For instance in many cases, the employers indicated that 'computer operating skills' were more important than seafaring knowledge and skills. Where the old seafarers faced problems with new technologies the employers attempted to relocate them to ships with conventional equipment.

> Researcher: "I was more interested in finding out from you if you have these kind of people in your company who as you said they are more senior and more experienced but they are not as good in using technology so what do you do with these people to accommodate them?"
>
> Manager: "Training, training and practice. What else you can do. Or else reallocate hardliners who believe it's just impossible that, they get extremely stressed out with

such things, to vessels with simpler designs and simpler equipment." (Fleet Director – FD2)

There were also situations where old seafarers faced redundancies should they find it difficult to adapt to new technologies.

> We have people onboard the ships that you know have been with us for many years and served us well and have done a great job. And we have sent them on training courses on how to operate reflex engines and the electronically controlled main engines. And even though we do a lot of courses and a lot of training they are simply not able to live up to the requirements that we face. And you know then we have to see if there's another ship that we have another ship that we can put him on where you don't have these requirements. An older ship or ship which is less hectic one ... and if we don't have that in some situations we say that may be you are not the right person to work in this company anymore." (Managing Director – MD1)

Others used terms such as 'sidelined' or 'archived' to describe the future employment prospects of old seafarers with technological advances (Field notes Aug 2009).

5.3.4 'EXCESSIVE' SHIP-SHORE COMMUNICATION

The data suggests that technological advancements increase the workload of employers at the shore end. This was mainly as a result of the increased communication between ship and shore in the past few years with advancements in communication technologies. Generally it was the middle managers who complained that the seafarers found it easier to reach for shore support rather than resolving their issues on their own. A technical manager says:

> Manager: "A chief engineer probably sends less emails in a trip than I get before 8 o'clock in the morning so everything they tend to email the office. For anything and everything! So that solves their problems and makes it for me."
> Researcher: "Why I mean?"
> Manager: "I think it's because it's too easy for them. And they think oh! I can email to the superintendent, saves me looking at the book." (Technical Manager – TEM2)

The technical manager above, being a seafarer for almost forty years, related his own experiences frequently during the course of interview. When asked to explain the reason for 'excessive' communication between ship and shore he said:

> "It's because communications are easier now. Might as well just sit down and type an email. My day you had to write it out and put it on a telex." (Technical manager – TEM2)

Most employers, being ex-seafarers, also reflected upon their own experiences as seafarers and claimed that the existing seafarers were not competent to perform their work independently without shore support. As a training manager suggests:

"What had started to happen was lot of over-reliance was happening from the shore side. I mean over-reliance of assistance like any query from the ship like we used to have lot of queries from the vessel … so that trend was alarmingly on the increase and that of course talking to friends in other shipping companies and other management companies, where everybody echoed the same sentiment. They all felt the same way that the superintendents were overworked because the ship had too many queries which the superintendents felt that they were so basic that when we were sailing as masters and chief engineers we could have handled this from onboard but now why they are asking such a stupid question." (Training Manager – TM10)

The managers felt that with communication technologies the ease of access to shore side was making the seafarers less autonomous and hence more dependent on shore staff in performing their work. A senior fleet manager said:

"… what's happened is that it [communication] has led to a culture where now the ship staff tend to use for anything they end the sentence with 'please advise' [laughs] which never was there in the past but nowadays you find the captain sending a message this this this this and at the bottom line you will find 'please advise'. So as a company how we address we look at this as a master's decision -making abilities so we look into giving them leadership courses so we look at competence compliance, building their confidence, we do all this training and ask them that decision making lies at their end. It's a challenge sometimes but I think that's the nature of communication of today that has led to this." (Senior Fleet Manager – FM1)

The above section presented the problems faced by employers as a result of new technologies. The most common problem and concern for employers was the excessive dependence of seafarers on technology. In most cases it is the young seafarers who seem to rely more on technology for their work. As for the older seafarers, it was felt that they do not make optimum use of technology which is much desired resulting from the resources invested in buying expensive equipment on ships.

An added concern for employers was the seafarers 'excessive' dependence on shore staff in carrying out their jobs at sea facilitated by advancement in communication technologies.

5.3.5 THE SEAFARERS' PROFESSIONAL STATUS – THE EMPLOYERS' PERSPECTIVE

This section illustrates the employers' views about the professional statuses of seafarers. As discussed earlier, technology, according to the managers, has played a crucial role in bringing down the crew sizes and minimising the crewing costs. Occasionally, however, the employers brought to light the adverse effects of technology in reducing the crew sizes on ships. One such example was the advent of the Global Maritime Distress and Safety Systems (GMDSS) resulting in job losses for skilled radio operators at sea (see Chapter 3 for details). The

primary duties of radio officers included the operations, repair and maintenance of the navigation and communication equipment. Apart from their core duties these radio officers were also expected to perform certain administrative duties such as accounting, crew wages, managing food and provisions supplies, port formalities etc. The removal of radio operators from ships resulted in some of their administrative tasks being redistributed to the remaining crew members. In some cases jobs such as accounting and food rationing were now directly under a shipmaster's work profile. These administrative tasks according to the managers were not commensurate with a shipmaster's rank and status. An operations manager says:

> "I mean he [captain] is not there to count the cabbages and chicken [laughs]. So if you had more automated process like that supermarkets have it ... This would really let the master do a master's job rather than count cabbages in the cold storages or something." (Operations Manager – OM4)

Some managers even compared the professional statuses of shipmasters with their own professional statuses as ex-seafarers especially those who quit their jobs as seafarers long ago.

> "When I went to sea as a Master we used to have Master's steward, radio officer, purser etc. Now master does everything including making pilot's bed, victualling, accounting etc." (Training Manager – TM4)

> "I remember those good old days when we used to have radio officers and pursers. A master was like a real master you know ... Nowadays he's just a postman or I should say a middle man onboard." (Training Manager – TM2)

5.4 THE CHANGING SKILL REQUIREMENTS

5.4.1 SEAMANSHIP SKILLS

This section discusses the changing skill requirements with new technologies. When asked to describe the changing skill requirements at sea the employers claimed that new technologies should not be viewed as a substitute for seafaring knowledge and skills which they felt were of paramount importance. As two managers suggested:

> "We must go back to the basic skills ... Fundamental skills are important." (Training Manager – TM14)
> "To me the important thing would be getting back to basics. ... today a ship's bridge or an engine room is like a pilot's cockpit ... We are getting too engrossed or too involved up with the automation side of it. My biggest worry is again a trade- off between to what extent you should embrace this and not leave the basic prudent seamanship." (Operations Manager – OM8).

The employers frequently brought up the unpredictable nature of work at sea (such as 'machinery failures', 'equipment breakdowns') and the problems in providing back-up support during the times of crisis which according to them reinforces the importance of seafaring skills. As three managers stated:

> "First of all as a traditional seafarer I believe that knowing your basics is the most important thing. No matter how advanced the technology is but the root of that technology is your basics. Technology is based on the knowledge that we are taught during our younger days so I think that having a good seamanship is most important because if the technology fails at anytime at least you still have your fundamentals and basics to keep going." (Operations Manager – OM3)

> "There are certain skills that you have to have but we also have to have the basic engineering, the basic engineering skills you know how to operate the plant, what happens if the plant trips off, what happens if there's a blackout, how do you recover from that. So you not only have the troubleshooting for sophisticated equipment you also need the basic engineering skills." (Fleet Director – FD2)

> "I think all I would like to say what I feel very very strongly is that technology is great. I mean it is forward thinking, it is moving in the right direction, where were we with communication 25 years ago and where are we today I think there is a big big change. Same thing with navigation system. But at the end of the day certain seamanship skills have to be retained where at least in an emergency we are not completely thrown off track." (Quality Manager – QM3)

The need to preserve traditional seafaring skills also seems to be influenced by the identity of shore managers as ex-seafarers. As is evident from the anecdotal accounts of an operations manager below:

> "During my own sailing time I remember we once had, what happened was that the vessel was going to US. I can't really recall the date but I think the US switched off their GPS system. OK once the GPS system was off nobody on the ship knew what to do because we were so reliant on the GPS for our position fixing because it was so easy, so friendly and so convenient to just look at the GPS and plot your latitude and longitude. But once the GPS was off for 2-3 hours everybody was like now what - now what. Why because we had forgotten the basics of position fixing by sextant even though the company has provided two or three sextants which are on every ship but nobody uses them. But to our luck we were we were lucky enough that we were in the mid ocean but just imagine if you are in a busy traffic area. It could be disastrous." (Operations Manager – OM3)

The training managers expressed even more remorse when discussing the level of skills of seafarers onboard ships, perhaps because they observed these problems more closely as part of their routine work. To these managers addressing the seamanship skills was *the* only solution to overcome the skill issues on ships. Whilst articulating the importance of

'seamanship' it was common for the training managers to shed light on the issue of 'over-reliance' on technology by the seafarers.

> Researcher: "So what is basic seamanship according to you?"

> Training Manager: "Basic seamanship – awareness of situation, what lies ahead of you, how you handle the ship. People are not aware of what is happening around them, a repetitive problem. The science of ship behaviour has to be clear to you – If I do this, this would happen. People are too struck in radar and the ECDIS. They are not bothered about going and looking at the chart ... these are the basics which were drilled in us during our days of training." (Training Manager – TM14)

A training manager narrated an incident where a shipmaster failed to make use of his own professional knowledge and judgement and rather relied on electronic equipment to avert a situation. This according to him was lack of basic seamanship skills. In the end he even asked for my comments as an ex-seafarer to which I (diplomatically) smiled and moved to the next question.

> "I'll tell you what half an hour back I spoke to a Master. He says he was headed for a TRS [tropical revolving storm] waiting for a weather report. I asked him don't you have a bloody barometer onboard. He said we do. I said why didn't you look at it then. And I won't be surprised if he doesn't know how to read a barometer. These are basics of seamanship – don't you think so. Huh? I mean you have been a seafarer?" (Training Manager – TM15)

The study elicits the views of both, training faculty employed in state owned maritime institutions and training managers in private maritime training centres. It was generally observed that training managers in private colleges were not as keen to promote the traditional seafaring skills. Their emphasis was more on acquiring the operational skills to work with new technologies. The traditional seafaring skills, according to training managers, were relatively resource intensive and heavy on training budgets. As a training manager commented:

> "We teach them principles of navigation ok this is one way of looking at it that it opens up their brains but it's of no practical usage. If you need to send someone to the moon you don't teach him astrophysics. You teach him what is required to know for operating the spacecraft unless you have 50 years to teach him." (Training Manager – TM4)

5.4.2 TECHNICAL SKILLS

In some cases the employers claimed that new technological changes do not necessarily reduce the demand for intellectual skills. Conversely, work efficiencies could be exponentially increased if technology could be used more effectively by employing technically skilled seafarers. This is illustrated by the quotes below:

"At least onboard our ships we have a lot of optimizing tools, nautical tools to optimize, to optimize the speed, to reduce the buffer, to use the current, to use the weather to arrive just-in-time and not adjusting your speed but keeping the same RPM throughout the entire voyage ... the demands are getting higher from the complexities, it's difficult to keep it simple onboard the ship now. That is the bit of difference now and may be you have a bit of difference between the people who understand how to optimize the ship and the people who know how to run the ship who can do that. We start to see a big difference now." (Managing Director – MD1)

If you take the container segment, a big 8000 TEU [twenty foot equivalent unit] container segment burning 250 tonnes of fuel per day, costing $ 4-500/ ton that's a lot of money and to resolve that we have also installed some very expensive engines, some very expensive equipment onboard the ships that is enabling us to optimize the fuel consumptions and getting efficient both for the benefit of the company and the environment. And we talk about the electro-technical controls, reflex engines or any engines which we found very advanced, very difficult systems that you put onboard the ships, it's not easy to operate and it does require some technical skills to operate them. It does require some extra training to operate those engines and those more advanced systems that you put onboard today. And it's not everybody who has the capability to do that in an efficient manner." (Fleet Director – FD2)

"Now until and unless the human operating the technology is using the technology to its fullest we are not actually you know targeting this particular issue. As I said the radars for example are a prime example, they can do all sorts of fancy things because but the poor third mate or the second mate is not trained to use them. So he is still using them as conventional radar, one blip and then he measures the distance and now he clicks and gets an ARPA and that's about it. And there's this 50,000 dollars piece of equipment which can do all sorts of things and is not being used to do that." (Operations Manager – OM6)

In another case a senior human resource director was of the view that with new technologies there has been a substantial reduction in crew sizes on the ships. But according to him, reduced manpower on ships will put more pressure on the skills of seafarers in future:

"A lesser number onboard with more highly competent set of crew who are able to handle these kinds of more sophisticated ships, short port times, fast in their turn around so I think the demand on the crew will be more because they will be looking for more qualified people who can manage that kind of work pressure on them, being able to operate more sophisticated ships with highly technical competence." (Human Resource Director – HRD1)

The employers also expressed concern about the lack of technical skills on ships resulting from the shift from electrical and mechanical technologies towards electronic equipment and computer based technologies on ships.

"Up till now we are all used to electrical ... and now we have jumped into electronics, actually truly speaking right from the chief engineer to anybody his electronic knowledge is zilch. You actually need a electronic officer on the bridge nowadays

because there is hardly anything that the electrician can do on the radar and all. It's all electronic." (Training Manager – TM1)

In some cases, the employers suggested moving towards incorporating the knowledge of 'electronics' in seafarers training for the repairs and maintenance of shipboard equipment.

> "Our new cadets whom we are training and the institutes that we are trying to emphasise that electronics should be an integral part of it that is to tackle the software side of it, I mean the computer or whatever the electronics part and the equipment." (Standards and Procedures Manager – S&P1)

According to the employers certain technologies (such as the advanced electronically controlled engines) require advanced knowledge and technical skills for effective operation. In such cases, the managers claimed that seafarers were sent out for advanced equipment trainings from the vendors and manufacturers of new technologies. But because of economic constraints the employers claimed that only a few seafarers (generally those in higher ranks) were provided advanced training. A quality manager says:

> Manager:" You can't give to everybody you know. It's not cost effective huge costs. These trainings are very costly and you know. And you don't need. Basically you need may be one or two brains and then more hands that's why."
> Researcher: "Why do you think so?"
> Manager: "Because you know. Of course if you can give training to everybody its quite good. So in terms of money you cannot do. So if there is one person who can see and find it and then do it, basically it's more or less laborious job. And then one person will say what to do and how to do. Same happens when the shore technician comes, he basically comes but he doesn't do everything himself. Ship's people they give hand. He instructs what to do how to do and all." (Quality Manager – QM1)

Since advanced technical skills could be limited only to a handful of crew members the employers indicated a separation between operational jobs and high skilled technical jobs on ships:

> "We need people on the top who are skilled in the IT and electronics side and the people down below they just can be do as they are told so you need somebody on top, people on top who knows about the ins and outs of electronics and IT, consultations and you need less people down to do the actual work." (Technical Manager – TEM2)

> "The ships have sophisticated controls systems OK; integrated control systems so you need people who can operate sophisticated systems and you need people who can maintain that. So you need engineers who have a fairly high level of skills in troubleshooting, and in repairing sophisticated control systems. And on the operational side you need deck officers who can operate that kind of a system." (Fleet Director – FD2)

But in many cases even this arrangement does not seem cost effective to the employers because of the non-standard nature of equipment and specialised knowledge required to resolve technical issues the employers claimed that providing advanced technical training to the seafarers was not the answer to their problems. An operations manager said:

> "Even if we put an electronic engineer onboard ... I don't think they would be able to solve all problems because again all manufacturers are different. So unless you send your electronics engineers to a course with each and every manufacturer whose equipment you have installed on your ship which is neither practical nor cost effective. It's just not possible." (Operations Manager – OM6)

A technical director added by saying:
> "If I have a seriously automated vessel and I have the brightest team that I have onboard. That's the best combination that I can have. Even then there are a lot of issues with the automation onboard like the moment you go behind the panel then it is completely irresolvable onboard even with the brightest of brains. Because every system is made by a different maker." (Technical Director – TD2)

The employers claimed that outsourcing technical maintenance to third party contracting services was by far the most cost effective solution for advanced maintenance and repairs of new technologies. An operations manager noted:

> "What we are doing is we are getting into a contract with a maintenance company who will be responsible for maintaining our navigational equipment. So that way we hope that we can get better response if something goes wrong and that we think is the most suitable way. It is now beyond the capability of the ship." (Operations Manager – OM6)

5.4.3 NON-TECHNICAL SKILLS

When asked to explain the changing skill requirements the employers also felt the need to address the business awareness and commercial skills of seafarers. Within a particular company the managers posited that with new technologies it is not so much about the technical know-how of workers but instead their ability to manage work in a cost effective manner. The managers believed that the entire approach towards seafaring skills needs to be revised which has so far primarily focused on transporting goods from the point of origin to the destination. Rather, it was claimed that along with seafaring skills the seafarers should be able to 'add value' to the businesses. This is illustrated in the conversation with a business development manager in one company:

> Researcher: "So then with these new technologies what skills do you think are crucial to work onboard ships?"

> Manager: "I think with new technologies the mindset has to change. We still need to take pride in repairing what is broken down and that will remain an integral part of a

seafarer's life because when at sea middle of ocean and there's no help around they need to know how to repair things which have broken down but at the same time we need seafarers to start focusing on the commercial aspect and take an informed decision on how much it costs to repair that compared to throwing it and replacing it with a new one."

Researcher: "Do you think such skills are difficult to obtain in the present market?"

Manager: "It's difficult to have someone with a commercial mindset and still possess good seafaring skills, it's a difficult combination. Like we have invariably focused seafarer to be a seafarer run the ship from A to B and today to repair a hole in the shipside railing I wouldn't have been surprised if a seafarer cuts a brass pipe and puts it over there so [laughs] it's a small example but it doesn't make commercial sense at all to repair things like this." (Fleet Director – FD1)

None of these comments aimed at addressing the management skills of seafarers corroborate with the views of the managers in the training department within the same company. Besides a short training courses in business management, to which a training manager sarcastically stated as "crash course in MBA" (as it lasts no more than three to five days – interview notes SB), there seems no genuine attempt to enhance the commercial skills or business awareness of seafarers.

With new technologies the employers also emphasised improving the 'communication skills' of seafarers. The employers pointed out that with remote technical support at the shore end it is now a question of seafarers' ability to communicate their technical issues to shore side technicians to resolve technical problems on ships. A technical manager stated:

> "In fact apart from being a good master and a good chief engineer these two gentlemen onboard also require to be reasonably good communicators. Given the nature of complex equipment, complex processes … they need to be clearly put forward their problems, their ideas, their issues which they have onboard so they get a good response." (Technical director - AK)

Equally, the importance of 'team working', 'leadership' and 'people skills' was brought up almost on all occasions by the employers. As a senior human resource manager says:

> "I think beyond knowing the technical knowledge they have to have some of the other skills of managing people and leadership skills and these are some of the skills that we do, we train them from time to time, expose them to such leadership development, teamwork, you know managing people skills." (Senior Fleet Manager – FM1)

The employers claimed that these soft skills were even more important than technical skills because of the changing nature of work on ships. Occasionally the employers also emphasised the importance of personal attributes such as 'faithfulness', 'honesty', and 'loyalty' in seafarers. The managers claimed that the seafarers these days are not committed

to their employers as they often switch between companies even for a marginal increase in wages. As one crew manager comments:

> "Nowadays you see most people would just leave for 50-100 dollars and join another company. So most important I think as I told you we are looking for some sort of honesty, some you know commitment, *dedication* from these chaps." (Training Manager – TM5 - emphasis in italics)

For the same reasons, the employers claimed that there is not much incentive to invest in crew training as the seafarers do not show commitment to employers. A technical manager said:

> "I know we can train somebody from our ships, we can put him through all sort of courses but the trouble is these days there is no fixed contract so we can put this guy through a lot of training and then he can say bye bye. Somebody else offers him more money and he will go. We have seen this quite a lot." (Technical Manager – TEM2)

In one case an employer felt that it was safer to invest in technology rather than improving the welfare conditions of seafarers on ship. He commented:

> "I mean I wouldn't overrule paying extra money to put in technology because you see that gives you return. Giving people is a dead investment because you see they are as it is going there and getting nothing out of it. They just go, run the ship, come back. I would much rather prefer to put that hefty sum into technology if that dispenses to people because it is a return in one way to me." (Operations Manager – OM2)

A training manager claimed that the company paid careful attention to the design and operation of new technologies to keep training costs to a minimum in response to the high attrition rates of seafarers. He said:

> "What is happening in the shipping industry is nobody is permanently employed, everybody is on a contractual basis. Today you have that company tomorrow you have another company people are just changing for $ 100 or $50. So basically what we are looking at the technology has to be simple, easy to use and friendly." (Training Manager – TM5)

This section illustrated the views of employers about the demand for seafaring skills in technical and non- technical areas. The importance of traditional skills is still felt important by many employers and particularly training staff mainly because of their background as seafarers. Equally the importance of technical skills seems to be on the rise with new technologies. As the data shows, however, high skilled technical jobs are primarily limited to a few crew members thus accentuating the gaps between low skilled operational jobs and high skilled professionals on ships. As for non-technical skills, it seems to include everything from 'skills', 'attributes' to personal traits.

5.5 THE ROLE OF TECHNOLOGY IN SEAFARERS TRAINING

The employers claimed that because of technological advancements in the past few years there have been significant changes to work organisation on ships. In contrast, however, it was felt that the maritime training has not been revised to address the changing skill requirements on ships. The employers used various terms such as 'century old training', 'outdated training' and 'obsolete training' to suggest that statutory maritime training has not been very useful to address their skill requirements. The employers felt that technology plays an important role not only in management and operations but also in the training of seafarers. From the data it appears that the managers favour the use of technology in crew training mainly in the areas of computer based training and simulator training.

5.5.1 COMPUTER BASED TRAINING (CBT)

In the case of certain NECs the employers felt that the institutional support and training standards were not sufficiently geared to meet the skill requirements. The employers appear to have less faith in the training and certification of seafarers. As a crewing manager suggests:

> "There is no more faith in the STCW. Even if he [seafarer] comes with a ticket it's not worth more than a paper." (Training Manager – TM7)

At the same time the lower training standards of the seafarers in these countries do not appear to offset the supply of seafarers from these countries. The same employer felt that through effective use of computer based training the skills issues of the seafarers from NECs could be addressed.

> "We assume that the guy knows nothing when he joins us and then we identify the gaps in their knowledge. We have what we call a knowledge management system here, we see what training is required and then we use CBT." (Crewing Manager – TM9)

The benefits of using CBT were mainly felt in its ability to reduce the cost of training the seafarers. The role of CBT was considered useful also because of the mass recruitment of seafarers from NECs. As a quality manager explained:

> "Remember people keep entering and people keep leaving so what do you do with the new people who are coming into the organisation ... what we are right now doing is we are using technology we are using actually a lot of computer based programs because it's not possible to do a one-on-one training for each person it's not an efficient way of doing it. So we are using a lot of animation and lot of technology, and lot of basically computer based training programs." (Quality Manager – QM3)

The employers claimed that with CBT seafarers could even be trained onboard ships thus reducing the costs of training and saving the businesses from investing in building training infrastructure ashore. At the same it was claimed that the training data of seafarers could be accessed and assessed from centralised locations ashore. A senior HR manager suggested:

"Training and development onboard ships have always been almost nil. They have to wait for port visit to be trained but now they don't have to come to Singapore for training. They just go and just learn onboard the ship and they can be picked up anywhere on ship where they are to see what they are learning. That has reduced costs as well as improved the efficiencies of development." (Human Resource Director – HRM1)

In two companies at least the managers claimed that the cost of CBT has been further reduced through outsourcing of training functions to specialised agencies.

"Earlier we were doing it on own but now we have tied up with Seagull and Videotel. So they take care of our training needs." (Standards and Procedure Manager – S&P1)

"We have outsourced our training to XX (company name concealed for ethical reasons). So now you see we have one job less now plus we are happy with the service. We have told them what our requirements are and I think they are doing a good job so far. In today's world I think this is the best choice." (Senior Fleet Manager – FM1)

In some cases the employers also demonstrated the use of CBT in setting up career progression objectives for seafarers. As a crewing manager explained:

"We just don't promote people based on time based I mean if I have done 10, 12, 15 months, I should be promoted, we don't do it that way. To be promoted we have certain matrixes and we have a CDR that is issued and the officer has to meet each of his competencies which is identified from the rank, like for a 3rd officer to a second officer he has about 50-60 competencies which he has to accomplish. Then master has to sign off on that objective evidence of project report he sends. Performance report is evaluated, we have onboard training, we have Seagull and Videotel and we set certain minimum prescribed training that we have to do and once this is done and it is reviewed by the training dept then only we consider promotion."... (Senior Fleet Manager – FM1)

5.5.2 SIMULATOR BASED TRAINING

The employers also highlighted the role of simulation technologies to illustrate the benefits of technology in seafarers' training. Here again the employers appeared primarily concerned with the economic benefits of using simulator training. As two training managers commented:

"It is cheaper here you see. You have to spend far more if you send them onboard ships. There you pay them wages, you provide them berth onboard, victualling costs etc etc etc. Here you just give them some training and that's it." (Training Manager – TM8)

"These days we don't send them [seafarers] onboard to learn any more. We send them to *perform*. We have all the technology here to give them the hands-on training. You see it's not only cheaper for us it's far better for them also to learn here." [Training Manager – TM15 emphasis in italics]

The managers claimed that simulator based training was effective because although a virtual technology, it was the closest resemblance to onboard learning and training environment. The term 'fidelity' of simulators was used on many occasions which according to the (training) managers described its semblance with the actual work environment at sea. As three training managers commented:

"The environment here resembles to a real ship. We call it fidelity of equipment. Only then you get that real feeling with the sound. Simulator training is that only – virtual reality, you should see how their stress level rises their voice changes when we induce a problem in the exercise." (Field notes – Training Manager – TM6)

"The quality of simulators, functions are modelled on particular ships. Parameters are drawn from real ships replicated because otherwise the student loses interest. Fidelity of simulators should be high." (Field notes Training manager – TM7)

"In one case a manager was of the view that the simulator technologies should instead be termed as 'emulators' because successful simulator based training according to him was about 'emulating the real situations onboard ships'." (Field notes Training manager – TM3)

But on the other hand there were those who suggested that simulator training ashore was not a substitute for traditional skills acquired by training and learning onboard ships. In most cases these views reflected in the data from training faculties employed with the state run MET colleges in India.

"Simulator is ok as a benefit. Simulators are good in some respects ... You may have data, you may have information but the decision is still yours. You need data but that data still remains data. Anticipation is the name of the game, if you can use that data with anticipation. And you can't anticipate using astronomy. You can anticipate only if you have experience, knowledge, and the simple basics of seamanship ... The problem with simulator technology is that there is no wind on the face. And seamanship is not to get certified but to learn, to get salt in your veins and not just in your blood." (Training Faculty – TF2)

It was argued that simulator training should not be seen as a substitute to onboard learning and training to acquire seafaring skills:

"The problem with simulators is that I can train him on ten different cases but if he goes onboard and experiences an eleventh scenario he would say I was not trained on this." (Training Manager – TM15)

"Many a times things happen onboard which cannot be experienced or recorded. Simulators cannot help there." (Training Manager – TM17)

"Sea life is something where everything cannot be backed up in simulators. We need practical training. We need to promote head and gloves together." (Training Faculty – TF3)

The employers seem confident that technology can be very useful to address the skills of seafarers, more so because of the lower cost of computer based training techniques and infrastructure. At the same time, it appears that computer based training can be used effectively to monitor the performance of seafarers for their career progression at sea.

The benefits of simulator training are also felt along the same lines of cost benefits but in this case the training staff does not always seem to approve the market rationale for using new technologies in the seafarers' training.

5.6 CONCLUSION

It is evident from the discussion that market competition and the opening of global labour markets for the maritime industry present significant opportunities to reduce crewing costs by employing seafarers from new countries. New technologies are perceived as positive and powerful tools for reducing labour costs, but at the same time the employers seem to raise doubts about the skills, knowledge and motivation of seafarers to work on ships. It shows that the sourcing of cheaper workers from new locations is not without its problems as it raises the issue of trust between the ship and shore interface. This is evident from the detailed monitoring of shipboard activities from the shore side. Nonetheless it also creates setbacks as the shore side claims that the seafarers are increasingly dependent upon shore management in carrying out their duties. Overall, the tensions between the ship and shore interface seem to have increased with the international sourcing of labour.

The findings also suggest that the employers increasingly find younger seafarers better skilled in operating new technologies than some of the older seafarers. But at the same time the employers also claim that the young seafarers exhibit less motivation and at times rely excessively on technology without using their own discretion and skills.

On the issue of training and skills, whilst in general the employers seem to espouse the idea of reducing costs by using new technologies, there are also those (mainly the training managers) who oppose the idea of replacing traditional seafaring skills with new technology.

To sum up, this chapter has outlined both the underlying reasons and the challenges faced by the employers as a result of implementing new technologies on ships and the changes to the work, skills, training and employment of seafarers.

Having sifted through the views of employers and training managers the thesis turns to examine the views of seafarers in the next chapter.

CHAPTER 6   TECHNOLOGY, WORK, AND SKILLS – THE SEAFARERS' PERSPECTIVE

In the preceding chapter the thesis has examined the views of the employers about the main reasons to implement new technologies and the impact on work, skills and employment. Likewise in this chapter, the changing nature of work, skills and employment will be examined but from the seafarers' perspective.

The chapter begins with an understanding of the traditional seafaring knowledge and skills to give the reader an overview of the work cultures, work practices and traditions at sea in what constitutes the seafaring identity. Next, the chapter discusses the changes to work, skills and seafaring identity as a result of technological advancements on ships. It begins with the perceptions of seafarers about market competition when competing with others in global maritime labour markets. It would then outline the impact of new technologies on ships followed by its potential advantages from the seafarers' perspective. The following section discusses the challenges faced by seafarers as a result of technological changes at sea. The penultimate section illustrates the changes to the training and skill requirements of seafarers before summarising the conclusions.

6.1   THE SEAFARING PROFESSION

Any attempt to review the traditions, work cultures and practices at sea can be challenging given the extensive literature on this 'centuries' old profession (Vickers and Walsh, 1999). The earlier work of Francis Bacon, and more recently Benedict Anderson in his work, suggested that sea transport along with the invention of gunpowder and printing played a crucial role in the spread of capitalism (Anderson, 2006, Bacon, 1878). Seafaring opened new avenues for 'discovery' leading to the exploitation of economic resources from new countries and the migration of labour across continents, in the same way as gunpowder was used for military invasions and 'print capitalism' for the manipulation, spread and control of knowledge (Anderson, 2006).

For a long time in maritime history this urge for 'discovery' was somewhat limited because of *force majeure* at sea and the limitations of human innovations so far confined to sail powered wooden boats. Because of the tough weather conditions at sea a strong hierarchical work organisation was required comprising a shipmaster with the ability to 'command and

control' and at the same time disciplined and yet physically strong crew members were expected always to behave in a 'seamanlike manner' (Wallace, 1924, Morison, 1979). Past literature sets a clear distinction between shipmaster and *his* crew exhibiting a hierarchical culture in crew structures on ships. Put simply, the shipmaster was not seen as ordinary crew.

Rodger (1986) reported that work conditions on merchant ships were even more severe compared with navy vessels since work organisation in the case of the former was primarily influenced by profit motives. Transporting cargoes in 'ship shape' was the priority of ship owners since profit-making was largely dependent on eschewing any losses to cargoes and seaworthiness of ships. A voyage at sea was termed as 'adventure' shedding light on the precarious nature of work and the perils of the oceans to which sail powered boats had little control.

Because of the precarious and remote nature of work, the experiential knowledge and skills gained at sea were crucial for the employers to place their trust upon seafarers. In a local narrative Vickers and Walsh (1999) explain the trust relations between the seafarers and ship owners in the mid nineteenth century involving a merchant Orne who owned a sail ship *Beaver* and handed it over to Captain William Webster for command at sea.

> The master of the Beaver was William Webster. To him Orne had delegated the responsibility for choosing and hiring a crew, making sure they were paid, stowing and unloading the cargo in Salem and Fayall, handling the vessel at sea and serving as his business agent abroad ... he was easiest the oldest and most experienced man onboard – somebody Orne felt he could trust. (Vickers and Walsh, 1999: 21)

Orne's objective like any businessman was to generate profits, but his decision to appoint an old and experienced shipmaster stresses the importance of work experience in the seafaring profession.

According to Vickers and Walsh (1999) seafaring experience was acquired mainly through rigorous training and learning onboard ships. Smith observed that young seafarers, termed as cadets and ship's boys, were brought onboard ships and 'were formally apprenticed to masters who would instruct them in the management of vessels and the art of navigation' (p. 25). Past literature shows that these young apprentices went through harsh training on ships to eventually become 'good sailors'. Hoffman and Kumar (2002) noted that 'the education of a young sailor is incomplete if it does not include indoctrination for facing calamities at sea or ashore' (Hoffman and Kumar, 2002: 56).

These narratives provide a useful insight into the work cultures and practices at sea in the past. In the context of this study, it was attempted to shed light on the seafaring identity in the past. A brief review suggests that seafaring was considered as a high skilled profession that allowed autonomy and control to the seafarers whilst at sea. The role of specialist knowledge acquired through experience and learning also seems to reinstate the importance of the profession. Recent studies of wider industries suggest otherwise. New technologies and competition pressure seem to have influenced the notion of professional identity in skilled professions (Huws, 2006). To examine how the seafarers have responded to the introduction of new technologies, let us return to the views and experiences of seafarers who participated in this study.

6.2 THE SEAFARING SKILLS, WORK CULTURES AND WORK PRACTICES IN THE PRESENT CONTEXT

The discussions with the seafarers reflect that there still exists a strong inclination towards traditional practices and skills despite the introduction of new technologies. For many seafarers interviewed in this study, there is a deep desire to engage in work. The emphasis is on 'doing stuff' rather than monitoring or just 'watching things standing there'. The seafarers frequently made use of terms such as 'dirtying the hands' and 'hands-on experience' to highlight the importance of actual involvement in work. Any jobs except those which require physical engagement are perceived menial work (for example 'checking inventories', 'ticking checklists', or 'stupid paper work') which fail to engage the interest of seafarers. Even with modern equipment, visual inspections, physical presence and tangible feel of work are considered more important than 'just peeking' at digital information obtained from new technologies to conduct safe operations. As a shipmaster commented:

> "See let's say cargo operations, now you can't be theoretical there. It's not just looking at the suction pressure but to know how to handle a valve, to handle the ropes ... "(Master – M11)

Another shipmaster commented:
> "If you want to survive at sea only trust on your eyes don't trust anything except what you see with your eyes. Computers can fail you any time and this is what I tell my boys." (Master – M9)

When asked to explain how best the seafarers could acquire seamanship skills a shipmaster says:

> "Drag the guy to the deck, ask him to touch the bare metal and feel it. Use common sense, *Jugaad*[9], people should know there's a problem now what's the solution, we have this situation do you have any innovative idea, is there any alternative way of doing it?" (Master – M11)

Any theoretical knowledge - or in their words 'bookish' knowledge - is considered only of marginal importance as the seafarers strongly believe that it lacks the rigours of 'practical' seamanship.

When asked about the skill requirements, the seafarers suggested that seamanship skills are of paramount importance irrespective of technological advancements at sea. The older seafarers believed that seafaring skills are being undermined with new technologies and more as a result of the increase in administrative work at sea. A shipmaster says:

> "When I go on ship I see everybody the chief engineer is perpetually on the computer, the first engineer is there, the chief officer is there, but what about the actual skills of the people I mean you know you have to practise it. As they say the famous guy who was playing violin they say that if I don't play for a day I will come to know but if I don't practice for three days the audience will come to know. You have to keep practising these skills you know. For that you need time." (Master – M3)

As illustrated in the quote above the seafaring skills were often compared with craftsman skills to underpin its artisan and intuitive character which the seafarers believed could only be enhanced through practice. A chief engineer stated:

> "It's like a driver test, you see you start to learn to drive after you pass your test and I think it is a little bit like that, a lot like that." (Chief Engineer – C/E.1)

The seafarers suggest that practice based learning and traditional apprentice model of training remain the most powerful tools to acquire the knowledge of seafaring work. By the same token, ships are perceived as the most appropriate setting to acquire seafaring skills. It is generally believed that the training of a seafarer remains incomplete unless the apprentices are exposed to the maritime 'adventures' and casualties - fire, flooding, and grounding to name a few. The ability to remain calm when faced with a situation, to anticipate what lies ahead and to handle the situation in a 'seamanlike' manner are still considered integral to good seamanship skills. The acquisition of such skills is not something which is of immediate importance or productivity gains at work. The seafarers believe that seamanship skills, even

---

[9] **Jugaad** is a colloquial Hindi word that can mean an innovative fix, sometimes pejoratively used for solutions that bend rules mainly due to a lack of resources

though rarely used in contemporary work conditions, should never be ignored in the maritime training.

> "Like in my case I'll tell you I have seen so many situations man overboard, search and rescue, suicide onboard, distress, fire in the cargo hold. I've been there for sixteen years and I can tell you every situation at sea is unique. You may have learnt something sixteen years ago and you may not use it every day but when you face the situation you know how helpful it was to know that. It does help you then." (Master – M2)

> "Recently I rescued some fishermen near the territorial borders of Pakistan. There was a lot of drama onboard, we had some coastguard visiting us, they honoured us with some awards to save the life of these people. Lot of photographs were taken, I'm telling you this story you see because you need these skills still, same goes with emergencies, accidents they don't happen every day but you need to know, you need that practical knowledge you can't just survive without it." (Master – M11)

Alternatively good seamanship, for some seafarers, meant the application of 'pure common sense'; learning to adapt with the harsh conditions at sea; or even taking good care of one's self and the ship mates. Some felt that one needs only to 'keep his eyes and ears open and observe his surroundings to become a good seaman' (field notes March 2009). Others felt that each day at sea is new and seamanship in itself a (learning) process as the sea has much to offer to acquire new skills each day.

Although shipping companies claimed to have introduced objective measures to assess the performances of seafarers for their career progression, the seafarers still emphasise the importance of certain attributes which they feel should form the basis of career progression at sea. The interviews with older shipmasters suggest that merely showing the ability to perform one's duties as part of the job profile was not sufficient to approve promotions to the junior officers. For that matter even a certificate of competency was only a 'piece of paper' to old seafarers who do not seem to place much importance on the theoretical knowledge (as part of the statutory STCW certification) to approve the promotion of junior officers to higher ranks. Rather, the ability to demonstrate the 'practical skills' and knowledge expected to perform at the next level is perceived of paramount importance for career progression. An old shipmaster commented:

> "Shipmaster - I think promoting the people to senior ranks is like put the penguin in water let it swim. You prove your efficiencies, your capabilities, ability to understand and disseminate, conduct training of crew, load the ship in port. I mean take charge from the chief officer, so you know show me that you can really do that job."

> Researcher – "And what about the company's procedures on promotion?"

> Shipmaster – "You see you may be good at ticking those boxes to show that you have learnt all those things listed there but to me unless you have shown me that yes I can do it I would not want to recommend you to the next rank." (Master – M1)

At the other end, those young seafarers who obtained promotion as senior officers at an early stage saw it as a social achievement more than any economic gains. These seafarers gave the impression that obtaining promotions to higher ranks at an early stage of their career was still rare at sea. A young second engineer at the beginning of the interview boasts about his earlier than expected career progression at sea:

> "Like I am just 29 I mean in my batch I'm the youngest one to be promoted as second engineer. Like my friends they can't believe it, they call me and say wow man you are going to be chief soon. And like some of them still they are third engineers, fourth engineers." (Second Engineer – 2/E.1)

With old seafarers the pride of seafaring still lies in navigating ships using the conventional equipment of past – sextant, chronometer, and magnetic compass. The ethos of industrial training of seafarers strictly emphasises using 'all available means' to navigate the ship and not so much to rely on a single source or piece of equipment for safe navigation. Besides, complete understanding of work principles and limitations of equipment are considered crucial when using technology in critical operations. Relying on technology to perform work without complete knowledge is considered the antithesis of seamanship skills. Even with the technological advancements nothing is left to chance and 'prudent seamanship' still appears to form the basis of safe operations at sea. Interestingly even a young Angolan officer undertaking training in the UK appeared critical and concerned when discussing the implications of new technologies in traditional seafaring skills. He stated:

> "GPS is very good piece of equipment but it's a shame to say that it is reducing the second mate's job in terms of sight. So nowadays very very very difficult we are taking sights and then may be after one month you try to take but the performance is low and on the third or fourth sight calculation you get but after sometime without calculations your skills just start coming down and I'm afraid if it keeps on going this way even though this technology is faster and its helps us to do some other kind of job but when they fail I think then the generation of mine will have a lot of problem because we tend to forget the background or the principles behind all these new technologies." (Third Officer – 3/O.6)

These work cultures emphasising the importance of 'good seamanship' reflect regularly in maritime conventions and codes aimed at improving the safety at sea. To quote the collision avoidance regulation at sea (Rules of the Road):

> Nothing in these Rules shall exonerate any vessel, or the owner, master or crew thereof, from the consequences of any neglect to comply with these Rules or of *the neglect of any precaution which may be required by the ordinary practice of seamen,*

or by the special circumstances of the case (Cockcroft, 2004 - Rule 2.a Emphasis added in italics).

Likewise the collision avoidance regulations spare no room for ignoring the importance of good seamanship:

> Any action taken to avoid collision shall be taken in accordance with the Rules of this Part and shall, if the circumstances of the case admit, be positive, made in ample time and with due regard to the observance of good seamanship. (COLREGS, 1972 - Rule 1.a)

With old seafarers there seems a sense of pride associated with the work experience (generally referred to as 'sea-time') gained at sea. The importance of work experience gained at sea was brought up on many occasions which according to these old seafarers qualified them as 'seadogs'. Fast promotions at sea seem to be discouraged because someone without 'grey hair' does not appear to fit into the role of a senior officer in the perceptions of old seafarers. A shipmaster is addressed as 'old man' and the chief engineer as *'Bada Sahib'* as someone who bears 'the weight of four stripes' in-charge of a 'multi-million dollar empire' (Field notes miscellaneous). There is also respect for the ship owner who, the seafarers feel, trusts them with commanding an expensive ship. This was evident from the opening statements of most ships' shipmaster in the interviews when they were asked to describe their role on ships. Most began with identifying themselves as 'owner's man' with the overall responsibility to command the ship. As a shipmaster states:

> "I am the master of the ship which means basically that I am in charge of the complete administration onboard ... basically complete running of the ship which includes basically representing the owner, his interests, as far as profitability and you know reasonable running of the ship is concerned, looking after manpower onboard." ... (Master – M6)

This section was an attempt to compare the work cultures, work practices and the seamanship skills with the past literature. The views of seafarers suggest that the prevailing work practices and skills at sea display a strong resemblance with the past. Let us now turn to examining the impact of market competition and the introduction of new technologies on seafarers' perceptions and experiences.

6.3 GLOBALISATION OF MARITIME LABOUR MARKETS – THE SEAFARERS' PERSPECTIVE

During the course of interviews the seafarers were asked to comment on the strategies deployed by their employers to remain competitive. The seafarers (especially those serving in

senior ranks) felt that in the past few years the employers have 'excessively' cut down on the operating costs on ships. As three seafarers noted:

> "Cost cutting, cost cutting that is the part that we are seeing and cost cutting in its complete sense in fact I would put it that way cost cutting in its complete sense. Save whatever you can wherever you can." (Master – M7)

> "Well a ship owner generally one thing I discover about them is they are always thinking of maximising profit." (Second Officer – 2/O.5)

> "It's really bad right now. It's too much cost cutting. Even food, the quality of food we get its really cheap quality. I don't think the day is too far when they will say – ok no chief cook from now you make your own food and clean your plates." (Chief Engineer – C/E.2)

Since the data was collected in the year 2009, however, it is possible that these views were in part also influenced by the global economic downturn. The same master who emphasised 'cost cutting' (above) adds to his previous comments by saying:

> "Since the last one year our company has started facing the brunt of economic meltdown which is taking place so according to that those are the challenges we are facing." (Master – M7)

The seafarers were then asked to explain the ways in which the competition strategies of the employers have changed in the past few years. These seafarers singled out the drive towards 'cheap labour' from new countries as a dominant cost saving strategy used by the employers. In doing so, these seafarers made frequent references to South East Asian and East European countries which according to them appeal to the employers to source cheaper seafarers. As a ship master and a chief officer explains:

> "It has changed quite a bit. Because you see earlier seafaring was completely restricted to Europeans and then later on they started taking people from Asia especially from India and but now we have a lot of competition because cheaper crews are available for example from China, Russia and Eastern Europe. Lot of seafarers come so as far as competition goes it increases because and these countries especially China the potential is not being yet tapped and the manpower from there is fairly cheap so I would say it's increasing and it's going to get increasing day by day and I would say after 5 years it would be even more competitive." (Master – M3)

> "It's all cost control. Cheaper people who are getting into the shipping industry would always like to market themselves as a cheaper option which is being offered now by China and Indonesia and countries in that area so the company works out to be cost effective. Ya a Chinese cadet would cost me $300, a Sri Lankan cadet would cost me $ 500, OK let's fill them up with Chinese cadets. Sri Lankan officer will cost me about 1800-1900 US, a Chinese guy will do it for 1100 so let's take the Chinese. What they don't understand is that traditional seafaring nations bring with them a lot of experience which the new nations do not have." (Chief Officer – C/O.2)

In some cases the seafarers also believe that the shift towards 'new' locations to source labour is also as a result of the shortage of seafarers within the EMNs. In addition the old seafarers seem convinced that most young people in the developed countries are not interested in pursuing a seafaring career.

> "They have now found newer source and it's a very disturbing thought because the traditional seafaring nations are now shutting down. They don't want, most of the guys are not wanting to go out to sea so they are looking for new venues they have started looking at Burma, which is again a non-seafaring nation, they are looking at China which is getting into shipping now but then the language problem is a big problem. They are looking at Indonesia, they are looking at Philippines, they are looking at south East Asia ..." (Chief Officer – C/O.3)

6.3.1 'POOR' TRAINING STANDARDS

The older seafarers from EMNs (established maritime nations) claimed that the training standards in the past few years have declined particularly highlighting the safety awareness, competency standards and language skills of young recruits. When asked if the problem of training was limited to any particular labour supplying countries the responses of the senior officers were mixed. Some felt that the decline in training standards was common with the young recruits irrespective of their country of origin. As two ship masters suggested:

> "Junior officers across the board, their knowledge their proficiency their training is below any standard." (Master – M1)
> "I think they are all the same. It doesn't make a difference these days." (Master – M3)

The same shipmaster suggests further:
> "I've had cadets from Britain who can't even speak good English. I mean OK they are British but being from Britain doesn't mean you have to speak slang, it's all crap. If I ask them to draft an application or draft a report I am telling you [laughs] you'll be surprised." (Master – M3)

When discussing the training standards of young recruits the senior officers felt that it was mainly as a result of their lack of traditional seafaring knowledge and skills. A shipmaster says:

> "I have sailed with Canadians, and Australian sailors in the North Sea, 15 - 20 years at sea you know, they share the same views that the quality of people today is really downgraded. There's no sense of seamanship." (Master – M11)

In some cases the older seafarers accepted that it was their responsibility to train the young seafarers on ships to address their skill issues.

> I think with generations coming the level of proficiency or the level of competency appears to be going down ... The younger generation coming onboard ships has got a more casual approach toward things and I would say most of it is basically because of

the training being imparted to them and we could be blamed for it. I mean I could blame myself for it because what I train my cadets is what comes of them as officers and maybe I can credit myself for what my seniors did for me." (Master – M6)

Some seafarers from EMNs raised concerns about the training and certification standards of seafarers from particular countries. This was witnessed in the anecdotal accounts of two seafarers who expressed concerns about the certification and training standards in the Philippines (see also Sampson and Bloor, 2009 for 'papermill' approach to seafarers training).

> "They all have a nice certificate when they come onboard [laughs]. And I don't blame these boys. I hear they have all done their training in some computer lab in Philippines sitting on a computer where everything is on computer ... I hear a lot of these stories and I think it's true." (Master – M9)

Likewise a chief officer from India commented:
> "In my company what is happening is we are having multi-national crew, Indians, Britishers, Romanians, Filipinos and Chinese that sort of thing. Whereas everybody is not of the same standard though STCW 95 says that the certification should be that way that everybody should be same level but you ask a third mate coming from Philippines where the exams system is still yes no, yes no, yes no ... when you get that kind of people I mean it really concerns you what sort of watch or what kind of what kind of. They are willing to learn but their training program is such, it's of very very low quality, so that puts additional pressure on masters or chief mate because they have to rely on them when they take over the watches, and be awake for some time at least, and then take some rest." (Chief Officer – C/O.6)

But others felt that even the training standards of young seafarers from India were equivalent with the NEC (non established countries) seafarers. These old seafarers alleged that the quality of seafarers from India has reduced drastically in the past few years partly due to privatization of maritime education and training.

> "The new trend that has started these days that they are just churning out what's it called cookie cutter mould kind of thing they are churning out people by dozens, in a shorter period of time is not good at all." (Master – M7)

The same shipmaster describes the training standards and the credibility of present MET certification standards in India:

> I would give you the example of a deck cadet. A deck cadet comes on board, he has done whatever one ship. Before joining he has done some course in a training institution being run by the company, a *certified training institution*. And in that he has cleared an exam for ROR [rules of the road at sea] and all that. But when the guy comes onboard you find out that he is not conversant with ROR at all though that is not a big problem but the problem, it becomes a problem because then the responsibility of training him comes squarely on your shoulders. So you are expected to train him and bring him up to a mark." (Master – M7: emphasis in italics)

Some senior officers even expressed reluctance for being allocated the job of training new recruits onboard ships.

> "I have seen a lot of people who are designated training officers getting extremely frustrated because it adds to the burden of his work. that at least in the morning the chief mate will have a peaceful watch 4-8 at least he is just navigating, have a cup of coffee and you know just relax and be at ease with himself but now even from 4-8 he has got a guy to train. OK tell me this rule; start learning this rule, no this is not correct that is not correct. It is very taxing, extremely taxing ... And it doesn't stop; one guy goes the next guy comes. It's like the guy is now a dedicated teacher which is nice but them sometimes you need a break." (Master – M7)

The older seafarers were consistently dubious about the (STCW) certification standards which they often described as a 'piece of paper' as they felt it could no longer be trusted to authenticate the training standards of seafarers from NECs. As two chief officers suggest:

> "For some people who come from certain countries I won't like to name those countries but their certificate of competency is just a piece of paper. It means nothing." (Chief Officer – C/O.2)

> "The market is flooded with under qualified oh sorry! Qualified people by their COC [certificate of competency] but under skilled people." (Chief Officer – C/O.1)

The same chief officer, when asked about the labour sourcing strategies of his company, commented:

> "Labour sourcing? They pick up every goof they get on the bloody street and they put him onboard." (Chief Officer – C/O.1)

6.3.2 A 'RACE TO THE BOTTOM' APPROACH

In some cases the seafarers from EMNs were convinced that the influx of cheaper labour from NECs in the maritime labour markets was primary because the employers' concern is not so much about the quality of crew but to comply with the minimum requirements of statutory safe manning document[10].

> "You might have people with certification but no competence. The grade of seafarers today is back to the stone ages ... Just complete the minimum manning required and doesn't matter what the quality of people." (Chief Officer – C/O.2)

> "Companies are keeping them just to keep the safe manning and cheap labour so they are keeping them." (Chief Officer – C/O.6)

---

[10] Safe manning document: Every ship, by law, is obliged to be comply with minimum manning requirements to be certified as seaworthy

Some seafarers also felt that the quality of seafarers has declined as a consequence of lower wages and the desire to bring down wages even further by sourcing seafarers from NECs. A chief engineer says:

> "If you give peanuts you will get monkeys only. That's the situation with the junior officers and the crew recently. The quality has gone very low." (Chief Engineer – C/E.2)

The safety awareness of seafarers from the NECs was another concern for seafarers from EMNs. It was brought to light that in some cases the companies were hiring seafarers from 'sub-standard companies', 'small crafts', and even 'fishing boats' to work onboard merchant ships. Because of their background and past work history the general safety awareness of NEC seafarers was perceived of lower standards by the seafarers from EMNs. A second engineer stated:

> "Basically when we are hiring people from different countries basically they have been working on small crafts, small vessels so over there there aren't any safety issues which are being discussed in their every day work. So they come from companies where owners are not even providing them basic safety gear so when they come to these kind of vessels where everything is being provided they take some time to start accepting the fact that safety is important." (Second Engineer – 2/E.1)

6.3.3 VERTICAL AND LATERAL POLARISATION OF SKILLS

In some cases the senior officers suggested that the crewing patterns onboard ships now comprise senior officers from established maritime countries and the remaining seafarers from cheaper locations. Apparently, serving in senior ranks these seafarers felt that the junior officers from certain NECs are not able to demonstrate the knowledge and skills and hence the potential to progress as senior officers. It was emphasised that in most cases the knowledge and understanding of the latter about shipboard work was of poor quality due to their training standards and thus these officers were suitable only for 'operational work'.

> Researcher: "Talking about the Filipino junior officers, do they get promoted as senior officers or?"
> Chief Officer: "[interrupts in between] may be just one in a million chance a guy going up to second engineer or chief mate level."
> Researcher: "What could be the reason for that?"
> Chief Officer: "I think the training system there in Philippines. They were not following the proper procedures so if the basic knowledge is not so much. They know how to operate a GPS, how to operate a radar but not beyond that. Cargo also they have the small Casio computer and all; they don't know what it means KG and GM. They know KG is this KM is this ok now I get the GM I got this that's it but what will happen if I shift this there, they don't know, nothing is there ... they can't at management level they cannot but this is my opinion of course." (Chief Officer – C/O.6)

(Note: The terms KG, GM and KM represent ship stability calculations (centre of gravity) and understanding the basic calculations of ship stability is still considered crucial even though most software systems are capable of calculating ship stability with minimum input from the seafarers.)

Against this vertical separation between the senior officers from EMN and junior officers from NECs some seafarers suggested that the employers were now introducing senior officers from NECs. There were serious concerns about the competencies and language skills of the seafarers from NECs. A junior officer from India says:

> "We have an Indonesian chief officer now. He knows nothing not even the basic knowledge. Forget his knowledge he can't even understand English. So captain asked me to keep a close eye on him in whatever he does. All the time he [captain] says second mate don't trust this bugger. Follow him in everything he is doing otherwise I'll hold you responsible."
> Researcher: "What about the wages? Contractual conditions?"
> Seafarer: "That's one thing it's still not clear to me. It's a bit tricky and they don't make it clear. I don't know office doesn't put it clearly but I heard it's really lower than what Indian chief mates get. And I know for sure he doesn't get leave wages."
> (Second Officer – 2/O.10)

In another case a British second officer states:
> "Before we had some senior officers from India but now they are bringing them from [pause] we had one from Sri Lanka last time on my ship." (Second Officer – 2/O.7)

6.3.4 'DISCRIMINATION' IN INTERNATIONAL MARITIME LABOUR MARKETS

The young seafarers from NECs also felt that the employers showed bias towards seafarers from developed countries in their employment strategies. Apart from wage differences and general employment conditions these seafarers claimed that they experienced discrimination in terms of career progression opportunities when competing with the seafarers from EMNs. A young seafarer from Angola stated:

> "I would say, it's not a shame, but this is the way things are going, even if you are very very very good but if you don't have good background you have a lot of trouble to get promotion because I've seen people they are good in their job, they are diligent but take a long time to be promoted, due to competition with another guy [later referred to as 'white skin people' from Europe during the interview] which still have a lot of problem in the job but he's getting promoted." (Third Officer – 3/O.6)

Occasionally, young seafarers from India also expressed similar views.
> "I would say overall the system is partial in world shipping industry overall the system is overall partial. Let me be blunt on this [laugh] because they still, Europeans are preferred over Indians or any other nationality and then they are given, with less experience they are given better opportunities whereas other nationalities with good

amount of experience can do better job so that's like still there," (Third Officer –
3/O.1)

The above section attempted to capture the responses of seafarers as a result of globalisation
of labour markets. A large part of the data was drawn from seafarers from EMNs. Generally
it shows the resistance of the workers to the employment of NEC seafarers. A small section
of data from the NEC seafarers brings to light the issue of discrimination in seafarers' labour
markets.

6.4   THE IMPACT OF NEW TECHNOLOGIES ON SHIPS

This section draws from the seafarers views about the importance of new technologies in
their work at sea.

6.4.1   NEW TECHNOLOGIES AND SHIP SAFETY

The seafarers were asked to explain the benefits of new technologies in their work. Most
importantly, according to many seafarers, technology contributes to the safety of ships and
helps to reduce 'accident rates' on ships. The seafarers believed that 'human error' is a major
cause of accidents at sea.

> "The primary reason is to improve the safety because long ago a lot of accidents more
> than 80 per cent were because of human error, between me and you. You understand
> and very few are as a result of technology where the equipment failure or whatever.
> Most accidents are as a result of the human error for one reason or the other, you
> understand." (Third Officer – 2/O.5)

The seafarers also suggested that the employers' main concern is the 'safety of cargo' and not
so much the safety of crew members onboard ships and this according to the seafarers is the
main reason for ship owners to promote new technologies on ships. As a shipmaster
commented:

> "Basically, what I think like today these equipment are being placed onboard not for
> the safety of seafarers or ships but for the safety of their [ship owners'] own
> interests." (Master – M5)

The seafarers claimed that new technologies have made a positive contribution to safety in
their respective areas of work. The seafarers used terms such as 'accuracy in navigation' and
'precision in navigation' or 'accuracy in cargo calculations' to explain the use of information
based technologies in their jobs. But whilst suggesting safety improvements these seafarers,
on a regular basis, used terms such as 'cross checking', 'double checking', 'counter

checking', 'using technology as an aide' and 'not relying on a single technology to obtain information' (Field notes miscellaneous). A shipmaster says:

> Now regarding ECDIS it's a beautiful thing, *it's a beautiful thing* [emphasis in italics]. But ok it's an aide only so we have to take that particular precaution. If somebody can mix up this OK I will see the radar also sometimes and then I will use the ECDIS it's a perfect thing. But if somebody says OK this is the ultimate and relying on the ECDIS completely then it is gone." (Master – M10)

When faced with technical issues the seafarers, with their limited understanding of electronics and computer based technologies, expressed difficulties in resolving the problems on ships. Although the seafarers felt that most technical issues could be resolved simply by 'restarting' the equipment or by 'replacing cards' the more complicated issues according to the seafarers were beyond their understanding. A chief engineer says:

> "In fact half of the time problems in the electronics are so difficult to analyse that even the makers seem unsure about the next course of action. The majority of times rebooting solves the minor glitches and sometimes we need to swap the controller cards." (Chief Engineer – C/E.2)

The seafarers claimed that the malfunctioning of new technologies, if not sorted out in time through shore technical support, could result in unsafe work conditions at sea.

Some seafarers also brought to light the low cost procurement strategies of shipping companies such as 'building sub-standard ships' and sourcing cheap inventories, stores and equipment 'made in China' with incomplete instruction manuals. Such 'unreliable' technologies according to the seafarers impacted negatively upon the safety of ships.

> "Cheap automation is making life miserable. It's very basic automation and the quality of equipment is very poor." (Master – M4)

> "What safety are we talking about? Building ships from China ... the manuals are not complete, half the times people are not able to read the manual also." (Master – M2)

In one case a chief engineer suggested using innovative fixes to by-pass safety alarms at sea:
> "Quality of spares supplied has deteriorated, very plasticy stuff, breaks easily and then you are left with your own *jugaads*[11] which are not very safe." (Chief Engineer – C/E.2)

These innovative fixes included the use of 'toothpicks' and 'paper weights' to by-pass safety alarms during hours of rest. When discussing the implications of sub-standard technologies and equipment malfunction on the safety of ships the seafarers also emphasised that the

---

[11] **Jugaad** is a colloquial Hindi word that can mean a short cut or an improvised solution that may even bend rules to get a job done

manning regulations do not necessarily take into account the sub-standard quality of equipment and equipment malfunctions, which adds to their workload and impacts severely upon their hours of work and rest.

6.4.2 NEW TECHNOLOGIES TO REDUCE MANPOWER

The seafarers also felt that new technologies are implemented to reduce if not eliminate the jobs at sea to a minimum. Past technologies (such as the GMDSS resulting in job losses for skilled radio operators – see chapter 3) seem to play an important role in forming these perceptions. There was a tendency amongst the seafarers to extrapolate future trajectories of skill -replacing technologies even to the extent of anticipating the advent of 'unmanned ships'. The seafarers seem to believe that in future as the level of automation increases, the need for technical knowledge will reduce which could lead to further job losses at sea. A second officer and a second engineer commented:

> "Well with the modern technology what happens is that job security is there but there is a fear that in future even more people you know will have to lose their jobs. Because in those days we used to have radio officers onboard but now because we have GMDSS equipment and every officer is required, at least the master and the chief officer and one other officer is supposed to have GMDSS certificate. So based on this you find out that radio officers are out of the job. Again some people are contemplating that why do you need engineers? You can turn an officer to be a combined something. So over the time with these technologies coming up if for example for Christ sake, I mention earlier this UMS [unmanned machinery spaces] vessels, if an engineer will have nothing to do, if he's not required to be here, he's not required to do everything. If you have computers and everything can be monitored from there then why do you need him here, why don't you just train a deck officer on how to check temperature and put some oil and all this and all this and then you take the engineer out, so you see this modern technology will phase out a lot of people. A lot of people may be required to go home and rest." (Second Officer – 2/O.5)

> "See what I feel is that in the next ten years the technology is gonna be much more better than what it is presently so the need for engineers won't be much to do in mechanical jobs. So we might be just operators who are running the engines from A to B and there might be shore guys who will come and carry out the maintenance for the ship's crew. So these are the changes which are being talked about here and there you don't know how much is the truth in that. If that happens good enough otherwise we are gonna be where we are right now." (Second Engineer – 2/E.1)

Modern ship designs incorporating maximum cargo carrying capacities and fewer spaces for crew accommodation appear to have reinforced the belief of seafarers that new technologies would replace the need for seafaring skills in future. Some seafarers even recalled the introduction of new ships in their fleets and reduced crew sizes (in relation to the ship sizes) and expressed a sense of insecurity of further job losses.

6.4.3 NEW TECHNOLOGIES REDUCE WORKLOAD

The seafarers also felt that new technologies reduce their workload onboard ships. The reduction of workload comes through software programs designed to escape the need for 'manual calculations' which they felt were laborious and time intensive.

> "There are some things which only the computers can do and it's very lengthy to do by hand. So it's helpful there." (Chief Officer – C/O.4)

> "... another thing which has made the mate's job is the cargo computer. That's massive. when I first went to sea, the mate, certainly on VLCC [very large crude oil carriers] doing cargo calculations he would be there for hours and hours and hours, working his ass out with sheer forces and bending moments, now you have it on computer how much you load how much you discharge, five minutes job that's it." (Second Officer – 2/O.7)

Young seafarers, it appears, resist the idea of manual work and physical labour which they often termed as 'running around' on the ships. New technologies were appealing to the seafarers because it helps them monitor their work from centralised locations thus reducing the need for physical labour. As a young officer noted:

> "Basically automation will always help. It lessens your work so you don't have to run on the bridge. Like my last ships I have done ships which are 22 years old they have telegraph on one side, radar on one side, chart table on one side duty officer is literally running everywhere. All of a sudden captain will ask you plot the position he needs to know where are we. Next moment he would say dead slow ahead and the duty officer is running on the other side. But with automation everything is there in one place, certainly it helps." (Third Officer – 3/O.1)

The data elicited from young seafarers indicates a sense of relaxation when working with new technologies. These seafarers stated that the 'ease of information access' makes them feel comfortable and at the same time improves their confidence in technology. As two young seafarers suggested:

> "Some people will not like to tell you but for me even if you go to new ships with new technologies you know man [big smile and sits back to relax] you are in a new life. Oh man! Old ships whereby they don't have complete equipment, they have this equipment, they are struggling. Here everything is digital you know, you put this you put your figures correctly and you get what you want." (Third Officer – 3/O.5)

> "I would say that the ease has come like more comfortable and you are at ease. That's like you know what's happening. You know this ship is here, this ship is here and how much, what speed they are making and lots of information is there. That gives you a lot of comfort that confidence has come up. People are more at ease and more confident and less tensed. It's become more easier, simpler and easy to operate that's the benefit." (Third Officer – 3/O.3)

A young second engineer suggests similarly when asked to explain the implications of digitally controlled engines on his work:

> Researcher: "You said new technologies make life easy for you. How is that?"
>
> Seafarer: "When we say it makes life easy see the technology they have kept in mind that one should not run around too much. There's no running around on ship it's a very tedious job now. It is just press the button and things will start moving on. You can see your engine inside the engine on the CRT, you don't have to go down every now and then so the manual job is reduced you can see the condition of a machinery on a computer, you know what is going on, what's going to happen next, you are aware of everything." (Second Engineer – 2/E.1)

Occasionally there are also traces of empowerment and control with new technologies particularly with young seafarers. These young seafarers seem to believe that in the age of micro-electronics even the most arduous operations at sea can be performed at the touch of a button. As two young seafarers suggested:

> "On my last ship we had a remote control system on the bridge. It was just superb, you can literally control everything standing on the wing. You don't need to stay inside the bridge." (Third Officer – 3/O.3)

> "All our new ships are installed with fully integrated cargo control systems on the bridge. You won't believe the entire cargo operations ballasting; deballasting, trim, list correction you name it anything and we can control it from the bridge *at the touch of a button*." (Third Officer – 3/O.7: emphasis in italics)

But irrespective of the above quotes, a young cadet felt that it was not so much to empower the seafarers but to simplify their work by allocating control within technology. He said:

> "I think anybody can keep a watch. That's what I feel. You don't need to be qualified to keep a watch at least now. because you just stand there you can do what, you just stand there and if any problem's there you set all the alarms it tells you it tells you that ok this is the problem and you make the changes but nowadays you can even get the changes done. I mean like if you are on track if you are on collision course just turn the knob 3-4 degrees you should turn 3-4 degrees. I mean you can't call it alteration [laughs] just I mean turning the knob that even a small kid can do." (Deck Cadet – DC2)

The young seafarers also felt that automated technologies onboard ships have reduced the need for constant attention during the watch keeping hours. Such technologies, they claimed, are useful to alert the navigating officers of any potential navigational danger on ships and at the same time reduce their stress levels.

Besides, some seafarers praised the introduction of interactive technologies (such as multi-media software systems) which they found very 'entertaining' and useful to their work. It was

mostly the young seafarers who felt that such technologies expose them to new challenges and at the same time offer them the opportunity to learn new skills at sea.

The seafarers suggested that apart from their routine work technology also helps to improve their social welfare on ships. It was claimed that communication technologies help seafarers to remain connected with their families and the outside world which they saw as a positive step towards welfare at sea.

> "Technology is not just for the ship but also your family to know where you are, that's a big thing as well ... New technology for me has a great effect it makes my time onboard more bearable [laughs] you got a new satellite TV, you got internet onboard that's good for me." (Second Officer – 2/O.7)

This section showed complex understanding of seafarers about the importance of new technologies in their work. There are mixed views about the actual improvements in safety with new technologies. Alternatively many young seafarers also felt that new technologies make life easier on ships by reducing physical labour and simplifying mental efforts to perform their work at sea.

6.5 NEW TECHNOLOGIES – THE EMERGING CHALLENGES AT SEA

This section discusses the emerging challenges faced by the seafarers as a result of implementing new technologies at sea.

6.5.1 MICRO-MANAGEMENT - WHAT THEY KNOW ABOUT THE SHIPS?

A common concern raised by seafarers was the increased control and monitoring from the shore side with new technologies. The seafarers asserted that the shore based management is not capable of understanding shipboard work, let alone the monitoring and control of operations. When asked about the reasons, the seafarers suggested that it was mainly because of lack of knowledge and the limited seafaring experience of shore managers. As two shipmasters suggested:

> "Monitoring has increased but then the problem is people monitoring ashore are they competent enough or skilled enough, no they are not. You have one of the second officers and nearly second officers kind of people sitting there what they would know what a master is supposed to do or what a chief officer is supposed to do." (Master – M2)

> "I don't think they have enough skills. They probably are so inexperienced it is a pity that the people sitting in the office are not commensurate with the rank they are going

to handle. A superintendent of a ship who has not worked as a chief engineer is not to my understanding, similarly a superintendent in the safety department who has worked only up to a second mate level. I have no intentions to hurt anybody but I feel that's not the right thing." (Master – M1)

Interestingly both shipmasters belonged to the same company and these comments may have reflected the attributes of middle management of a particular organisation. There were others, however, who termed the middle managers as 'economics graduates' and 'MBAs with no shipping background' (Field Notes November 2009).

6.5.2 EXTENDED MONITORING TECHNOLOGIES

The data suggests that certain monitoring and data recording devices, for example electronic charts and voyage data recorders, even though introduced for regulatory reasons, seem to affect the crew's morale at sea. During interviews it was found that some seafarers felt apprehensive for being monitored during watch hours. A third officer discusses the implications of recording devices on ships. Since all his manoeuvring actions were being electronically recorded even a small mistake, he felt, could damage his reputation within the organisation.

> "Anybody can make a mistake but one single mistake in initial part of your contract can ruin your contract. You will have a tough time onboard. It has at times happened with other individuals who is very good in other things ... that was the chief officer and that guy he did this this and this was the final output and everything is being recorded in a graph system. So that it is not also healthy so much close monitoring very close monitoring." (Third Officer – 3/O.3)

In another case a junior officer stated that all new ships in his company were installed with an electronic chart display unit in the shipmaster's office. According to him, such devices allow shipmasters to monitor the junior officers on watch thus restricting their autonomy. The idea of being monitored on a constant basis also made him believe that his skills and competencies could not be trusted by the senior officers (Field notes Third Officer – 3/O.2).

For shipmasters, on the other hand, extended monitoring was one step closer to questioning the competency standards of young seafarers. On many occasions, shipmasters felt 'frustrated', 'restless', and 'sleepless' upon finding out that the young navigators were not taking collision avoidance actions in ample time, and were relying excessively on technology. A shipmaster from EMN comments on the navigation skills of a junior officer from a NEC and says:

"... Navigation is becoming like a video game now. I told you we have a display unit of ECDIS in master's office. I had this third officer on my last ship and I couldn't sleep when he was on duty." (Master – M7)

6.5.3 LOSS OF DISCRETION

New technologies allow shipping companies to move from top-down management towards more decentralisation and detailed division of labour. A detailed division of labour is bound to create conflicts within the different departments in the company as each department has its own performance requirements from the ships. But conflicting interdepartmental interests often translate into loss of discretion for the seafarers:

> "Earlier you had time to take decisions you knew as a master you had to do this. Today I don't know what's going behind the scene. I cannot take action. Theory says one things but practically it's different. Earlier port told you that you are not berthing this evening you had a party. Today if the port says that you feel in distress, you want to know what's your position. You as a master are confused." (Master – M4)

> "You see today I don't know whom to pay my sincerity to, to myself, to my manager who wants another vessel from the owner or to my owner who owns the vessel." (Master – M12)

Likewise during an informal discussion a shipmaster felt unsure about his position in relation with shore management despite a clear line of authority laid under the ISM code (International Safety Management Code).

6.5.4 WORK INTENSIFICATION

The junior officers claimed that they felt distracted during watch keeping duties because of increased 'paper work'. As two junior officers suggest:

> "I need to do so many paper work, so many this, chief engineer needs to do so many paper work, the master needs to do so many paper work, it is not that those things can be done during your duty. You have to do your primary duties navigation and all that." (Third officer – 3/O.5)

> "Our core job is maintenance of charts and navigation. we are given a lot of additional jobs like you do this, you maintain the ship management, do this paper work, do this for me ... and all those things take a lot of energy." (Third Officer – 3/O.3)

In one case a junior officer narrated an incident where, due to his involvement in paper work during watch keeping hours, he failed to notice an approaching ship which in his own words was a 'close quarter situation'. He also indicated later that the 'close quarter situation' could have potentially led to collision. He felt therefore that any increase in paper work could lead to unsafe work practices onboard ships." (Field notes Third Officer – 3/O.3).

The shipmasters on the other hand suggested that their workload has intensified mainly as a result of the nature of communication with the shore side. It was asserted that the shore managers, with their limited understanding of ship work, are not very useful in resolving their technical problems on ships. Since shipmasters are generally responsible for ship-shore communication the emails and queries 'back and forth' between the ship and shore side seems to have intensified their workload.

To some extent the emailing traffic increase between ship and shore also seems to have increased because of the low cost objectives of companies. In one situation for example a shipmaster explains about a usual problem faced on ships when experiencing any technical problems.

> "They try very hard to solve all the problems sitting there [shore office] but they can't. And they won't give you shore help it costs money. Keep sending emails one after another captain do this do that have you tried this that but when nothing works they will say – Captain please can you manage somehow, Jokers I tell you [laughs]."
> (Master – M4)

The shipmasters also claimed that due to 'excessive' communication their actual involvement in shipboard work has reduced to a minimum. A shipmaster stated:

> "Would you believe I sit on the computer full day right from morning 6 o clock till about evening eight to nine o'clock? That is my job primarily but do I really want to do that? I don't think I want to do that. I want to roam around, go up, go down but I don't get time." (Master – M2)

Another shipmaster asserted that the disengagement of senior officers from shipboard work because of their involvement in administrative work was a dominant reason for increase in accidents onboard ships.

> "I am sending maybe 30-40 messages a day and then they expect that you know that you should be replying them as soon as possible. it is not that ok this is the message and you take one day two day time no. then they won't be happy that what the captain is doing you understand so they have made it a virtual office. I am just sitting there to communicate so it brought down your involvement onboard ... If you go down and look into this ... you will find that there are so many accidents involved or stress related today this is the main reason today because safety is being compromised on the work." (Master – M5)

6.5.5 DISSATISFACTION AND DISENGAGEMENT WITH WORK

The data from seafarers also suggest dissatisfaction at work with new technologies. The young seafarers suggested that their navigational duties were reduced to monitoring

equipment and systems on ships. The terms 'watching', 'watchman's job', 'chokidari' (night watch-manning) 'monitoring work', and 'monitoring job' appeared frequently in the data obtained from the junior watch keeping officers. These young seafarers expressed boredom and idleness at work when surrounded with automated technologies.

> "When you are having watch you are keeping watch 8 hours every day and you're out at sea then you have no ships coming anywhere nearby. So you just watching the sea you have to. That's as per regulations you are to watch. Keep watch all the times keep watching … You can't move away from your place you have to be alert all the time you have to keep watch … and even when you have some traffic there you have standard rules put up you just blindly follow the rules according to whatever situation you are put in. and you just get your ship through. There is not much mind work I think. You have your equipment which are all automised now. So you have ECDIS you have your communication equipment now. So that also whatever small work you have to do that also is taken care of now. You don't have to plot your course now your ECDIS will do everything. So finally there is no work for you, you are just standing there. And ya once you you know come across some situation some emergency situation or something then you have a problem then you have to think for yourself and decide on what to do or what not. Otherwise when you have normal sailing time then there is no problem. Not much work." (Deck Cadet – DC1)

> "On a long ocean passage you feel like some chokidar [night watchman] on the bridge. There is nothing to do on the bridge, what can you do? Sometimes I just go out and talk to myself." (Third Officer – 3/O.2)

The young seafarers also seem to believe that with new technologies their jobs have been simplified. These young seafarers do not find their jobs challenging as they claim that there is not much opportunity to acquire new skills. A young third officer says:

> "No challenge at all … You are playing with vectors that you see on the radars. You have two options left or right, port or starboard or worse comes to worse go astern on the engine. Nothing very big and may be 3-4 months you can develop those skills … it's nothing very big." (Third Officer – 3/O.1)

In another case a second officer commented:
> "From navigators we are now becoming more of navigating technicians." (Second Officer – 2/O.7)

The accounts of young seafarers also suggest boredom at work. These young seafarers appear more satisfied in their work when faced with some kind of challenges. As two junior officers noted:

> "You know most of the guys like what they say they find it interesting when there is traffic. When you have to do something then it's interesting. There are so many things then you don't even know what is going to happen … So ya when there is traffic definitely there is fun and your 4 hours 8 hours just goes like that." (Third Officer – 3/O.2)

Faced with boredom on ships, the data shows that the young seafarers even took to unsafe

work practices such as 'getting closer to other ships' during navigation 'to get a thrill',

watching virtual videos of ships colliding on radar screens (trial manoeuvre mode) simply to

seek some meaning in work. The same officer at a later stage of the interview states:

> "So with automation you know we can't say I mean do what we want ... In an open
> sea I would see a vessel and say OK let her come close then alter that is how I feel
> comfortable but like some masters say you should alter. He comes up on the bridge
> and next day he says why did you alter so late, you should not take risks and all and
> don't try to become a hero and all".

Likewise a senior cadet commented:

> "I just like the trial manoeuvre on the radar. It's like you just know you just put your
> track in the next 15 minutes what's going to happen, are you going to crash for the
> next 15 minutes, you just see your ship going going going and colliding . You don't
> need to think it you see it happening so it's pretty good." (Deck Cadet - DC1)

These occasional glimpses of unsafe work practices of young seafarers also corroborate with

the data elicited from old seafarers. The old seafarers expressed concern about young

seafarers getting too close to other ships at sea and delaying their manoeuvring actions which

could lead to precarious situations. The old seafarers also suggested that the young seafarers

make inappropriate usage of new technologies (such as High Frequency Radios and email

systems) as a means to socialise with their seafarer friends at sea, at times not paying enough

attention to their watch keeping duties. The old seafarers felt that these issues pose 'serious'

threats to the safety of navigation. As two senior officers noted:

> "AIS [automatic identification system] is being used or rather misused to call other
> ships in vicinity to see if there are any friends around, it's not for the safety of ship."
> (Chief Officer – C/O.5)

> "I see these boys so hooked on to the emailing system on the bridge. So many times I
> have written in the night orders not to use computers during dark hours but they won't
> listen, they just don't care. It's not safe it's not safe for navigation." (Master – M2)

6.5.5.1 NO 'ACTUAL WORK'

The old seafarers expressed the desire to be involved in shipboard activities rather than doing

'paper work' or working for long hours on computers. To these seafarers working on

computers replying to the email queries, updating inventories or performing routine checks

was perceived menial work. A British chief engineer felt that most young engineers kept

away from physical jobs in the engine room and relied more on virtual data of new

technologies. He said:

> "I find that a lot of lads coming, junior officers they've never done this. They know
> only how to touch the screen and this is the problem when it doesn't work. They'll all

be standing outside and talking why it's not working ... these guys they come down the elevator and the screen is there and they go and check the screen, is everything ok. [laughs] go and look, go down the steering gear and go and see if there's any oil leaks, see if the motor is running. But they don't usually do that." (Chief Engineer – C/E.1)

The data from older seafarers shows an aversion towards computer based work and administrative work and affinity towards involvement in shipboard operations which they termed as 'real work', 'actual work' or simply 'work'. In some cases even the sight of young seafarers attending to administrative work seems to result in dissatisfaction for older seafarers. A shipmaster stated:

> "I see a lot of officers spending a lot of time on the computers now. I mean at the end of the day if a guy can make a very good presentation or a very good program or something very jazzy or colourful it looks very nice but you know the basic skills of the people I find them ... I see a lot of people spending time on the computer. For example a third mate he has to do the maintenance of the lifeboat but if he is just doing the computer job and making colourful muster list, and stuff like that and he is not doing the actual job." (Master – M3)

Paradoxically, at a later stage the same seafarers also claimed that due to bureaucratic and statutory requirements it was the 'paper work' and not so much the actual work which is required most in the present context in the smooth running of ships.

There is little if any hope that the implementation of software systems and standard technologies would help reduce the administrative work of seafarers in future. Contrarily, where installed it appears that such technologies result in extended monitoring, loss of control, adding to the stress levels of seafarers. A chief officer expressed frustration over recent implementation of standard based database system within his company. He said:

> "Now they have come up with this software (XX software name concealed for ethical reasons). Now you can't skip even common emails about other ships. You can't scroll down without reading the full screen, it scrolls down automatically, slowly very slowly itself, and in the end it even asks you to put a comment in the box to check if you read it... it's pathetic, it's pathetic, stupid!" (Chief Officer – C/O.6)

The section above discussed the problems and challenges faced by seafarers as a result of new technologies. The seafarers felt the impact of detailed management, more so, because in their opinion the managers ashore did not understand the nature of work at sea. There is also a sense of loss of discretion for many ship masters as the result of a complex division of labour at the shore end. The data also shows that there is a sense of dissatisfaction at work amongst seafarers. For many young seafarers this dissatisfaction turns into more alarming

issues such as inappropriate use of technology which could undermine safety at sea. For others, it adds to their frustration and stress at work.

6.5.6 DEGRADATION OF THE SEAFARING WORK AND PROFESSION

Most shipmasters, at the beginning of the interviews, describe themselves as 'overall in-charge' of ship or as the 'ship owner's representative onboard ship'. The extensive time spent working at sea is perceived as a source of pride in the profession. These seafarers often proclaimed themselves as 'seadogs', 'hard core sailors' or simply 'shippies'. During the course of interviews, though, the same shipmasters also felt that their pride as veteran mariners has been lost with the increase in administrative work. Because of their involvement in administrative work these seafarers often perceived themselves as 'clerks', 'middle men', 'postmen' and 'liaising agents' doing 'paper work'. As three shipmasters noted:

> "The master is really really becoming more of a clerk onboard than anything else. He has to work out the finances, he has to pay the crew off, and then at the same time look after all the messages which is coming from the company." (Master – M6)

> "Today the line of control has shifted because of this commercial pressure. For simple things the office will send a message onboard. Responsibility has increased, the expectations of the office has increased, instead of one call I get something like 20 thousand messages a day and then they expect me to answer in one hour. It is too much pressure and I feel the master is only a middle man now." (Master – M12)

> "Now master is only concerned about how much chana daal [lentils and chickpeas] is remaining onboard. He's not doing any real work." (Master – M4)

But the degradation of professional status does not appear to stem alone from work based problems. The data suggests wider issues such as the tendency to compare with the employment conditions offered to the middle managers ashore which illustrates the degradation of the profession at a deeper level. As two shipmasters commented:

> "Tell me something when I join a ship I am a captain. Not a senior captain in XX company but a senior person in XX company for a long time. I join a ship, I am flying economy. Administrative assistant in my office when she goes admin assistants I am not talking about superintendents they are all flying business class. Why this disparity. You think I'll ever trust. I think that admin assistant has no right no qualification. I am not disparaging her she's good but I don't think some master should be equated to admin assistants. In XX company when you fly an admin assistant if your flight is more than 6 hours your flight is business class. Superintendents also business class, Why a master flies economy?" (Master – M3)

> [Note: Company name cannot be revealed for ethical reasons]

> "Can you justify people working in the office they get a full medical coverage why I am not getting when I am at home? After all I am a permanent employee. I am an

employee of the company so I don't understand this and you know I don't have any retirement package. So and I don't have any basically I mean you know we are talking about a profession as a whole." (Master – M2)

In some cases the perceived degradation of the profession went even farther and deeper when the seafarers compared their situation with friends and families ashore. A shipmaster stated:

"I have a younger sister she's year and a half younger than me she is VP with Morgan Stanley and I was thinking if I would have done banking or something I would have done better. And this is what is happening you are not getting motivated people. (Master – M3)

The above quote also reflects the motivation issues of seafarers alluding to their 'wrong' choice of seafaring as a career.

There also seems to be a spill over effect of perceived degradation of shipmasters' rank status in the views of other officers. As we saw earlier the seafarers perceive the image of shipmasters and chief engineers as someone with 'grey hair' and often used the term 'old man' or 'bada sahib' as a lingo to honour the shipmasters for their experience and knowledge of seafaring work. But the involvement of senior officers in administrative work and their treatment from the shore end (resulting from the shift of control at the shore end) seems to create a profound impact about the social status of the (seafaring) profession in the perceptions of young seafarers. It may be that these young officers imagined their position as senior officers and felt concerned over their future professional status. A chief officer says:

"I don't think that the master has been left with much choice but to sit in front of the computer and just check messages all day long. That command and respect he would get for being a master has slowly being taken away by the young punks sitting in the office who calls them by name which I don't agree with them again, who try and say that their knowledge on book knowledge is more than what experience has to offer so basically it's becoming a very very clinical thing, do your job get out of it don't question too much." (Chief Officer – C/O.2)

For young seafarers the degradation of professional status appears to play a crucial role in shaping their perceptions about a seafaring career. The young seafarers interviewed in India often spoke about quitting their jobs at sea which they perceived no longer offered the 'glamour' and respect of a high skilled profession. During discussion with these seafarers there was a tendency to compare the seafaring profession with the aviation sector (in their own words 'the airline pilots') and other better paid jobs such as in the ICT, finance, health and banking sectors.

Many young seafarers in India also showed an interest in taking up higher education in shipping – logistics, marine insurance, maritime law to name a few. Some even thought of switching completely to a different profession by acquiring business qualifications such as an MBA, finance or economics. Generally it was sensed that seafaring was not a profession and it should only be used to earn 'quick money', invest in higher education and find a job ashore for better future prospects. As two young seafarers comment:

> "I just want to quit. Maybe do MBA or something like something like you are doing. Sea life is so fucked up. I don't think I will be here for too long." (Third Officer – 3/O.7)

> "It's not a good job. Every day I get up I ask myself what the fuck am I doing here. I just want to quit as soon as possible." (Third Officer – 3/O.2)

These sentiments were common amongst almost all young seafarers. Most suggested that they did not intend to stay at sea for a very long time. Seafaring, according to these young seafarers, was only a 'short term' job to be used as a stepping stone to secure a brighter future. A young seafarer says:

> "Seafarer: I had decided that I want to do an MBA or MS before sailing, but I wanted to do it only after becoming a chief engineer say about 10 years after I started sailing, so that I would be able to settle down onshore. Once I went out to sea initially I enjoyed seeing the places, but life onboard has never appealed to me from day one."
> Researcher: "Why so?"
> Seafarer: "Isolated life, monotonous, away from loved ones I want to be with my friends and family 5 months is too long. They should make it 1 month on-off like in rigs. On alert 24/7, cannot relax completely, towards the end everyday became hectic with the kind of run container ship had and not enough people on board. I sometimes feel like I am on a floating prison." (Junior Engineer – J/E.1)

Terms such as 'steel tube', 'steel box' and 'floating prison' were common with these young seafarers. Because of the rapid turnaround of ships in ports these seafarers felt that life onboard ships was analogous to being in a prison as there was barely any time to 'stretch legs ashore' or relax whilst in port. Some claimed that the only time they got off the ship was at the end of their tenures of duty or may be 'to buy toothpaste'." (field notes Feb-April 2009).

This outlook of young seafarers (including junior officers) towards the seafaring profession as a transitory job corroborates with the data obtained from old seafarers. A shipmaster says:

> "Shipmaster: Some of the guys they are coming from very big family. They came here to see the world. Some of them are going back. Last ship I saw one junior engineer. He says I don't like this job, I want to get on because its better I do MBA and do a white collar job, the ship job is not a white collar job."
> Researcher: "Do you think that these young boys who are coming"
> Shipmaster: "[interrupts] They are they are excellent in computers no doubt in that"

Researcher: "But what about their other skills?"
Shipmaster: "See that is the thing I am telling that they know the [pause] suppose the engineer know their stuff but doing the work with their hands whatever if you are chief engineer also or a superintendent also you have to do the work with your hand which they don't like. May be with the time they will change also but right now in my short 4 months trip I found two of the guys went back, they say this job is not for me, no I want to go back and do whatever I want to do in the office and they are confident about that that they will get a job at shore." (Master – M10)

In contrast, these old seafarers exhibited a strong sense of identity with the seafaring profession. When asked if given a chance if they would like to switch to a job ashore most old seafarers appeared reluctant. As illustrated from the same shipmaster above:

Researcher: "What about you? You have been at sea for so long you have so much experience don't you think you have a good chance to get a job ashore?"

Shipmaster: "Yes I was doing, I was teaching but it's a corporate world. If you are going at 6 o'clock in the morning coming back 10 o'clock so while leaving everybody is sleeping and coming back everybody is about to sleep OK then like while you are ashore what's the use. At least at sea you will go and come back and you can be with your family for long time." (Master – M10)

The casual approach of young seafarers towards the seafaring profession was also blamed on the depressed wages, employment conditions and the general attitude of employers towards seafarers. A shipmaster says:

"You are getting people who are not getting anywhere. Since I can't find anything so let's join shipping. That level of enthusiasm is not there. Common – eighteen to nineteen years old guy he needs a girlfriend, if he doesn't get women he needs money man. Give him a lot of money so that never mind man 3 months I don't have a girlfriend but I have a lot of money but that money is also not there." (Master – M2)

In another case a shipmaster suggested:
"I always tell these boys don't stay at sea for too long. Pick up your money, do some good degree and get yourself a decent job. It's not worth it any more." (Master – M9)

The discussion in this section shows that the impact of work intensification and dissatisfaction at work leads to more serious problems such as low self esteem and the degradation of the profession as a whole. For many young seafarers in India it appears that the profession has lost its meaning as seafaring is no longer perceived as a career.

6.5.7 THE DIGITAL DIVIDE

New technologies seem to create an ideological gap between the old seafarers and young seafarers. On many occasions the old seafarers felt that the young seafarers were relying

excessively on technology without making use of their own skills which was against the safe practices:

> "These guys [young seafarers] they come onboard and they don't really know the limitations of the equipment they are using. They are just point blank relying on it [navigation technologies] which leads to complacency and may be you know grounding which is not a desirable situation." (Master – M6)

The old seafarers indicate a sense of pride in their knowledge of conventional equipment which they felt was missing with young seafarers. A shipmaster commented:

> "Junior officers ... with technology they don't believe in anything which was traditional and of pride to mariner. I would like to highlight one example. In good old days we used to work with three basic things - sextant, chronometer and magnetic compass. Today you would see that the junior officer after keeping their 4 hours watch would not know what is their magnetic course. So what happens is he is basically not at all bothered to see the magnetic compass. For him the automation has taken so much front seat that even at the back of his head he doesn't realise that if the gyro fails the vessel will continue to sail on a heading which it is showing you. And it has happened with me in 99 or 2000 when a second mate gyro had failed, he was steering 90 deg off course without knowing his heading. He was heading into Cape Town." (Master – M1)

It was also pointed out by the old seafarers that the introduction of new technologies does not necessarily lead to work simplification. Good seamanship skills and the ability to use information based technologies more critically were still important factors even with new technologies which they felt was lacking with the young seafarers. A shipmaster says:

> "On the bridge today there is a lot of information. It becomes difficult to collect all the information and use it. I don't need a 3rd mate or a 2nd mate to plot position. I can even have a mess man with GPS. I need someone who can take this info, use it to anticipate forecast what can happen in next fifteen twenty minutes. Can't do without basic fundamentals ..." (Master – M2)

Some seafarers used terms such as 'speckies' (perhaps to paint a scholarly image of contemporary seafarers wearing spectacles), 'computer boys', 'tech-savvies' and even 'daft', and 'donkeys' to describe the inclination of young seafarers towards computer based technologies, and their disconnection with seamanship skills. Interestingly, those who made such comments were not always old seafarers. A chief officer claims that the young seafarers these days were not able to work onboard ship without new technologies. He says:

> "They are all specky guys who know how to use the computer but should the thing shut down *they do not have a clue* how to go about it ... should you remove the hi-fi gadgetory from the bridge I can guarantee you there will be only two navigators on this ship right now. I am sure I can handle it and I am sure the captain can handle it. I doubt if anybody else onboard can handle it." [Emphasis in italics] (Chief Officer – C/O.2)

A shipmaster adds to this:

> "These days you find all *gadhaas* (donkeys) coming onboard. Very good with computers but if you ask me about their knowledge - I would say below average, far below." (Master – M2)

The same shipmaster, whilst being critical of the theoretical knowledge of young seafarers, commented:

> "You see their basic seamanship skills are on the decline. Technically they are very good but they are not seamen. When you talk to them you have a feeling that you are talking to some science graduates, very sound science, very theoretical approach they got. I'm talking about the Indians, the Filipinos are complete gone cases." (Master – M2)

Nevertheless, old seafarers indicated that the skill issues with young officers emerge also in part because of the complex design of new technologies. The old seafarers reflected upon their past involvements with conventional technologies and suggested that since most high skilled work these days involving the maintenance and repairs of new technologies can be carried out ashore the young officers are not exposed to the same level of learning and training on ships. This was particularly noticed with engineers resulting from the recent introduction of electronically controlled engines. The old seafarers suggested that most young engineers are now limited to performing operational and supervision work in the engine rooms.

The young seafarers on the other hand suggested that the older seafarers were not comfortable with using new technologies. Despite most instrumentation on ships being computer based and 'user friendly' these young seafarers claimed that old seafarers did not make effective use of new technologies. As a second officer noted:

> "Most of the equipment that we use onboard is quite user-friendly but even then there are some guys who do not find it what you call it, they do not have that. Some of them they are not very, that comfort level is not there with many of them especially the older guys that's what I have seen. Even some of them still you can find some of the guys who are still struggling with the computers." (Second Officer – 2/O.6)

The young seafarers also stated that because of their hierarchical positions the old seafarers did not always approve of the use of new technologies to the former. A third officer said:

> "They should make the people more comfortable with new technologies. The older people who are coming make them more comfortable, more confident they should be at ease with new technologies. You can give them some brief course so that they can get into the habit of using the new equipment." (Third Officer – 3/O.3)

Another young officer suggested he was 'quite cool' with using new technologies but on his previous assignment on ship an old shipmaster would not allow him to use 'electronic gadgets' for his work. This according to him was a 'barrier' which needs to be removed between young seafarers and old seafarers (Field notes Feb 2009).

Ironically, however, although these young seafarers claimed that some of the older seafarers were not adept at using computer based technologies there were also glimpses of appreciation and respect for the seamanship skills of the older seafarers in the accounts of the same junior officers. A young seafarer suggests:

> "We have got major equipment like best equipment onboard right now. Everything is modern, it's not an old bridge, it's a very modern bridge, and it's not a, I mean if a guy comes from an old background he will be like lost here ... I come across lot of people like that. My master was like that last time. And he was like lost *completely lost* [emphasis in italics] and he used to tell me what shall I do, what shall I do and I used to tell him, we'll do like this we'll do like that. But he was a very good master though I mean navigation-wise, he was a very good master but technology-wise he was nothing he was just zero [laughs]."(Second Officer – 2/O.3).

At a later stage during the interview the same officer says:
> "We have a navigation control system onboard the ship but my master he would rather do all the work by himself rather than using the computer. And I think it's good because it makes the ship safer." (Second Officer – 2/O.3)

The above quote also reflects an implicit belief that using traditional knowledge and skills was safer than adopting a formal approach to work at sea. This view was commonly held by many seafarers.

In some cases the divide between the views of seafarers also emanates from their national identity. The seafarers from EMNs claim that the NEC seafarers are lacking the traditional skills of seafaring. A British second officer throws light on the seamanship skills of the young seafarers from new countries and says:

> "... Even small things like taking the compass error I remember I was the only one who was doing it. Every watch we are doing it but we tend to find that the new guys don't do as much as maybe they should." (Second Officer – 2/O.7)

This section illustrated an ideological divide mainly between the young and old seafarers on the issue of technology and its usage in work.

6.6 THE CHANGING SKILL REQUIREMENTS AT SEA

This section illustrates the views of seafarers about the changing skill requirements and their future employment at sea with new technologies. The seafarers believe strongly that the nature of skills required to work on ships has not changed much even with new technologies. As two seafarers noted:

> "You still have to have that conventional knowledge because you need to have it but you may not be applying it over the time because computer is a machine and it can develop fault then you have to do it manually." (Second Officer – 2/O.5)

> "No I would say you need people with real skills to face the wind and weather, people who can think from their head and not their butts … Technology can never replace the need for seamanship." (Chief Officer – C/O.2)

Interestingly the importance of traditional seafaring skills was also raised by some young seafarers in India. For these seafarers the seafaring knowledge and skills translate into the notion that Indian seafarers will continue to remain high-priced in maritime labour markets when competing with NEC seafarers. As a young third officer from India says:

> "You can't compare Indians with other countries. Our basics are so strong, what they teach us here. Other guys you ask them their basic knowledge is so poor. That's why any company you see it is mostly Indian senior officers. Why they don't put Filipinos because they know if technology fails they can't they simply can't survive." (Third Officer – 3/O.7)

Occasionally, seafarers used the term 'real skills' to describe the seafaring skills and some even maintained a clear separation between the terms 'skills' and 'competencies'. To these seafarers whilst the competencies to work onboard ships may have changed, the 'real skills' at sea can neither change nor eliminate given the unpredictable and uncertain conditions at sea.

In my field notes I wrote once:
> "Some of the seafarers feel offended upon asking a simple question – do you think the skills have changed in any way? They would say – skills have to be there. You can't work without skills."(Field notes August 2009)

A shipmaster illustrated the implications of new technologies on the seafaring identity in what he perceived as the impasse between traditional seamanship skills and basic computer skills. He explained:

> "Seamanship in itself is application of common sense only; there is nothing fancy about it. All you need to do is two knots and how to go about work and keep your hands after the gear, and look after yourself, eat food at the right time, and work hard and finished. That's all. But now as we guys are no longer the big, burly, muscled,

tattooed guys we would have fun have women in every port [laughs]. We guys are expected to be sailors and also like office guys wearing ties and suits, we have to strike a balance by being both. So if somebody was to have a reasonable amount of common sense that is seamanship. That is I think something we cannot lose at all you just have to have common sense and good seamanship. Other thing which is really important is the computer skills. Computer skills I would say not skills as in programming, but usage and understanding which I think most youngsters have these days." (Master – M7)

The importance of computer skills in what was occasionally referred to as 'computer literacy', 'electronics skills' and 'IT skills' runs parallel alongside the importance of seafaring skills for most seafarers. Generally, though, it was the young seafarers who gave more importance to computer skills against seamanship whilst the older seafarers, even though acknowledging the need for computer skills, maintained the pivotal role of traditional seafaring skills. When asked about the future of skills with new technologies, three seafarers answered:

"Computers, that's what I think. Technology is coming very very fast you know and you cannot hide it from it. So we have to know it." (Second Officer – 2/O.3)

"We'll always need seamanship etc and IT, definitely IT from where we are at the moment with all the electronic systems has picked up." (Chief Officer – C/O.3)

"See basics will remain the same but I think the computer skills has to be much more improved. Computer skill is coming up like anything." (Master – M10)

The young seafarers, although comfortable with operating new technologies, expressed concerns about the limited orientation and training time available to familiarise with the equipment onboard each time they joined a new ship. This was mainly because the business strategies of shipping companies were aimed at minimising the cost involved in crew changes. A young seafarer from Mumbai says:

Seafarer: "I was supposed to join a ship in Singapore. Just to save some a couple of hundred dollars they put me on a flight with two stop-overs first in Bangalore then in Chennai. Just imagine and the waiting time at each airport about 4-6 hours and from the airport direct onboard. By the time I arrived on the ship I was so tired, I just wanted to crash on bed. Fuck bothered about taking over and all. Ah! And then the ship sailed out within few hours."
Researcher: "So you mean you did not get much…"
Seafarer: "[interrupts] that's what. No time to familiarise. And then the initial few days you keep struggling, asking other people, try and manage somehow." [Second Officer – 2/O.1]

A third officer adds to this:
"Introduction should be given as to what kind of equipment is there on ship you should have some pre-requisite information available. Hardly any information is

passed on to you they just tell you what kind of ship is it, what kind of functioning is there but about bridge and equipment nothing is told. And that you waste almost a month in learning and getting yourself familiarised with the stuff." (Third Officer – 3/O.7)

Some seafarers also expressed the desire to acquire wider skills beyond the basic operation knowledge of equipment such as advanced repairs and maintenance to assist with advanced technical maintenance of new technologies. As two young second officers commented:

"You need to have little aptitude for the automation. He should have interest in understanding. He should not say oh this not my job I cannot, the engineers will do it. The deck part of the machinery is so high the company should ask the individual to do automation course or should inculcate the understanding to see the diagram how the connection is there, if this system fails then what will the further consequences." (Third Officer – 3/O.3)

"Like they train you for the ECDIS but when they train you like for these IBS (Integrated Bridge Systems) it's like totally electronics totally software so you should be given some extra classes some extra course to deal with these faults, troubles you encounter during day to day. You don't need to call electrician for small small things. Like if you have learnt that electronics or software or some course then you can really sort out the problem." (Third Officer – 3/O.1)

But for old seafarers there was a sense of job insecurity with new technologies. This was because these seafarers felt at struggle with the operation of computer based technologies. A shipmaster commented:

"… the next 10 years I don't know where it is going to go, maybe we will be scrapped. We will get scrapped, that you are not up to the mark. You know your navigation but you are not good in computers. Maybe that is going to be another challenge for us, we have to upgrade ourselves in computer skills. (Master – M10)

The old seafarers facing problems in using computer based technologies also showed willingness to learn basic computer skills through attending computer course, but in most cases it appears that their request to attend computer courses are, at best, paid lip services by the employers.

In all, the seafarers do not seem to approve of the idea that with new technologies the skills required to work as a seafarer have changed dramatically. Rather, the seafarers tend to reinforce the importance of seafaring skills. But at the same time there is an awareness that the traditional skills and knowledge are at stake with new technologies particularly in the views of old seafarers.

6.7 CONCLUSIONS

This chapter presented the views of seafarers about the changing nature of work, skills and employment in the maritime industry. Seafaring has for a long time been regarded as an autonomous and prestigious profession and the working and living conditions onboard merchant ship have always been considered more challenging than the jobs ashore. Perhaps, a simple categorical separation between shore-*based* positions and sea-*going* jobs serves to explain this. The traditional skills and knowledge expected from a mariner took a lot of observation, experience and commitment from the individuals. These skills were generally available in traditional maritime labour supplying countries.

The findings suggest, however, that seafaring skills seem to have been undermined with the advent of new technologies. This chapter was largely based on the views of Indian seafarers, and due to India's position as a dominant maritime labour supplying country, the data shows a certain degree of resistance from the seafarers to the globalisation of labour markets and the introduction of workers from new countries. Most seafarers from established maritime nations were convinced that the shift to non-established countries was mainly to reduce crew costs by the employers. At the same time there were doubts about the competency and training standards of workers from new countries. A small group of seafarers from non – established countries, however, seem to experience a unique problem of 'discrimination' when competing with seafarers from established maritime nations.

Amongst its main benefits, the seafarers appeared convinced that new technologies were aimed at improving the safety standards on ships. At the same time young seafarers feel more engaged and positive about the introduction of new technologies.

At a deeper level, however, the data shows mixed responses about the introduction of new technologies. The education and training of older seafarers, embedded in the ethos of traditional work practices and work culture at sea, seem to create tensions as they find it difficult to rely on technology more than their own skills. There is therefore some degree of resistance to technological changes and the changing nature of work and skills. The problem is compounded further with enhanced shore-based control and intervention even in routine work on ships. On the other hand, the younger seafarers seem to adopt a casual approach to work and at the same time their tendency is to rely excessively on new technologies.

Finally, to compare between the views of employers and seafarers and analyse the overall impact of new technologies on work, skills, and seafaring identity let us turn to the next chapter.

CHAPTER 7 DISCUSSIONS: NEW TECHNOLOGIES, SEAFARING WORK, SKILLS AND IDENTITY

This chapter presents a description and analysis of the impact of new technologies on work, skills, and identity of seafarers. The analysis involves a comparison between the perceptions of the employers and the seafarers as discussed in the preceding two chapters.

It is evident from the preceding chapters that global competition and the rationalisation strategies of shipping companies are perceived in different ways by the seafarers. The young seafarers respond to competition pressure, new technologies and the changing nature of work and skills quite differently from the older seafarers. Previous studies have described these differences between young and elderly workers based on 'generational gaps' (Smith *et al.*, 2006). The authors argue that rapid technological advances and the changes at workplaces create differences in the ways some of the young workers perceive new technologies as opposed to the older workers.

By contrast, the analysis shows that these differences arise because of the understanding of workers about seafaring identity. The role of industrial training is particularly influential in shaping the professional identity of seafarers. The seafarers' training in the past has primarily focused on traditional values and practices of the profession as we saw in the case of many old seafarers. As reflected in the views of many young seafarers in private colleges in India, however, the fast-track technology-led training does not necessarily create an equivalent impact on young seafarers. These seafarers do not consider traditional skills and knowledge of much practical use in their work. By contrast, the seafarers in the UK training college, irrespective of their rank experience and national identity, continue to exhibit a strong sense of seafaring identity, re-enforcing the importance of industrial training in professional identity. Any firm relationship between training and seafaring identity is difficult to establish especially given the small sample of seafarers in this study but what emerges from the sample is that industrial training has a strong influence on the understanding of seafarers about their profession irrespective of their nationality. The existing literature shows similar impact of learning and training on the identity of professionals (Wenger, 1998, Farrell and Fenwick, 2007).

Professional identity, as explained in Chapter 2, is a result of the acquisition of knowledge and skills in a profession. The specialised knowledge gained over a period of time differentiates skilled workers from less skilled workers. By virtue of their specialised knowledge skilled workers enjoy a higher level of discretion and improved wages. In some cases, professional identity also becomes a source of social status in the society. But if the same knowledge can be captured and incorporated in the design and operation of new technologies, the demand for skills can be reduced and the workers can be comfortably 'reduced to the status of flexible appendages to the machine' (Harvey, 2010: 127).

In the case of seafarers a strong sense of seafaring identity is primarily the result of industrial training that enforces the traditional values and work practices of the profession (as outlined in Chapter 6).Nonetheless, new technologies and the changing nature of work and skills are perceived as a threat to the profession. Based on the notion of seafaring identity, the perceptions of workers can be explained at the level of work situation, market situation and life situation.

7.1 WORK SITUATION, MARKET SITUATION AND LIFE SITUATION

David Lockwood's (1989) painstaking analysis (based on Weber's theories) aimed at examining the 'work situation' and 'market situation' of clerks in Britain in the mid-twentieth century is appropriately based to explain the differences in the perceptions of seafarers based on their understanding about a seafaring profession. Lockwood found that in the mid- twentieth century the jobs of the clerks- even though low paid - demanded educated workers and in turn offered these workers social status and respect in society. Although the jobs of clerks did not allow much discretion or demand excessive skills these clerks were still paid competitive wages and migrated into trade unions to preserve their employment conditions and social statuses. Thus from Lockwood's viewpoint, although the work situation of these clerks stood in comparison with the working classes in Britain, their market situation in terms of the incomes, upwards occupational mobility and job security were kept intact; in other words embourgeoisement of the working classes. To give them the social statuses associated with the profession these clerks were even allowed to wear black coats at work which signified their status as middle class workers. Later, many scholars used this concept in class analysis (Goldthorpe, 1980, Erikson *et al.,* 1979, Breen and Rottman, 1995). By contrast, this thesis has revealed that with intense market competition, both work situation

and market situation of seafarers have been undermined with new technologies as illustrated below.

7.1.1 WORK SITUATION

'Work situation' refers to a set of social relations in which a person is involved by virtue of his/her position in the division of labour (Lockwood, 1989). This includes the extent to which the work is simplified, fragmented and re-assigned within the organisation and the resulting discretion allowed to each worker.

New technologies seem to have either reduced or simplified the core jobs of seafarers. For example navigational skills have simplified with the advent of GPS (Global Positioning Systems). Likewise, cargo planning in certain trade sectors (for example container ships) can no longer be left to ship's officers due to the complex nature of transport and distribution systems and the time constrained operations in port. High skilled maintenance and repair work of new technologies is now carried out ashore by specialised services leaving seafarers to perform routine operational work. With administrative and bureaucratic work on ships increasing, in the companies examined, the core jobs of seafarers such as their navigation work, cargo work and technical maintenance seem to have been simplified either by using automated technologies or by outsourcing high skilled work to the shore side.

But this redistribution of work and the loss of discretion on ships generate conflicting responses from the seafarers. At one level, the implementation of technology on ships is perceived positively by the seafarers. The seafarers claimed that technology has improved the safety on ships even though it is largely understood that it is not so much for crew safety but for safe and efficient shipment of cargo. Nevertheless, there still remains a perceptible relationship between new technology and the overall safety of maritime transport.

It is also claimed that technology facilitates the seafarers to perform their routine work on ships. The seafarers suggested that to a large extent the problems of insufficient manpower and the laborious nature of work can be overcome by using automated equipment. Even the employers admit to the fact that automation of labour intensive work is a safer alternative than relying on fatigued and over-worked crew members. Moreover, many young seafarers feel more engaged with work because of the interactive nature of new technologies. For example remote controlled systems (including integrated controls and touch screen panels)

seem to create an illusionary sense of autonomy in work. The data elicited from the young seafarers explains that technology makes their work easier by reducing their workloads. This may be as a result of the physically demanding nature of work and the aversion to blue collar work noted amongst most young seafarers interviewed. At one level these perceptions reflect that the young seafarers do not always seek challenges or the need to apply their knowledge and skills in work; a fact that appears to contradict Braverman's (1974) theory of deskilling. Young seafarers seemed to be less concerned about discretion and satisfaction in work than the simplification and reduction of workloads.

Care must be taken, however, not to exaggerate the role of new technologies in simplifying the work of seafarers and improving their work situation. Considering the intensification of work and reduced manning on ships, both simplification and reduction of work are gratifying experiences in that they relieve seafarers from physical work and mental exertion. But it is more important to understand that if the skilled operations can be *absorbed* by complex equipment, these workers do not see any point in using their intellect and thus turning into what Chang (2007) describes as 'mindless automata'. As Richard Sennett (1998: 74) puts it:

> "... Resistance and difficulty are important source of stimulation, that when we struggle to know something, we know it well ... When things are made easy for us ... we become weak; our engagement with work becomes superficial, since we lack understanding of what we are doing."

To an extent the submission of workers to new technologies as the convenient alternative to using their own judgement and skills explains what is widely perceived as 'over-reliance', 'complacency' and 'misuses' of new technologies by the young seafarers in the industry literature. Work becomes effortless, intellectually dumb and the workplace becomes a source of transitory entertainment to overcome social isolation and boredom. As Bauman (2000) suggests such improvements in work situations are not always to 'ennoble its performers'; it is 'measured and evaluated in its capacity to be entertaining and amusing, satisfying not so much the ethical ... as the aesthetical needs and desires of the consumer' (pp139-40).

Despite optimistic views about simplification and reduction of work, doubts emerged constantly about the reliability of new technologies and the complex functioning of equipment. There were many instances where the seafarers were critical about the reliable output of information obtained from new technologies. Occasionally, there were also complaints about the quality of equipment and the purchasing strategies of shipping

companies aiming to install cheap technologies on ships. These claims, however, cannot be confirmed, because of the design of the study but it shows that the seafarers have less faith on the quality and reliability of equipment because of the procurement strategies of shipping companies aiming to reduce the cost of supplies on ships

To an extent the doubts over quality and reliability of information can also be explained on the basis of Sennett's (1998) analysis. Computer based technologies process much of the intellectual work earlier performed by skilled workers and at the same time they do not allow an insight into the complex functioning of equipment. Much of the high skilled maintenance work is either carried out ashore or by following the instructions of shore based technicians. With new technologies the seafarers do not necessarily need to possess the advanced knowledge of repairs and maintenance as it was the case with the mechanical equipment of the past (King, 2001). For the same reasons, it is not always possible for the seafarers to account for the operational limitations of new technologies. This, however, is in direct contrast with the ethos of the industrial training that discourages from relying excessively on technology and using own judgement in performing work.

7.1.1.1   DEGRADATION OF WORK

In the case of older seafarers, loss of discretion is strongly linked with the degradation of work. The old seafarers complained of menial tasks such as 'ticking boxes' and 'checklists', sitting on computers for long hours and doing 'paper work' rather than deeper engagement in work which they perceived as 'real' work. Along with technology, this is also resulting from the introduction of the International Safety Management Code (ISM) and the bureaucratization of work on ships as a consequence of the regulatory requirements. The shipmasters felt their statuses have declined from shipmasters 'overall in-charge of ships' towards that of 'clerks', 'middle men', and 'post men' working 'secretarial jobs' on ships (Knudsen, 2009, Anderson, 2005). Wider studies have reported a similar impact of new technologies on the perceptions of workers. A recent study of the mining industry in Sweden concluded that the older mine workers often perceived the mechanisation of labour intensive mining jobs as a threat to their identity as skilled miners (Johansson and Abrahamsson, 2006).

The administrative work also seems to have increased as a result of the shore intervention even in routine shipboard matters. The email traffic from the shore side, often termed as

'frivolous' or 'stupid' office queries, has increased and the commercial pressure to respond instantly to the emails has increased further according to the seafarers. The problem intensifies further because of the tensions between senior officers on ships and the middle managers ashore. The former complain that the 'less experienced' managers ashore do not have a comprehensive understanding of ship operations and hence the challenges faced onboard should best be resolved by the ship staff. On the other hand, the employers claim that the competition pressure does not allow the liberty to leave operational matters to the seafarers, shore support is much required and queries from the employers *must* be answered in time. As a result, the shipmasters claim that a significant proportion of their time is utilized in communication and liaising with the shore side and their involvement in ship matters has reduced causing them dissatisfaction. Some even warned that their disengagement with shipboard work is undermining the safety of ships as the 'overseeing' role of a shipmaster has been supplanted by trivial jobs.

The degradation of work as a result of increase in administrative work is difficult to establish because of the design of this study (as I did not have the opportunity to visit ships and record such information). What appears to upset the seafarers is the notion of being perceived as semi-skilled workers performing administrative work which undermines their professional identity. This is evident from the resistance to 'paper work' and the inclination towards traditional work practices of the past which demanded greater involvement in work. The negative impact of administrative work on seafarers' perceptions has been widely reported since the introduction of the ISM Code at sea (Anderson, 2005, Knudsen, 2009). It is also evident from the accounts of old seafarers who felt disappointed watching young seafarers working on computers rather than doing what they termed as 'actual work'; although acknowledging the importance of administrative work because of the statutory and business requirements. The perceived threat to professional identity also appears as the employers emphasise that standard based software technologies are implemented to reduce the pressure of administrative work on ships, whereas the seafarers claim that such software programs only intensify surveillance and therefore exacerbate the bad work conditions on ships The degradation of work resulting from technological changes was also noticed in the views of young officers mainly in the form of dissatisfaction with their jobs. On the one hand these young seafarers felt a significant reduction in their workload as a consequence of new technologies to the extent that they experienced boredom during their work hours. At the same time, there were concerns that administrative work onboard ships has significantly

increased, resulting in work intensification and extended hours of work. For young officers the inclination towards new technologies as a result of aversion to physical labour seems to work only to some extent. Beyond that there seems to be dissatisfaction with the new forms of work which they often described as 'monitoring work' or a 'watchman's job' at sea.

7.1.2 MARKET SITUATION

'Market situation' refers to the conditions of employment such as wages, job security, and career progression opportunities offered to the workers based on their professional qualifications and skills. The professional qualifications and skills are integral to the market situation of the workers as it is the perceived importance of the workers' skills to the businesses which determines their employability.

Thus, the responses of seafarers in this category largely depend on their positioning within the global maritime labour markets. The empirical investigation shows that the seafarers' from EMNs (established maritime nations) are highly conscious about their market situation as 'skilled professionals'. These seafarers are aware of the cost saving strategies of shipping companies in sourcing labour from NECs (non established countries).Nevertheless, against the employers' assertion that the training standards of seafarers from NEC (even though it may exist) meet their crew sourcing requirements, the seafarers from EMNs strongly felt that the safety of work on ships is seriously compromised with the influx of what they saw as 'inadequately trained' labour. While some saw the problem lay with seafarers from specific countries the others felt the problem applied to almost all young recruits. The old seafarers gave due importance to the traditional knowledge and apprentice model of training which they claimed was the answer to address the skill issues of young seafarers. These old seafarers also felt that the employers' concern is mainly to save costs in fulfilling the minimum statutory requirements of crew manning and not so much about the quality of labour resulting from which cheaper seafarers from NECs are favoured to work on ships.

To a large extent the responses of EMN seafarers to the labour sourcing strategies of employers indicate a perceived threat to their market situation. Although the employers seem comfortable with shifting to NECs the seafarers from EMNs claim that 'inadequately trained' seafarers from NECs undermine the safety and efficiency of work onboard ships (note that the study makes no claims in favour of or against these assertions, it is merely a presentation of the views and perceptions of participants). The old seafarers from EMNs accepted that the

young recruits are proficient in the use of new technologies and that their own jobs are at stake vis-à-vis new technologies and the changing demand for skills. Contrary to these claims the seafarers from EMN, however, maintain the importance of traditional knowledge and skills of the profession. In some ways, these responses illustrate the resistance of EMN seafarers towards the introduction of NEC seafarers because of the perceived threat of losing their jobs at sea. An ethnographic study comparing the Norwegian and Filipino seafarers showed similar findings (Serck-Hanssen, 1997, Mills, 1967). The author argues that the Norwegian seafarers often claimed themselves as 'excellent sailors' or 'good workers' to legitimise their higher wages and in response to the fear over job loses to Filipino seafarers.

The responses of young seafarers from India were equally conflicting. These young seafarers especially those from private colleges appeared unsatisfied with the industrial training standards in India. What was taught in the maritime colleges, according to these young seafarers, was primarily a re-enforcement of the traditional knowledge and skills and as such it was of no practical use with new technologies on ships. At the same time, when asked to comment about the skills of seafarers from new countries, there was a tendency to highlight the importance of conventional knowledge (described as 'basics' or 'basic seamanship skills') to claim national competitive advantage over seafarers from NECs. The young seafarers from India alleged that the seafarers from new locations (South Asia and East Europe) were lacking the conventional skills which they felt were essential to work at sea. As illustrated in chapter 6 there are also reflections of appreciation for traditional seafaring skills of older seafarers in the data from young officers, confirming their acknowledgement about the importance of traditional knowledge and skills at a deeper level. In addition, these young seafarers also believed that Indian seafarers will remain the preferred choice for most employers in international labour markets.

From a small sample of four seafarers belonging to NECs interviewed in this research, new technologies seem to impact upon their market situation albeit in a different manner. These seafarers complain of discrimination, stagnant career progression opportunities and depressed employment conditions. Discrimination based on gender, religion, ethnicity and race has been an inherent characteristic of labour markets and as David Harvey (2010: 258) suggests 'foundational in the rise of capitalism' to minimise competition in favour of privileged workers. If the world's merchant fleet was predominantly controlled by ship owners in the North, such crewing structures favouring seafarers from established maritime nations are

bound to arise (Lane *et al.,* 2002). But with technology, the gaps between thinkers and doers on ships seem to intensify, and from a small sample of NEC seafarers the findings suggest that these seafarers appear to be less favoured when competing with seafarers from EMNs in international maritime labour markets.

Occasionally, the perceived threat to the market situation also reflects when seafarers made reference to the employment conditions of middle managers ashore. This is especially the case with the seafarers serving in senior ranks claiming that along with balance of power shifting to the shore side, the less experienced middle managers were now provided with superior employment conditions compared with some of the experienced and older seafarers serving onboard ships.

7.1.2.1 JOB INSECURITY

There was a pervasive sense of job losses in the accounts of many seafarers from EMNs. This job insecurity emanates from the fear of being replaced by workers from NECs but with the older seafarers it is also felt because of the rapid technological changes at sea and the resulting changes to work and skills. The seafarers from EMNs, who seek to secure their position as skilled professionals, resist the technology-led reorganisation of work by reinforcing the importance of traditional work practices, work cultures, and seafaring skills in shipboard operations. The job insecurity that arises as a result of new technologies contradicts the policy perspective that new technologies create more jobs and help reduce unemployment rates in society. The findings suggest that with new technologies, workers feel increasingly concerned about their market situation and the fear of being replaced.

The responses of many young seafarers in India also suggest an element of job insecurity, albeit in a different manner. These seafarers do not show much resistance to the influx of NEC seafarers. Their concerns are more about acquiring 'new' skills such as electronic skills and academic qualifications (for instance management degrees) to make their future more secure through 'better' shore jobs. There is also less faith in the future of traditional seafaring skills for the same reason. Such responses offer an alternative understanding of why workers worry about their job security and future employability. Indeed, as Wright Mills (1967) suggested, these personal desires to acquire wider skills offer an understanding of the broader social forces that manufacture insecurity in the labour markets (see also Webster *et al.,* 2008).

7.1.3 LIFE SITUATION

The implications of new technologies for seafarers can also be explained at the third level of the life situation. The issue of the life situation has not been grappled in the earlier work of Lockwood (1989). Lockwood's third category of class analysis rather rests on the issue of status situation. The concept of life situation helps to understand the broader and deeper problems of the profession stretching beyond the issue of work, workplaces and employment conditions at sea. It derives from the basic question of the importance of profession in the lifetime of a worker.

A strong sense of dignity and pride in the profession is by and large missing in the accounts of many young seafarers from India. Indeed, their understanding about the profession is based on the notion of a 'short term' career. The data shows that most young seafarers, even at very early stages of their career, saw their entry into a seafaring career transitory and merely as a platform to earn 'quick money' and secure a job ashore. Whereas some seafarers were particularly keen to transition to a shore based career within the maritime industry, others insisted that their aim was mainly to 'quit seafaring' so long as they could secure *a* job ashore. The dilution of seafaring identity with new technologies has been met with what Alvin Toffler (1974) explains as the beginning of 'serial career' workers as the profession loses its meaning.

The combined impact of low esteem about the profession and new technologies contradicts the optimistic views of many young seafarers about new technologies and a sense of engagement in their work as outlined in the previous section – work situation. These views can easily be misconstrued in drawing any assessment of new technologies. In the absence of any profound sense of achievement in the profession or the motivation to pursue a long term career the same technology can also give rise to disengagement and dissatisfaction at work. The young seafarers do not see much incentive in acquiring further knowledge and skills if technology can somehow be used to perform their work. This is of course not the same as 'relaxing and switching off from work' as discussed in the section work situation. It is to highlight the deeper serious issues of lack of interest to acquire further learning and training in the job that reflects in the attitude of young seafarers.

In addition, the low motivation levels of young seafarers results in excessive dependence on technology, often termed as 'over-reliance' or 'complacency'. This was particularly noticed in the accounts of training staff and old seafarers who felt that young seafarers paid lesser attention during navigational watch and relied excessively on automated technologies in their work which according the former could undermine the safety of lives, property and the environment at sea. It explains also why some young officers turn to inappropriate use of technology, such as emailing and chatting on radio during navigational watch, to cope with the pressures of mundane and socially isolated work at sea.

The mundane work environment at sea, fast turnaround time of ships in ports, limited manpower on ships and social isolation add further to the aversion towards the seafaring profession. This is evident in the accounts of young seafarers who used terms such as 'steel tubes' and 'floating prisons' to describe their living conditions at sea. In some cases, the seafarers expressed the desire to give up a seafaring career without much concern about the repercussions of losing their jobs.

Interestingly, however, within this small sample I could not find much evidence of attrition rates at the employers' end and hence I cannot comment further on this problem. But more importantly, it is the understanding of the young seafarers about the profession as a 'short term' career which explains their casual approach to work, dissatisfaction, low motivation levels and precarious behavioural traits.

By contrast, professional identity in the case of older seafarers is closely linked with self respect and dignity as a professional. The idea of being guided, if not controlled, by the less experienced middle managers tends to upset many old seafarers. In some cases, it also seems to have an adverse impact on the young seafarers who strongly believe that the previous notion of a shipmaster *commanding* a ship has dramatically changed with the nature of competition and shore side intervention even in daily routine work on ships.

The notion of life situations explains why old seafarers do not always find a shore based opportunity appealing or a better choice than working on the ships. Even if offered the opportunity to work ashore, their inclination is more towards retaining their sea-going statuses. It reflects the importance of a profession for an individual and the reluctance to switch between careers. Whilst many young seafarers tend to take a casual approach towards

the profession the old seafarers on the other hand endeavour to preserve the work culture and practices of the profession. In the case of the latter, there is an implicit belief that the traditional skill and practices at sea contribute to the safety at sea. Where young seafarers deviate from the traditional practices it creates tensions onboard ships.

This section was aimed at explaining the implications of new technologies on work, skills and identity of the seafarers. The views of seafarers point towards the deeper problems of professional identity that seems to have been challenged by new technologies. More specifically, the attitude of young workers towards a seafaring profession points towards significant manpower and skill issues for the maritime industry in future.

It is important to investigate the wider competition strategies of the employers and why such strategies are being pursued. Equally important is to examine the extent to which technology is being used to achieve the competition requirements of the employers. From a theoretical viewpoint, the analysis will point towards the comparison and contrast with the competing theories of technology outlined in Chapter 2. For this, let us turn to the next section.

7.2 GLOBAL COMPETITION AND THE ROLE OF NEW TECHNOLOGIES

The empirical investigation suggests that the employers are highly sensitive about the competitive nature of work and the regulatory and market pressure to provide safe and reliable transport services. In doing so, there is a constant pressure on reducing costs and improving efficiencies. Faced with market competition, the employers seem to be targeting labour costs as an area where prominent costs savings can be made. In that respect the findings confirm past literature within and outside the maritime sector (Klikauer, 2003, Gereffi and Fernandez-Stark, 2010, Ritzer, 1998).

In large part, the reduction in manning levels on ships irrespective of the increase in ship sizes appears to have contributed to the notion that new technologies can prove very useful in minimizing crew costs (King, 2001, Donn and Morris, 1997). But in recent years, the complexity of ship designs compounded with regulatory and market constraints appear to have challenged further reduction in crew sizes. Indeed, in certain sectors of trade such as those involving high risk cargoes the employers indicated an increase in crew sizes on ships (as outlined in Chapter 5). There are of course limits to minimum levels of manning on ships

as outlined in the safe manning regulations under the Safety of Life at Sea Convention (SOLAS), but as we shall see below this does not deter the employers from finding innovative ways to further reduce labour costs.

7.2.1 GLOBALISATION OF MARITIME LABOUR MARKETS AND NEW TECHNOLOGIES: A 'RACE TO THE BOTTOM APPROACH'

The access to cheaper labour from competitive locations combined with new technologies provides ample opportunities to reduce costs in order to remain competitive. To begin with, the increasing trend towards flagging out of ships to the flags of conveniences (Lillie, 2006) and the tripartite reforms aimed at creating a level playing field in global maritime labour markets (as outlined in Chapter 3) are used as the platform to drive down costs by the employers. The employers' concern, it appears, is mainly to comply with the minimum regulatory requirements concerning the employment, training and certification of seafarers. This can be seen, in part, by examining the labour sourcing strategies of shipping companies. The seafarers from non- established countries (NECs) are particularly appealing to the employers because of the lower wage structures, training costs and favourable business environment offered by these new countries. 'Reasonable' language skills and minimum standards of training and certifications seem to be the decisive factors in the labour sourcing strategies of shipping companies. Likewise, 'accommodating' and docile behaviours of seafarers from NECs are considered conducive to enhance control from shore side and operate ships in the most cost effective manner. By contrast, seafarers from EMNs are considered 'rigid' and 'strong headed' creating challenges for shore managers, given the claims that most aspects of shipboard work can now be planned and controlled from the shore end. Such labour sourcing strategies favouring flexible and docile labour more than skills have also been discussed in the wider literature (Brown *et al.,* 2007, Harvey, 2010, Warhurst and Thompson, 2001).

The literature suggests that the employment of senior officers from EMNs and junior officers from NECs has for a long time been used as an effective strategy to reduce costs especially where comprehensive replacement of seafarers from EMNs is either not possible for regulatory reasons or simply appears problematic due to the nature of work[12]. But that with new technologies the existing gap between high skilled technical jobs and low skilled

---

[12] There are many examples in the existing literature confirming a combination of the seafarers from EMNs in senior positions working and Filipino seafarers at operational and rating levels

operational work seems to have intensified. Again, this is mainly for cost reasons as the employers suggest that technical knowledge has become more concentrated, resource intensive and specifically tied to the manufacturers and vendors of new technologies. Thus, only selected crew members are chosen to perform high skilled technical jobs whilst leaving the majority of seafarers to carry out low skilled work.

Further investigation shows that the segregation between the seafarers from EMNs and NECs does not always remain vertical; it appears now to have entered the next stage extending into lateral directions. As an alternative to vertical segregation in crewing structures the employers are becoming increasingly cost conscious and aiming to replace seafarers from EMNs with NEC seafarers even at the management level. Note that these subtle changes in the crewing patterns were rarely acknowledged by the employers. Rather, it appeared mostly in the anecdotal data from seafarers who felt that crewing strategies were increasingly inclined towards employing at least a few seafarers from NEC's at the management level. These seafarers claimed that this was not merely a coincidence but a planned strategy to cut down on crewing costs.

The seafarers' anecdotes about the intake of NEC seafarers at management level also corroborate with future crew sourcing strategies of employers. Most employers indicated that in future the seafarers from NECs will not be restricted to low skilled work. As is evident in the data some employers seem to reject the notion of 'nationality differences' in evaluating the crew training standards. Rather, 'flat world' analogies were used to justify the willingness to employ anyone with the 'right skills' irrespective of their nationalities so long as the labour costs could be kept in control.

7.2.2 THE DEMAND FOR SKILLS AT SEA

At the operational level the employers suggest that new technologies have either simplified the skill intensive work on ships (for example navigation and cargo related duties) or simply allowed outsourcing of administrative work to the shore side (for example inventory control, crew wages, budgeting and finance). Hence, there is not much concern about the quality of training which shows in the actual demand for skills. So long as the seafarers meet with the minimum standards of certification the employers do not seem to show much concern about employing them on ships. Any gaps in the training standards and competencies of seafarers from NECs can be comfortably addressed using innovative training technologies and

strategies. As we saw in Chapter 6 the traditional seafaring skills were largely acquired through onboard learning and formal training in the MET colleges across EMNs. To minimize training and recruitment costs, the seafarers are employed in large scale and trained using computers and simulator based training as the alternative to resource-intensive onboard learning and training.

The simplification of work on ships does not rule out the importance of acquiring computer skills for seafarers. For this, young seafarers are preferred over older and experienced seafarers by the employers to escape the training costs each time new technologies are introduced onboard ships. The employers seem convinced that even with limited training these young seafarers can work effectively with most computer based equipment and systems on ships. The benefits of employing young seafarers with 'good' computer skills was also observed against the background of the challenges faced in employing some of the older seafarers facing difficulties in adapting with the new technologies irrespective of their conventional knowledge and skills. These differences between young and old workers have also been recorded in earlier studies (Goldin and Katz, 2008). Faced with market competition such a shift in the views of employers also questions the actual importance of seafaring knowledge and skills to improve the competitive advantage of shipping companies. It shows the precedence of *basic* computer skills over years of experience and skills acquired at sea which appears to be undermined by technological changes at sea.

This also raises questions about future employment of those who struggle with the use of new technologies – in most cases the older seafarers. There is almost no empirical evidence to suggest any organisational support to re-skill these old seafarers to work with new technologies although on some occasions it is highlighted by these seafarers that such skill issues have been raised with the employers. Contrariwise, where the firms face pressure these old seafarers seem to be transferred to ships with conventional technologies and if not face redundancies. If there is a 'real shortage of available skills' as the companies claim, the question then is why these seafarers are not being re-skilled with some support to cope with the changes at work? Perhaps, one possible explanation is that besides computer skills the companies now require a flexible workforce, and the professional identity of these old seafarers hinders the smooth functioning of businesses faced with intense competition.

In some cases the employers expected a sound educational base including knowledge of mathematics, physics and chemistry from the young recruits. The same was confirmed also by the older seafarers who pointed out the recent increase in the recruitment of 'science graduates' on ships. There seems a contradiction here. Technology does not always seem to reduce the demand for skills. Rather it shows that as innovation advances further and ship are designed to transport high risk cargoes the employers expect a higher scientific understanding of shipboard work from the seafarers. But again, when claiming the demand for higher skills the issue of labour costs remains of paramount importance to the employers. This trend towards cheaper yet high skilled labour was further confirmed by examining the collaborative partnership of employers with specific (maritime) institutions in Western countries as well as those with established maritime training infrastructure in emerging economies. Putting together, so long as the seafarers from NECs can be sourced at competitive costs the employers do not always exhibit the desire to source less skilled seafarers even with new technologies on ships. Rather better educated workers are sought at cheaper rates confirming the contemporary shift towards high skilled-low waged model of workforce in knowledge based industries (Brown *et al.*, 2011, Gereffi *et al.*, 2010, Wadhwa, 2008).

To sum up, this section has highlighted the management strategies aimed at exploiting the benefits of new technologies and cheap labour from competitive locations. Where technology does not allow comprehensive replacement of seafaring skills, the employers do not hesitate to upskill a handful of seafarers on their ships. This has further intensified the existing gaps between high skilled and low skilled work on ships.

7.2.3   ENHANCED SHORE-BASED CONTROL

Although on the one hand, the demand for skills has either been reduced or concentrated to a few crew members on ships, on the other hand the onus on shore management seems to have increased. The employers suggest that with new technologies a major proportion of shipboard operations can now be monitored from the shore end. If the seafarers continue to 'co-operate by feeding in raw input' from ships the employers claim that the shore side can manage the operations more effectively rather than relying on the seafarers to carry out the same jobs. This is evident also from the tacit acceptance of many shipmasters that their role on ships has been reduced to *clerks* and the managers' claim that their role in shipboard operations is *pivotal*.

Hence, technological advancement has allowed shipping companies to redistribute much of their high skill activities to the shore side. Wider studies have reported this as a case of spatial re-organisation of work (Harvey, 2005, Harvey, 2000, Reinert, 2007). Theoretically, low skilled work on ships should be balanced with concentration of knowledge and skills at the shore end. If that is the case, the shore managers should be rewarded with higher wages and employment conditions although in practice this is questionable.

A burgeoning expansion of middle management was noticed during data collection which shows that the onus on the shore side has increased. Nevertheless, although the seafarers often felt that the managers ashore were in relatively better positions in terms of employment conditions, the interviews with the latter do not show any significant improvements. These claims cannot, however, be confirmed and require further investigation.

The underlying reasons for shore-based control seem to be driven by wider competition issues and the complex nature of work that no longer allows reliance on seafarers for skill intensive work. This is evident in the relentless pressure on companies to interface ship operations with the wider requirements of transport and distribution networks. The employers appear highly sensitive about delays and disruption to ships which could cause potential disruptions to supply chain networks. To this end, the employers suggest that simplifying work on ships and intensifying shore based control are essential to build reliability in just-in-time supply chains. The literature confirms the commercial pressure due to business constraints (i.e. just-in-time arrival and departure of ships in ports) because of which the control over planning and organization of work on ships has been shifted to the shore management (Kahveci and Theo, 2006, Sampson and Wu, 2003).

Furthermore, work intensification, long hours of work, crew fatigue and limited manpower on ships put pressure on the safety of ships as highlighted also in a number of studies (Smith *et al.*, 2006, Smith, 2006). But these issues cannot be avoided as the market rationale does not allow for an increase in the manning levels on ships. An alternative, according to many employers, is to increase monitoring and control from the shore side.

7.2.4 TENSIONS AT THE SHIP AND SHORE INTERFACE

Despite the claims that new technologies have comfortably allowed the redistribution of skilled work to the shore side, the employers were consistently concerned about the competencies, skills and motivation levels of seafarers. On many occasions doubts were raised about the actual understanding of seafarers about routine shipboard work.

To prevent the skills and motivation issues of seafarers from affecting the safety and efficiency of ship operations, the employers insisted on the careful designing and implementation of new technologies. There were terms such as 'fool proof' and 'idiot proof' technologies designs (as well as sufficient back-ups) which the employers believe would enhance the safety of ships. These claims confirm existing literature that human intervention is perceived as a potential source of errors and technology is used to remove human judgement in workplaces (Wajcman, 2002, MacKenzie and Wajcman, 1999).

At the same time, the employers were also particularly keen to adopt a formal approach to shipboard work by adopting the guidelines of International Safety Management (see Chapter 3 ISM Code). By doing so, the employers need not rely heavily on the skills of seafarers.

In certain cases, the employers felt strongly that investment in technology was more productive than crew training simply because the seafarers could no longer be trusted. The employers complained that the attrition rates of seafarers were particularly high and as a result of the contractual nature of employment, standard based technologies and simplified work processes proved more cost effective, safe, and reliable than investing in the training and re-training of seafarers.

Excess intervention from the shore side in shipboard matters seems to have exacerbated the level of trust at the ship-shore interface. Interestingly, although on the one hand discretion has been removed from ships there are consistent doubts about the decision making abilities of seafarers. The employers showed even less faith in the seafarers' abilities during crisis situations, and concerns were raised about the safety issues on ships owing to the competency and motivation issues of seafarers. On the other hand, less trust of seafarers, their skills and competencies adds to the existing challenges of seafarers. Whilst for old seafarers this is a

question of integrity and pride in profession, the young seafarers continue to adopt a casual approach to work.

7.3 CONCLUSIONS

The seafarers' response to new technologies and the changing nature of work and skills is explained on the basis of their experience of profession as a whole on the lifetime. In doing so, the conceptual tools used by Lockwood (1989) have been utilised and the perceptions of seafarers are explained at the level of work situation and market situation. The differences in the views of seafarers exist primarily because of their understanding of the profession. Primarily, differences were observed around the issues of work simplification with new technologies, the level of engagement with work, perceived degradation of work and the notion of being replaced either by new technologies or cheaper workers.

A third category of seafarers' perceptions, hereby termed as life situation, is a novel concept based on the importance of profession in the lifetime of workers. The findings suggest that for many young seafarers the seafaring profession has lost importance resulting from the management strategies of employers in what appears to be a race to the bottom approach driven by intense market competition. The motivation for progressing further in a seafaring career is considerably low and these young seafarers exhibit precarious behaviours that may undermine the safety of the maritime industry.

All this however does not seem to deter the employers in their endeavours to reduce costs. The access to cheaper labour from competitive locations creates enormous opportunities for firms to search restlessly for competitive locations to source cheaper labour. New technologies are introduced with the objective to drive down the cost of operations, improve efficiencies and maximise control over labour processes. The work on the ships has been simplified, formalised and much of the skilled operations have been shifted to the shore side. Only a handful of skilled professionals are required onboard ships leaving the majority of the crew members to perform low skilled work.

Further investigation reveals that shipping companies are aiming to employ low cost labour from NECs to replace the seafarers from EMNs. Moreover, the attributes of NEC labour appear conducive to the businesses – docile, flexible and yet educated workers – when compared with 'uncompromising' high waged seafarers from unionised zones of Europe.

To a large extent the employment and management strategies of employers illustrate the intention to deskill the workers. Deskilling, however, is primarily driven by the nature of competition and the opportunities and challenges of sourcing cheaper labour from global labour markets. Work simplification on ships is driven by the idea of employing cheaper labour from competitive locations. Where these workers cannot be trusted for their level of knowledge, skills and motivation levels, new technologies are used as the alternative to skilled labour.

In some cases, the employers indicated the importance of employing workers with 'good computer operating' skills and sound basic education (mathematics, science, and English language skills). Hence, a slightly different set of skills is required in working successfully with new technologies onboard ships. This should not necessarily be misconstrued for the upskilling of workers. Rather, reduction of cost still remains the top priority for the employers and what emerges from the analysis is the desire to source educated workers at cheaper rates.

The deskilling of seafarers is compensated with the increased onus on shore side management although the actual upskilling of shore-based workers is questionable. What appears so far is the iterative process of deskilling of workers to rationalise costs followed by low level of trust in the training and competencies of workers. This 'race to the bottom', however, drives further technological control and deskilling and furthermore, without some sort of enforcement and regulatory mechanism, search for an 'infinite bottom'.

CHAPTER 8   CONCLUSIONS

This thesis has investigated the competitive reasons for implementing new technologies and their impact on work, skills and identity. The maritime industry was chosen as the basis for empirical investigation in light of the technological advances that had followed trade liberalisation and the globalisation of the maritime labour market.

The empirical investigation suggests that global competition and the introduction of new technologies in the maritime sector have created new opportunities for businesses to rationalise costs and improve efficiencies. The inherent problems of regulation and enforcement in the global maritime industry, described as 'archetype of unbridled free-market capitalism' (Lillie, 2006: 1), allow businesses to adopt a 'race to the bottom approach' in their employment and training strategies (Sampson and Bloor, 2007) and general operating standards.

The findings, however, reveal significant mismatches between the competitive reasons to implement new technologies on ships (driven by safety and efficiency issues) and its (un)intended consequences on work, skills and identity of seafarers. From the workers' perspective global competition and new technology create an adverse impact on the workers' understanding about the profession. This is evident in the dissatisfaction and disengagement with work, low self esteem, job insecurity, a sense of disrespect, and perceived degradation of the profession on the whole. The thesis has systematically analysed and explained these issues at the level of the work situation, the market situation and life situation in the preceding chapter (Lockwood, 1989).

For many seafarers, more specifically the young ones, the incentive to pursue a career at sea has lost meaning, and their behaviour reflects a lack of interest in the job and occasionally, excessive dependence on technology. The idea of being micro-managed, interrogated and guided even for routine operations tends to upset the seafarers and induces tensions between ship's crew and shore staff. For older workers with years of experience and knowledge of the profession, it is also a question of integrity, pride and self respect as skilled professionals. This has led to a lower level of trust between employers and seafarers, increased tensions in ship-shore interface, and safety concerns within the maritime sector. It may even lead to

further erosion of skills if the early retirement of seafarers and their negative attitudes towards their jobs becomes a norm within the industry.

The shipping companies on the other hand are hard pressed to meet their competition requirements. Part of the problem is the nature of competition and the complex organisation of work driven by external demands, which do not always allow handing over control and relying on the seafarers for shipboard operations. In large part it is as the result of the globalisation of labour markets and access to cheap workers from competitive locations. The findings suggest that the employers are not always confident about the knowledge, skills and motivation levels of seafarers. Nevertheless, instead of addressing the problem through training and development, the employers chose to simplify the jobs and reduce the dependence on seafarers.

While the jobs on ships are being further simplified, the responsibility for operations has largely shifted to the shore side. The employers are convinced that shore based intensification and control are the best alternatives to the cost efficient management of ships. Nonetheless, intense control and a 'race to the bottom approach' is met with further resistance by the seafarers, either explicitly or implicitly, and added to the existing challenges of businesses. A vicious circle has emerged whereby the workers adopt a negative approach to work and a 'short-term' approach to the profession and the employers attempt to compensate for this by increasing the onus on shore based management and technological control. This would, though, likely lead to further degradation of the profession. To summarise, the use of new technologies to resolve competitive pressures on employers has led to unintended consequences that may exacerbate the problems that companies attempted to resolve through new technologies.

8.1 THEORETICAL CONTRIBUTION: THE DESKILLING EFFECT OF NEW TECHNOLOGIES

To a large extent, the findings coincide with the wider concepts of the deskilling thesis outlined in Chapter 2. The employers intend to reduce the dependence on seafarers and new technologies allow them to achieve their cost objectives. Nevertheless, the deskilling of workers, in this case, is not straightforward and it is certainly not 'control' and 'oppression' as pointed out by the earlier proponents (Winner, 1977, Braverman, 1974). The thesis has

shown that deskilling is driven by the wider opportunities and challenges of global competition.

Both market competition and global access of cheaper labour call for a review of the deskilling thesis. In a knowledge-driven economy, irrespective of the simplification of work the operating knowledge of computer based technologies is fundamentally important for the seafarers to work effectively with new technologies if the businesses are aimed at improving efficiencies and output. In some cases, this operating knowledge may become even more critical and hence demand highly qualified individuals on ships. Thus, complete replacement of skills with technology becomes an expensive and challenging affair. For this, a handful of high skilled seafarers are appointed to serve on ships.

In addition, deskilling does not always mean employing less skilled workers. Globalisation of maritime labour markets provides the opportunity to source educated workers at lower prices from competitive locations. The employers show no hesitation in employing educated workers so long as their low cost objectives are met, but this does not necessarily mean upskilling of workers. Indeed, even where the employers indicated an increased demand for technically skilled workers, the emphasis was that such skills could be obtained at competitive prices in non-established countries. Hence, the increased demand for skills does not necessarily result in improved wages and employment conditions of workers. It is rather off-set by globalization of labour markets and access to cheaper workers in non-established countries (see Annex 6 on wage differences between seafarers from established maritime nations and non-established countries). It is evident from the findings that the workers don't seem to benefit much from technological changes. Post-recession recent literature has identified this as a trend towards a high-skilled low-waged model of work (Brown *et al.*, 2011).

8.2 POLICY RECOMMENDATIONS

The study has highlighted a 'race to the bottom approach' in the employment, sourcing and training of seafarers as a result of global competition. The findings suggest that the employers, faced with intense competition pressure to reduce costs, are inclined towards employing seafarers from non-established countries with weak regulatory mechanism. At the same time, it was found that many employers view new technologies as a means to simplify and reduce the skilled jobs of seafarers. For instance, the employers asserted that satellite

navigation technologies have simplified the skilled job of seafarers earlier performed using experiential knowledge and skills. It is important to promote the training of seafarers in order to make effective use of technology and enhance safety at sea.

Various 'experiments' are underway in the maritime industry to resolve manpower issues by focusing on technical solutions. The IMO's e-navigation, a move to harmonise navigation standards in the areas of congested waters and high traffic density, is one such policy initiative. Similarly, a Dutch research project - 'Shore Support' - is based on the idea of establishing round- the- clock technical support at the shore end (in other words call centres) and introducing a new class of 'hybrid officers' equipped with both nautical and engineering skills to reduce the costs of operations by using flexible labour at sea (Wijnolst, 2011). Likewise, the international research project 'Lashing@Sea' is expected to change the crewing regulations by modifying the design of ships. Too often, the solutions to the problems are found in technical fixes. By contrast the notion of 'life situation' and the importance of profession in this research show that exclusive focus on technical solutions will have a negative effect on the retention and motivation of seafarers. In the bid to rationalise costs, the long term negative effects of new technologies on crew motivation and their perceived degradation of profession should not be ignored especially at the time when several policy initiatives are underway to retain good quality seafarers (for example IMO's 'Go to Sea' campaign).

In order to recruit and retain good quality seafarers, there is a need to acknowledge and promote the seafaring profession as a long term career. Due attention should therefore be paid to the training requirements and career aspiration of young seafarers. A short term approach to the profession as evident in the views of young seafarers will have a negative impact on the safe running of ships as would higher attrition for recruitment and training costs. Furthermore, the notion that seafarers engage well with technology, a common belief within the industry, should be viewed more critically. The research shows that in the absence of the recognition of seafaring as a long term career the seafarers are often disengaged with work and inclined towards unsafe work practices (for instance excessive dependence on technology) which may have serious consequences for the industry.

The concerns about reduced manning, work intensification and crew fatigue were consistently raised by the seafarers during the course of this study. These concerns have also

been raised in the policy area. The employers, on the other hand, seem convinced that the manpower and level of skills on ships can be comfortably reduced with technology. Occasionally it came to light that lack of sufficient manpower results in excessive dependence on technology to perform shipboard work. It is in the interest of maritime safety to review the manning requirements on ships with new technologies in the broader context of the challenges faced by the seafarers.

The thesis elucidates an ideological divide between the older seafarers and the young seafarers based on new technologies. The popular belief, as observed during the data collection, is that such digital divides are transient and as technology spreads more evenly and the older workers are phased out, the digital divide may soon disappear. This may not always be the case, however. The findings suggest that it is likely that in future the gaps between high skilled jobs and low skilled work at sea may intensify further with new technologies. This implies that those serving in higher ranks on ships will be provided with a higher degree of technical training. At the same time for operational work the unending search for cheaper labour in pursuit of profits may lead to geographic zones with relatively lower education and training standards and infrastructure. Thus, this divide may well last for a longer time than expected by policy makers. It should therefore not be ignored as a transient problem and dealt with in a serious manner.

Coinciding with this issue is the problem that many older seafarers face in operating new technologies. There is an implicit assumption at the shore end that new technologies are easy to use and hence do not require much training. It is important that policy makers see the magnitude of basic computer skills and take the issue more seriously, in order to avoid job losses among experienced seafarers.

Finally, assuming that the advancements in communication technologies continue, it is recommended that employers should invest at least a proportion of resources to improve the social conditions of the seafarers' onboard ships. Although few companies have moved towards installing satellite televisions, internet and broadband services for the crew members, it remains to be seen if the majority of the employers perceive it as an added expense or as a long term benefit to improve the living conditions of seafarers. Where implemented, the seafarers have been very grateful to their employers and as one young seafarer says – 'you feel a bit like you owe them something'.

8.3 FUTURE RESEARCH AGENDA

This thesis shed light on the issue of intense global competition resulting in the implementation of new technologies to improve business competitiveness and its implications for the work, skills and employment of seafarers. In so doing, the study relies on the views of a small sample of seafarers and companies. The findings are by no means exhaustive nor does the thesis claim to be a definitive assessment of new technologies, work and skills and identity. To this end it suggests further research is required in this area.

In understanding the behavioural responses of the workers at the three distinct levels of work situation, market situation and life situation the role of seafaring identity is pivotal to the analysis of data. It was found that the older seafarers with extensive work experiences exhibited a strong seafaring identity against those with limited work experience at sea. Thus work experience was used as the basis to explain the issue of seafaring identity in this study (see Annex 2C). This relationship between work experience and seafaring identity was, however, observed on the basis of a small sample of data from Indian seafarers.

Interestingly the above relationship was challenged in an interview with a young Angolan seafarer whose understanding of the seafaring profession was far stronger irrespective of his limited work experience at sea, when compared with some of the young seafarers interviewed in the private colleges in India. Similar perceptions about seafaring identity, although of slightly lesser magnitude, were noticed in the responses of several junior officers and young seafarers from the UK and other NECs such as Ghana and Bangladesh in their proclivity towards seafaring skills. The most apparent common denominator in all these cases was the participants undertaking training in a reputable maritime college within the UK. By contrast, young seafarers in the private training centres in India gave less importance to traditional seafaring skills. These seafarers were trained in private institutions where the training environment and techniques, including the views of training staff, reflected a strong free-market view in vocational education. Thus, in understanding the role of the seafaring identity the role of training institutions cannot be ignored. The literature discusses the importance of formal learning and training to the socialisation of skills and the professional identity of workers (see Fenwick, 2005, and Wenger, 1998 on *Communities of Practice*). There is therefore a need for further research to understand the issue of professional identity and its

impact on workers' responses to technological changes at work more widely in a multi-national context.

From a small sample of data of NEC seafarers it was found that these seafarers expressed slightly different concerns about new technology and its implications for their skills and employment. Their concerns highlighted the issue of discrimination and stagnant career opportunities in global shipping when competing in the global labour markets. The implications of economic rationalisation and new technologies may therefore generate myriad understandings and bring to light alternative issues when examined across other nationalities and cultures.

The views of ratings have been excluded in the study. In view of the implementation of labour saving technologies, particularly in low skilled operational jobs, future research needs to examine the implications of technologies on the ratings if we are to obtain an overall assessment of the impact of new technologies and the changes being instituted to shipboard work organisation and crew structures. In part this is important because past studies have persistently ignored the issues of ratings.

In answering the research questions there were some traces of positive relationships between new technologies and the work, skills and employment of seafarers. In certain trade sectors where market competition was based on product quality and safety (for example in the transport of oil and gases) relatively more experienced and better skilled workers were demanded than in the sectors of trade based on transactional relationships (for example container shipping companies). These relationships have been subject to investigation in past studies both within and outside the maritime sector. Its implications for skills and employment of workers are worthy of further investigation.

8.4 LIMITATIONS OF THE STUDY

To begin with the issue of limited funding and time constraints, a common problem which appears in most doctoral studies, was even more amplified in this case. This is because unlike most funded PhDs there was only a time frame of three years (including the nine months spent in the Diploma in Social Science Research Methods) to complete the study. Thus, at every stage during the course of study careful planning, organisation, self discipline and

negotiation played an important role in bringing this project to completion. A few other limitations are outlined below.

The majority of the fieldwork was conducted within the maritime colleges in the UK and India and hence the opportunity to visit ships for data collection was missed out. The data from shipboard interactions may have generated a direct insight into work based problems rather than relying solely on the views and perceptions of seafarers. For example on one occasion a shipmaster narrated how the superintendent from the office distracted him through telephone calls and emails whilst making an approach to the port. Subsequently he appeared convinced that his job as a shipmaster was not so much to manoeuvre the ship but that of 'a clerk attending to office calls and mails'. Gathering such vivid and enriched accounts through ship visits could have improved the quality of the data. Such rich data may have also brought to light the tensions onboard ships resulting from the ideological gaps between the seafarers from EMNs and NECs and its impact on the maritime safety (as many old seafarers warned of the unsafe work practices of the young seafarers from the NECs during the interviews). Equally, this first hand data may have also helped to validate the increase in administrative work and the extent of work intensification as claimed by many seafarers.

Onboard studies are, however, not without their problems. There were several issues such as problems of gaining access to ships, the confidentiality of shipboard data (more so because the study involves comparing the perceptions of the employers and the seafarers), and the practicalities of the resource and time constraints of spending time at sea. To a large extent the data losses from onboard visits were anticipated in advance and addressed during the research. This includes informal interviews with the participants, extensive field notes in the training colleges including recording simulator training exercises and review of the company training and employment policies.

The sampling of the employers represents only the upper strata of the shipping industry for methodological and practical reasons in Chapter 3. The findings are therefore unique to particular strata of global shipping and may not represent the employment conditions and skill demands in average companies.

Another limitation is that when comparing the employers and seafarers there were at least four cases where the seafarers were interviewed even though access to their employers

(shipping companies) could not be established. Nevertheless, the data from the four seafarers above does not show any significant disparities from the remaining samples of seafarers.

Finally, there is the danger that my 'inside' knowledge (as highlighted in Chapter 3) may have influenced the findings of the study. I have attempted to challenge my assumptions during every stage of the research. It may come as a surprise to the reader but on several occasions during the fieldwork my reflexive techniques of interviewing meant that the interviewees raised doubts about my seafaring background. As an ex-seafarer, spending time collecting data in the shipping companies was a unique experience and understanding the employers' perspective was revealing. The work intensification and commercial pressures faced by managers demonstrated that technology led restructuring and emerging work patterns also affected those at the shore end. Even during the writing-up stages I maintained the same critical approach to the research to avoid any prejudice. To that end, my non-seafaring colleagues at the Seafarers International Research Centre were extremely helpful in challenging my implicit understanding of the shipping industry. Nevertheless, it is possible that I may have interpreted or overlooked some aspects because of my background and 'seafaring identity' and any of these mistakes are mine and mine alone.

REFERENCES

Acemoglu, D. (1998) Why do new technologies complement skills? Directed technical change and wage inequality. *Quarterly Journal of Economics*, 113, 1055-1089.

Ackroyd, S. (1996) Organization contra organizations: Professions and organizational changes in the United Kingdom. *Organization Studies*, 18, 4, 599-621.

Adler, P. S. (1992) *Technology and the future of work.* New York: Oxford University Press.

Ala-Mutka, K. (2009) Fostering ICT Professionalism. IN INDUSTRY, E. C. E. A. (Ed.) *European e-Skill Conference 2009.* Brussels.

Alderton, P. (2009) *Port management and operation.* London: Informa.

Alderton, P. M. (2008) *Port management and operations.* London: Informa.

Alderton, T., Bloor, M., Kahveci, E., Lane, T., Sampson, H., Thomas, M., Winchester, N. & Zhao, M. (2004) *The Global Seafarer: Living and Working Conditions in a Globalized Industry.* Geneva: International Labour Organization.

Alderton, T. & Winchester, N. (2002) Globalisation and de-regulation in the maritime industry. *Marine Policy*, 26, 35-43.

Allen, P. (2009) Perceptions of technology at sea amongst British seafaring officers. *Ergonomics*, 52, 1206-1214.

Amin, A. (1994) *Post-Fordism,* Oxford: Blackwell.

Anderson, B. (2006) *Imagined communities: reflections on the origin and spread of nationalism.* London: Verso.

Anderson, P. (2005) *ISM Code : a practical guide to the legal and insurance implication,* London: LLP.

Atkinson, P., Coffey, A. & Delamont, S. (2003) *Key themes in qualitative research: continuities and changes.* Walnut Creek, Calif: AltaMira Press.

Bacon, F. (1878) *Novum organum,* Oxford: Clarendon Press.

Baird, A. (2002) Privatization trends at the World's Top-100 Ports. *Maritime Policy Management*, 29, 271-84.

Baird, A. (2006) Optimising the container transhipment hub location in northern Europe. *Journal of Transport Geography*, 14, 195-214

Baldry, C., Bain, P. & Taylor, P. (1998) 'Bright Satanic Offices': Intensification, Control and Team Taylorism. IN Thompson, P. & Warhurst, C. (Eds.) *Workplace of the Future.* London: MacMillan Press Ltd.

Barboza, D. (2010) After Suicides, Scrutiny of China's Grim Factories. *The New York Times.* New York.

Barton, H. & Turnbull, P. (2002) Labour Regulation and Competitive Performance in the Port Transport Industry: The Changing fortune of Three Major European Seaports. *European Journal of Industrial Relations*, 8, 133-56.

Bauman, Z. (2000) *Liquid modernity,* Cambridge: Polity Press.

Bell, D. (1974) *The Coming of Post-Industrial Society.* London: Heinemann Educational.

Berardi, F. (2009) *Soul at Work.* Mass: MIT Press.

Bergantino, A. & Marlow, P. B. (1998) Factors influencing the choice of flag: empirical evidence. *Maritime Policy Management*, 25, 157-174.

Beynon, H. & Nichols, T. (2006) *The Fordism of Ford and modern management : Fordism and post-Fordism,* Northampton: MA Edward Elgar Pub.

Bijker, W. E., Hughes, T. P. & Pinch, T. J. (1987) *The social construction of technological systems : new directions in the sociology and history of technology* Cambridge, MA; London: MIT Press.

Blauner, R. (1964) *Alienation and freedom : the factory worker and his industry.* Chicago: University of Chicago Press.

Bordogna, L. & Perdisini, R. (1999) Collective Bargaining, Employment Security and Firm Competitiveness in Italy. *International Labour Organisation Project on Collective Bargaining, Employment Protection/Creation and Competitiveness.*

Braverman, H. (1974) *Labor and monopoly capital : the degradation of work in the twentieth century.* New York ; London: Monthly Review Press.

Breen, R. & Rottman, D. B. (1995) *Class stratification: a comparative perspective,* New York, Harvester: Wheatsheaf.

Broeze, F. (2001) The Muscles of Empire: Indian Seamen and the Raj, 1919-1939 *Indian Economic and Social History Review,* 18, 43-67.

Brooks, M. R. (2004) The Governance Structure of Ports. *Review of Network Economies,* 3.

Brown, P., Lauder, H. & Ashton, D. (2007) Higher Education and the New Realities of Global Capitalism. In Epstein, D., Boden, R., Deem, R., Rizvi, F. & Wright, S. (Eds.) *Geographies of Knowledge, Geometries of Power: Higher Education in the 21st Century.* London: Routledge.

Brown, P., Lauder, H. & Ashton, D. (2011) *The Global Auction: The Broken Promises of Education, Jobs and Incomes.* Oxford: Oxford University Press.

BSA (2002) BSA Statement of Ethical Practice. The British Sociological Association. Available: http://www.britsoc.co.uk/equality/ [Accessed 20th Dec 2007]

Burawoy, M. (1979) *Manufacturing consent : changes in the labor process under monopoly capitalism.* Chicago; London: University of Chicago Press.

Burgess, R. G. (1984) *In the Field: An Introduction to Field Research.* London: Allen and Unwin.

Carlisle, R. (1981) *Sovereignity for Sale: the origins and evolution of the Panaminian and Liberian flags of convenience.* Annapolis: Naval Institute Press.

Chang, Ha-Joon (2007) *Bad Samaritans: The Guilty Secrets of Rich Nations and The Threat to Global Prosperity.* London: Random House.

Chin, C. B. N. (2008) Labour Flexibilization at Sea 'MINI UNITED NATIONS' CREW ON CRUISE SHIPS. *International Feminist Journal of Politics,* 10, 1-18.

Chinoy, E. (1955) *Automobile Workers and the American Dream.* New York: Doubleday.

Cimoli, M. & Katz, J. (2003) Structural reforms, technological gaps and economic development: A Latin American Perspective. *DRUID-Nelson and Winter conference.* Aalborg, 12-15 of June 2001, United Nations.

Cockburn, C. (1983) *Brothers: Male Dominance and Technological Change.* London: Pluto Press.

Cockcroft, A.N., (2004) *A guide to the collision avoidance rules: International Regulations for Preventing Collisions at Sea,* Amsterdam: Elsevier.

Coffey, A. & Atkinson, P. (1994) *Occupational socialization and working lives.* Aldershot; Brookfield, Vt: Avebury.

Comtois, C. (1994) The evolution of containerization in East Asia. *Maritime Policy & Management,* 21, 195-205.

Conti, J. A. & O'Neil, M. (2007) Studying Power: Qualitative Methods and the Global Elite. *Qualitative Research,* 7, 62-82.

Creswell, J. W. (1998) *Qualitative inquiry and research design: choosing among five traditions.* Thousand Oaks, Calif.: Sage Publications.

Denzin, N. K. (1989) *The Research Act: A theoretical introduction to sociological methods,* Englewood Cliffs, N.J.: Prentice Hall.

Denzin, N. K. & Lincoln, Y. S. (1994) Introduction: Entering the Field of Qualitative Research. In Lincoln, N. K. (Ed.) *Handbook of Qualitative Research.* Thousand Oaks, CA: Sage.

Denzin, N. K. & Lincoln, Y. S. (1998) *Collecting and interpreting qualitative materials*. Thousand Oaks, CA ; London: Sage Publications.

Desai, D. (1940) *Maritime Labour in India*, Bombay.

DeSombre, E. R. (2006) *Flagging Standards: Globalization and Environmental, Safety and Labor Regulations at Sea*, Cambridge MA: MIT Press.

Dirks, J. (2001) Decision Making in the International Maritime Organization – The case of the STCW 95 Convention, European Consortium for Political Research (ECPR) 2001 Workshop paper, downloadable from: http://www.essex.ac.uk/ECPR/events/jointsessions/paperarchive/grenoble/ws12/dirks. pdf.

Drucker, P. (1986) The Changed World Economy. *Foreign Affairs*, 64, 768-91.

Eason, C. (2008) IMO sets deadline for installation of ECDIS. *Lloyd's List*. London.

EC (2005) Final Report - The Application of Competition Rules to Liner Shipping. European Commission.

Edwards, R. (1979). *Contested terrain: The transformation of the workplace in the twentieth century*. New York: Basic Books.

Ehrbeck, T., Henke, N. & Kibasi, T. (2010) The emerging market in health care innovation. *Health Care: Strategy and Analysis*. London, McKinsey Quarterly.

Erikson, R., Goldthorpe, J. H. & Portocarero, L. (1979) Intergenerational Class Mobility in Three Western European Societies: England, France and Sweden. *The British Journal of Sociology*, 30, 415-441.

Fairplay (2010) Squeezed Out Under Pressure. Fairplay, [online] Available at: <http://www.fairplay.co.uk/login.aspx?reason=denied_empty&script_name=/secure/d isplayMagArticles.aspx&path_info=/secure/displayMagArticles.aspx&articlename=fp sw20100812003sw> [Accessed 12th Aug 2010].

Faridany, E. (1972) *LNG marine operations and market prospects for liquefied natural gas*, London: Economist Intelligence Unit.

Farrell, L. & Fenwick, T. (2007) *World yearbook of education: educating the global workforce : knowledge, knowledge work and knowledge workers* London, New York: Routledge.

Fenwick, T. (2005) Taking stock. A review of research on learning in work 1999–2004. *Conference on Researching Work and Learning*. Sydney, Australia, 2005.

Flick, U. (2002) *An introduction to qualitative research*, London: Sage.

Fredriksson, T. (2009) Information Economy Report 2009: Trends and Outlook in Turbulent Times. New York, UNCTAD.

Freidson, E. (1973) *Professionalism Reborn*. Cambridge: Polity Press.

Freire, P. (2005) *Education for critical consciousness*. London: Sheed & Ward.

Frey, J. H. & Oish, S. M. (1995) *How to conduct interviews by telephone and in person*. Thousand Oaks: Sage.

Fuller, R. & Petch, A. (1995) *Practitioner research : the reflexive social worker*, Buckingham ; Philadelphia: Open University Press.

Gadamer, H. G. (1975) *Truth and Method*. New York: Seabury Press.

Galbraith, J. K. (1962) *The affluent society*. Harmondsworth: Penguin.

Gallie, D. (1991). Patterns of skill change: Upskilling, deskilling or the polarization of skills? *Work, Employment & Society*, 5(3), 319-351.

George, B. (1960) *Lloyd's Register of Shipping*. 1760-1960.

Gereffi, G. & Fernandez-Stark, K. (2010) The Offshore Services Value Chain - Developing Countries and the Crisis. Washington: The World Bank.

Gereffi, G., Humphrey, J. & Sturgeon, T. (2005) The governance of global value chains. *Review of International Political Economy*, 12, 78-104.

Goldin, C. & Katz, L. F. (2008) *The race between education and technology,* Cambridge, MA: Belknap Press of Harvard University Press.

Goldthorpe, J., Lockwood, D., Bechhofer, F. & Platt, J. (1968) *The affluent worker: industrial attitudes and behaviour.* Cambridge: Cambridge University Press.

Goldthorpe, J. H. (1980) *Social mobility and class structure in modern Britain.* Oxford: Clarendon Press.

Greenbaum, J. (1998) The Times are Changing: Dividing and Recombining Labour Through Computer Systems. In Thompson, P. & Warhurst, C. (Eds.) *Workplaces of the Future.* London: MacMillan Press Ltd.

Guba, E. & Lincoln, Y. (1989) *Fourth Generation Evaluation,* Newbury Park: Sage.

Gubrium, J. F. & Holstein, J. A. (1997) *The new language of qualitative method,* New York ; Oxford: Oxford University Press.

Gupta, S. (2006) Financial services factory. *Journal of financial transformation: The Capco Institution.*

Hamilton, R. & Wright, J. (1986) *The State of the Masses.* New York: Aldine.

Hammersley, M. & Atkinson, P. (1995) *Ethnography: Principles in practice,* London: Routledge.

Harlaftis, G. & Theotokas, J. (2002) Maritime Business During the 20th Century: Continuity and Change. IN Gramemenos, C. T. (Ed.) *The Handbook of Maritime Economics and Business.* London: Informa Professional.

Harris, J. R. (1998) *Industrial Espionage and Technology Transfer : Britain and France in the Eighteenth Century.* Ashgate: Aldershot.

Harvey, D. (2000) *Spaces of Hope.* Edinburgh: Edinburgh University Press.

Harvey, D. (2005) *A brief history of neoliberalism,* Oxford: Oxford University Press.

Harvey, D. (2010) *The Enigma of Capital: And the Crisis of Capitalism,* London: Profile Books Limited.

Head, S. (2003) *The New Ruthless Economy,* Oxford: Oxford University Press.

Hirschhorn, L. (1984). *Beyond mechanization: Work and technology in a postindustrial age.* Cambridge, MA: MIT Press.

Hirst, P. & Thompson, G. (1999) *Globalization in Question,* Cambridge: Polity Press.

Horck, J. (2007) The ISM Code versus the STCW Convention – MET challenges convene? In: Dmitriy Zhukov (Ed.) (2007). Proceedings of the 8th Annual General Assembly and conference of the International Association of Maritime Universities (IAMU) (AGA 8), pp. 217-232. Odessa, Ukraine: Odessa Maritime Academy. Presented: At the IAMU AGA 8, Odessa Ukraine, 17-19 September 2007

Huws, U. (2006) What Will We Do?: The Destruction of Occupational Identities in the 'Knowledge-Based Economy'. Monthly Review.

Huws, U. (2006) Fixed, Footloose, or Fractured: Work, Identity, and the Spatial Division of Labor in the Twenty-First Century. Monthly Review.

IMO, (1995) IMO Performance Standards for Shipborne Global Positioning System (GPS) Receiver Equipment. *A19/ Res. 819.* Adopted 23rd Nov 1995, London: IMO.

Jackall, R. (1978) *Workers in a Labyrinth: Jobs and Survival in a Bank Bureaucracy.* Osmun: Allenheld.

James, P. & Mulcahy, D. (1998) What Counts as Competency? Views of Training Managers. *Great News, 2.*

Janesick, V. (2000) The Choreography of Qualitative Research Design. IN Denzin, N. K. & Lincoln, Y. S. (Eds.) *Handbook of Qualitative Research.* Thousand Oaks, CA: Sage.

Jasso, G., Wadhwa, V., Gereffi, G., Rissing, B. & Freeman, R. (2010) How Many Highly Skilled Foreign-Born are Waiting in Line for US Legal Permanent Residence? *International Migration Review, 44, 477-498.*

Jeremy, D. (1977) Damming the Flood - British Government Efforts to Check The Outflow of Technicians and Machinery. *Business History Review*, L1, 1780-1843.

Johansson, J. & Abrahamsson, L. (2006) From Grounded Skills to Sky Qualifications: A Study of Workers Creating and Recreating Qualifications, Identity and Gender at an Underground Iron Ore Mine in Sweden. *The Journal of Industrial Relations*, 48, 657-676.

Kahveci, E. & Theo, N. (2006) *The other car workers : work, organisation and technology in the maritime car carrier industry*, Basingstoke ; New York: Palgrave Macmillan.

Kemp, J. (2011) Coastal Navigation in the Mid-20th Century. *Journal of Navigation*, 64, 533-550.

Kerr, C., Dunlop, J. T., Harbison, F. & Myers, C. A. (1962) *Industrialism and industrial man : the problems of labor and management in economic growth*. London: Heinemann.

Kezar, A. (2003) Transformational Elite Interviews: Principles and Problems. *Qualitaitve Inquiry*, 9, 395-415.

King, J. (2001) Technology and the course of shipping. *Ocean & Coastal Management*, 44, 567-577.

Klikauer, T. (2003) Human Resources in German Maritime Industries: Back-Sourcing and Ship-Management. *Human Resource Management*, 14, 544 – 558.

Kline, R. & Pinch, T. (1999) *The Social construction of technology* In Wajcman, D. M. A. J. (Ed.) The Social Shaping of Technology. Buckingham: Open University Press.

Knudsen, F. (2009) Safety Science. *Paperwork at the service of safety? Workers' reluctance against written procedures exemplified by the concept of 'seamanship'*, 47, 295-303.

Kolding, M., Robinson, K. & Ahorlu, M. (2009) Post Crisis: e-Skills Are Needed to Drive Europe's Innovation Society. *IDC Working Paper:* IDC.

Kopacz, Z., Morgas, W. & Urbanski, J. (2003) The Ship's Navigation Function, Ship's Navigation Processes, and Ship's Navigational Information. *Journal of Navigation*, 56.

Korte, W. B., Braun, N. & Gareis, K. (2007) Benchmarking Policies on Multi-Stakeholder Partnerships for e-skills in Europe. *Behchmarking report eSkills Policy*. Brussels, European Commission.

Korte, W. B., Hüsing, T., Cattaneo, G. K., M & Lifonti, R. (2010) Monitoring e-Skills Demand and Supply in Europe: Current Situation, Scenarios, and Future Development Forecasts until 2015. Brussels: European Commission.

Kumar, S. & Hoffman, J. (2002) Globalization: The Maritime Nexus. In Gramemenos, C.T. (Ed.) *The Handbook of Maritime Economics and Business*. London: Informa Professional.

Lane, T., Obando-Rojas, B., Wu, B. & Tasiran, A. (2002) Crewing the International Merchant Fleet. *Lloyds Register-Fairplay Ltd:* Surrey.

Lawrence, S. A. (1972) *International sea transport : the years ahead.* Lexington, Mass: Lexington Books.

Leadbeater, C. (1999) *Living on thin air : the new economy.* London: Viking.

Leggate, H. (2004) The Future Shortage of Seafarers: Will it become a Reality? *Maritime Policy and Management*, 31, 3-13.

Leggate, H. & McConville (2002) The Economics of Seafaring Labour Market. In Gramemenos, C.T. (Ed.) *The Handbook of Maritime Economics and Business*. London: Informa Professional.

Leitch, S. (2006) LEITCH Review of Skills: Prosperity for all in the global economy. Final Report.

Lewarn, B. (2000) Seafarer Training - Does the System Defeat Competence? Launceston Australian Maritime College.

Lim, S. (1998) Economies of Scale in Container Shipping, *Maritime Policy and Management*, 25, 361-73.

Lockwood, D. (1989) *The blackcoated worker: a study in class consciousness* Oxford: Clarendon Press.

Maanen, M. V. (1997) *Researching Lived Experience: Human Science for an Action Sensitive Pedagogy*. New York: Suny Press.

MacKenzie, D. & Wajcman, J. (1999) *The social shaping of technology*, Buckingham: Open University Press.

Magdoff, F. & Magdoff, H. (2004) Disposable Workers: Today's Reserve Army of Labor. New York: Monthly Review.

Marlow, P. B. & Paixao, A. C. (2003) Fourth generation ports - a question of agility? *International Journal of Physical Distribution & Logistics Management*, 33, 355-376.

Marx, K. (1867) *Capital Volume 1*. New York: Penguin Books.

Mason, J. (2002) *Qualitative researching*. London, Sage.

Mayo, E. (1960) *The human problems of an industrial civilization*, New York Viking Press.

McDougall, P. (2009) IBM Offers to Move Laid Off Workers to India. *Information Week.*

McLaughlin, J., & Webster, A., (1998) Rationalising knowledge: IT systems, professional identities and power, *The Sociological Review*, 46, 4, 781-802.

McLoughlin, I., & Clark, J. (1994). *Technological change and work*. Philadelphia: Open University Press.

Milkman, R. (1998) The New American Workplace: High Road or Low Road? In Thompson , P. & Warhurst, C. (Eds.) *Workplace of the Future*. London: MacMillan Press.

Milkman, R., & Pullman, C. (1991). Technological change in an auto assembly plant: The impact on workers' tasks and skills. *Work and Occupations*, 18(2), 123-147.

Miller, C. (1995) In-depth Interviewing by Telephone: Some Practical Considerations. *Evaluation and Research in Education*, 9, 29-39.

Mills, C. W. (1967) *The sociological imagination.* London: Oxford University Press.

Mitroussi, K. (2004) The Ship Owners' Stance on Third Party Ship Management: an empirical study. *Maritime Policy and Management*, 31, 31-45.

Morison, S. E. (1979) *The Maritime History of Massachusetts Boston* Boston; New York: The Universide Press Cambridge.

Mulcahy, D. (2000) Turning the contradictions of competence: competency-based training and beyond. *Journal of Vocational Education and Training*, 52, 259-280.

Nelson, R. & Winter, S. G. (1982) *An Evolutionary Theory of Economic Change*. Cambridge: Harvard University Press.

Notteboom, T. (2002) Consolidation and Contestability in the European Container Handling Industry. *Maritime Policy and Management*, 29, 257-69.

Pawar, K. & Shakesheff, K. (2010) Project BioPharm 2020. Nottingham, Research Councils UK (PCUK).

Perez, C. (2002) *Technological Revolutions and Financial Capital. The Dynamics of Bubble and Golden Ages*. Cheltenham: Edward Elgar.

Peters, H. J. F. (2001) Developments in Global Seatrade and Container Shipping Markets: their effects on the Port Industry and Private Sector Involvement. *International Journal of Maritime Economics*, 3, 3-26.

Peters, T. (1989) *Thriving on chaos : handbook for a management revolution*. London: Macmillan.

Piore, M. & Sabel, C. F. (1984) *The Second Industrial Divide: Possibilities for Prosperity*, New York: Basic Books.

Piva, M., Santarelli, E. & Vivarelli, M. (2005) The Skill bias effect of technological and organisational change: Evidence and policy implications. *Research Policy* 34, 141 - 157.

Punch, M. (1986) *The politics and ethics of fieldwork.* Newbury Park, CA: Sage.

Reinert, E. (2008) *How Rich Countries Got Rich and Why Poor Countries Stay Poor.* London: Constable and Robinson Ltd.

Richards, D. (1996) Elite Interviewing: Approaches and Pitfalls. *Politics,* 16, 119-124.

Ritzer, G. (1998) *The MacDonaldisation Thesis.* London: Sage.

Rodger, N. A. M. (1986) *The Wooden World: an anatomy of the Georgian navy.* New York, London: Norton Paperback.

Rojas, B. O. (2002) SCTW-95: A Guide for Seafarers. Cardiff: Seafarers International Research Centre (SIRC), Cardiff University.

Rubin, H. & Rubin, I. S. (2005) *Qualitative interviewing: the art of hearing data.* Thousand Oaks: Sage Publications.

Sampson, H. (2004) Romantic Rhetoric, Revisionist Reality: the effectiveness of regulation in maritime education and training. *Journal of Vocational Education and Training* 56, 244-267.

Sampson, H. & Bloor, M. (2007) When Jack Gets out of the Box: The Problems of Regulating a Global Industry. *Sociology,* 41, 551-569.

Sampson, H. & Bloor, M. (2009) Regulatory Enforcement of labour standards in an outsourcing industry. *Work, Employment and Society,* 23, 711-726.

Sampson, H. & Wu, B. (2003) Compressing Time and Constraining Space: The Contradictory Effects of ICT and Containerization on International Shipping Labour. *International Review of Social History,* 48, 123-152.

Sawchuk, P. (2006) 'Use-Value' and the Re-thinking of Skills, Learning and the Labour Process. *Journal of Industrial Relations,* 48, 593-617.

Sayer, A. (1992) *Method in Social Science,* London, Routledge.

Seale, C. (2004) *Qualitative research practice,* London ; Thousand Oaks, Calif., SAGE.

Seidman, I. (1998) *Interviewing as Qualitative Research: A guide of researchers in education and social science.* New York: Teachers College Press.

Selhofer, H. (2009) A Sectoral e-Business Watch study by empirica GmbH. . Bonn/Brussels. *Impact study No. 05/2009.* Bonn/Brussels., European Commission.

Sennett, R. (1998) *The corrosion of character : the personal consequences of work in the new capitalism,* New York: W.W. Norton.

Serck-Hanssen, C. (1997) The Construction of Distance and Segregation onboard Ships with mixed crew. Unpublished manuscript for a speech presented at the 4th International Symposium on Maritime Health, Oslo, June 1997.

Shuy, R. (2001) In-person versus telephone inter- viewing. In Holstein, J. G. J. (Ed.) *Handbook of interview research: Context and method(Eds.), (pp. 537–555.* Thousand Oaks, Calif. ; London: Sage.

Silver, B. J. (2003) *Forces of Labor: Workers' Movements and Globalization since 1870,* Cambridge: Cambridge University Press.

Simpson, I. H. (1989) The Sociology of Work: Where Have the Workers Gone? *Social Forces,* 67, 563-81.

Sletmo, G. K. (2001) The End of National Shipping Policy? A Historical Perspective on Shipping Policy in a Global Economy. *International Journal of Maritime Economics,* 4, 333-350.

Sletner, T. C. (2000) Quality system for the implementation of STCW-95 in higher maritime education in Norway. *Maritime Policy and Management,* 27, 89-10.

Smith, A., Allen, P. & Wadsworth, E. (2006) Seafarers Fatigue: The Cardiff Research Program. Centre for Occupational and Health Psychoogy, Cardiff University.

Smith, C. & Meiksins, P. (1995) System, Society and Dominance Effect in Cross-National Organisational Analysis. *Work, employment and society*, 9, 241-67.

Spradley, J. (1979) *The ethnographic interview*. New York: Rinehart and Winston.

SRA, (2003) SRA Ethical Guidelines: Social Research Association. Available at: http://www.the-sra.org.uk [Accessed 20th Dec 2007].

Stinchcombe, A. (1959) Bureaucratic and Craft Administration of Production: A Comparative Study. *Administrative Science Quarterly*, 4, 168-87.

Stopford, M. (1988) Yard Capacity – is it enough to meet future needs? *Fairplay*.

Stopford, M. (1997) *Maritime economics*, London ; New York: Routledge.

Stratton, D. (1994) Examining the Revision of the STCW Convention – Working towards more effective manning and training *Proceedings of a Seminar on Prevent Disaster and Maximize Environmental Protection by Optimising Ship Safety*. IIR Limited.

Talley, W. K. (2009) *Port Economics*. London, New York: Routledge.

Tamvakis, M. (2002) Energy Economics and Trade. In Grammenos, C. T. (Ed.) *The Handbook of Maritime Economics and Business*. London, Informa Professional.

Tate, J. (2001) National Varieties of Standardization. In Hall, P. A. & Soskice, D. (Eds.) *Varieties of Capitalism: the institutional foundation of comparative advantage*. Oxford: Oxford University Press.

Tausig, J. E. & Freeman, E. W. (1988) The Next Best Thing to Being There: Conducting the Clinical Research Interview by Telephone. *American Journal of Orthopsychiatry*, 58, 418-27.

Taylor, P. & Bain, P. (2005) 'India calling to the far away towns': the call centre labour process and globalization. *Work, employment and society*, 19, 261-82.

Thompson, E. P. (1991) *The making of the English working class*. London: Gollancz.

Thompson, P. & Warhurst, C. (1998) *Workplaces of the future*. Basingstoke: Macmillan Business.

Todd, D. (1985) *The world shipbuilding industry*. Croom Helm

Toffler, A. (1970) *Future shock*. London: Bodley Head.

Tsamourgelis, I. (2009) Selective replacement of national by non-national seafarers in OECD countries and the employment function in the maritime sector. *Maritime Policy and Management*, 36, 457-468.

Turnbull, P. (2000) Contesting Globalisation on the Waterfronts. *Politics and Society*, 28, 367-91.

Uden, S. (2010) Our biggest threat: skill shortages. *The Financial Times*.

UNCTAD (2008) Maritime Transport Review. UNCTAD.

UNCTAD (2009) Maritime Transport Review. UNCTAD.

Vickers, D. & Walsh, V. (1999) Young Men and the Sea: The Sociology of Seafaring in Eighteenth Century Salem, Massachusetts. *Social History*, 24, 17-39.

Vorbach, J. E. (2001) The Vital Role of Non-Flag State Actors in the Pursuit of Safer Shipping. *Ocean Development & International Law*, 32, 27-42.

Vulfovich, B. (2007) *Fundamental navigation*. Murmansk State Technical University, 3, 109-145.

Wadhwa, V., Rissing, B., Gereffi, G., Trumpbour, J. & Engardio, P. (2008) Can India and China Cure the Global Pharmaceutical Market? *The Globalization of Innovation: Pharmaceuticals*. Duke University.

Wajcman, J. (2002) Addressing Technological Change: The Challenge to Social Theory. *Current Sociology*, 50, 347-63.

Wallace, F. W. (1924) *Wooden Ships and Iron Men: The story of the square-rigged merchant marine of British North America, the ships, their builders and owners, and the men who sailed them*. London: Hodder and Stoughton.

Wallace, M. & Kalleberg, A. L. (1982) Industrial Transformation and the Decline of Craft: The Decomposition of Skill in the Printing Industry, *American Sociological Review*, 47, 307-24.

Walters, D. (2009) Supply chains and best practice in the management of health and safety at sea. *SIRC Symposium*. Cardiff, SIRC Cardiff University.

Weber, M. (1968) *Economy and society: an outline of interpretive sociology. Berkely; Los Angeles; London: University of California Press*.

Webster, E., Lambert, R. & Beziudenhout, A.(2008) *Grouding Globalization: Labour in the Age of Insecurity*. Oxford: Blackwell Publishing.

Wenger, E. (1998) *Communities of practice : learning, meaning, and identity*. Cambridge: Cambridge University Press.

Wijnolst, N. (2011) Willingness to change is key to progression. *Lloyd's List*. London.

Wilkinson, B. (1983) *The* Shop Floor Politics *of New Technology*. London: Heinemann Educational

Winner, L. (1977) *Autonomous Technology: Technics-Out-of-Control as a Theme in Political Thought*. Cambridge: MIT Press.

Winner, L. (1999) Do artifacts have politics? In Wajcman, D. M. A. J. (Ed.) *The Social shaping of Technology*. Philadelphia: Open University Press.

Wood, S. (1982) *The Degradation of Work? Skill, Deskilling, and the Labour Process*. London: Hutchinson

Wooler, R. G. (1975) *Marine transportation of LNG [liquefied natural gas] and related products*. Cambridge: Md Cornell Maritime Press.

Worldbank (2001) Worldbank Port Reform Toolkit. 2nd ed. Washington: The World Bank

Zimbalist, A. (1979) *Case Studies in the Labour Process*. New York: Monthly Review.

Zuboff, S. (1988) *In the Age of the Smart Machine*. Oxford: Heinemann.

ANNEX-1A INTERVIEW GUIDE - EMPLOYERS

General
Background
Role within the company

Global Competition
Nature of competition within the shipping industry
Changes to business strategies with global competition
Main challenges as a result of competition

Role of technology
Competitive reasons to implement new technologies

Nature of work
Benefits of implementing new technologies
Challenges as a result of new technologies
Changes to work as a result of new technologies

Training and skills
Changing demand of skills with new technologies
Difficulties in obtaining seafarers with required skills
The importance of technology in seafarers training and skills

Labour sourcing and employment policies
Main factors to consider in crew sourcing strategies
Changes to labour sourcing as a result of global competition
The level of skills of seafarers from new countries
Career progression opportunities for seafarers

In closing
New technologies likely to be introduced in near future including reasons
Additional information

ANNEX-1B INTERVIEW GUIDE - SEAFARERS

General

Background

Role within the company

Nature of business

Nature of competition within the shipping industry

Changes to company policies and strategies in recent years due to global competition

Main challenges faced on ships as a result of global competition

Role of technology

Main reasons for companies to implement new technologies

Nature of work

Benefits of new technologies in shipboard work

Challenges faced on ships as a result of new technologies

Changing nature of work as a result of new technologies (Hint: safety, efficiency)

Training and skills

Changing skill requirements on ships with new technologies (core skills)

The importance of traditional skills with new technologies

The role of technology in training and skills

Labour sourcing and employment policies

Comments about crew sourcing strategies

Changes to labour sourcing strategies in recent years

The level of skills and competencies of seafarers from new countries

Career progression opportunities at sea and ashore

In closing

New technologies likely to be introduced in near future including reasons

Additional information

ANNEX-2A PARTICIPANT LIST - SEAFARERS

Code	Total seafaring experience (years)	Rank	Rank category*	Nationality
M1	22	Captain	Old Seafarer	Indian
M2	24	Captain	Old Seafarer	Indian
3/O.1	8	3rd officer	Mid-career Seafarer	Indian
3/O.2	7	3rd officer	Young seafarer	Indian
3/O.3	7	3rd officer	Young seafarer	Indian
M3	17	Captain	Old Seafarer	Indian
M4	21	Captain	Old Seafarer	Indian
D.C 1	2	Apprentice	Young seafarer	Indian
D.C 2	2	Apprentice	Young seafarer	Indian
3/O.4	4	3rd officer	Young seafarer	Indian
M5	16	Captain	Old Seafarer	Indian
M6	17	Captain	Old Seafarer	Indian
M7	18	Captain	Old Seafarer	Indian
2/O.1	9	2nd Officer	Mid-career Seafarer	Indian
M8	25	Captain	Old Seafarer	Indian
C/O.1	16	Chief Officer	Old Seafarer	Indian
C/O.2	15	Chief Officer	Old Seafarer	Indian
2/E.1	11	2nd Engineer	Old Seafarer	Indian
2/O.2	7	2nd Officer	Young seafarer	Indian
M9	17	Captain	Old Seafarer	Indian
M10	22	Captain	Old Seafarer	Indian
C/O.3	16	Chief Officer	Old Seafarer	British
2/O.3	6	2nd Officer	Young seafarer	Indian
3/O.5	11	3rd officer	Old Seafarer	Ghana
2/O.4	7	2nd Officer	Young seafarer	Indian
2/O.5	14	2nd Officer	Old Seafarer	Nigeria
C/O.4	16	Chief Officer	Old Seafarer	Indian
C/E.1	24	Chief Engineer	Old Seafarer	British
2/O.6	9	2nd Officer	Mid-career Seafarer	Bangladeshi
C/O.5	16	Chief Officer	Old Seafarer	Indian
C/O.6	17	Chief Officer	Old Seafarer	Indian
C/O.7	16	Chief Officer	Senior officer	Indian
2/O.7	8	2nd Officer	Mid-career Seafarer	British
3/O.6	6	3rd officer	Young seafarer	Angolan
3/O.7	7	3rd officer	Young seafarer	Indian
2/O.8	9	2nd Officer	Mid-career Seafarer	British
M11	16	Captain	Old Seafarer	Indian
M12	20	Captain	Old Seafarer	Indian
D.C 3	6	Apprentice	Young seafarer	British
2/O.9	8	2nd Officer	Mid-career Seafarer	Indian
C/E.2	17	Chief Engineer	Old Seafarer	Indian

ANNEX-2B PARTICIPANT LIST - EMPLOYERS

Code	Designation	Code	Designation
TM1	Training Manager	OM1	Operations Manager
TM2	Training Manager	OM2	Operations Manager
TM3	Training Manager	OM3	Operations Manager
TM4	Training Manager	TM1	Technical Manager
TM5	Training Manager	OM4	Operations Manager
TM6	Training Manager	TD1	Technical Director
CM1	Crewing Manager	FD1	Fleet Director
TM7	Training Manager	HRM1	Human Resource Director
TM8	Training Manager	MD1	Managing Director
TM9	Training Manager	FM1	Senior Fleet Manager
TM10	Training Manager	COM1	Commercial Manager
TM11	Training Manager	OM5	Operations Manager
TM12	Training Manager	TM2	Technical Manager
TF1	Training Faculty	OM6	Operations Manager
TF2	Training Faculty	OM7	Operations Manager
TM13	Training Manager	FD2	Fleet Director
TM14	Training Manager	QM1	Quality Manager
TM15	Training Manager	TD2	Technical Director
TM16	Training Manager	S&P1	Standards and Procedures Manager
TF3	Training Faculty	QM2	Quality Manager
TF4	Training Faculty	QM3	Quality Manager
TF5	Training Faculty	CM2	Crewing Manager
TM17	Training Manager	OM8	Operations Manager

ANNEX-3 SEAFARERS WORK EXPERIENCE CALCULATION TABLE

Description of Activity	Total months	Years at sea	Rank	Work experience	Categories
Total sea service as apprentice^	30		Apprentice	0-7 years	Young Seafarers
Total vacations as apprentice	12		Apprentice	0-7 years	Young Seafarers
Certificate of competency Class 3	12	5	Junior officer	0-7 years	Young Seafarers
Sea service	6	5	Junior officer	0-7 years	Young Seafarers
Vacations	3	5	Junior officer	0-7 years	Young Seafarers
Sea service	6	6	Junior officer	0-7 years	Young Seafarers
Vacations	3	6	Junior officer	0-7 years	Young Seafarers
Sea service	6	7	Junior officer	0-7 years	Young Seafarers
Vacations	3	7	Junior officer	0-7 years	Young Seafarers
Certificate of competency Class 2**	12	8	Junior or senior officer	7-10 years	Mid-career Seafarers
Sea service	6	8	Junior or senior officer	7-10 years	Mid-career Seafarers
Vacations	3	9	Junior or senior officer	7-10 years	Mid-career Seafarers
Sea service	6	9	Junior or senior officer	7-10 years	Mid-career Seafarers
Vacations	3	9	Junior or senior officer	7-10 years	Mid-career Seafarers
Sea service	6	10	Junior or senior officer	7-10 years	Mid-career Seafarers
Vacations	3	10	Junior or senior officer	7-10 years	Mid-career Seafarers
Certificate of competency Class 1***	3	10	Junior or senior officer	7-10 years	Mid-career Seafarers
Sea service	6	11	Senior officer	10-18 years	Old Seafarers
Vacations	4	11	Senior officer	10-18 years	Old Seafarers
Sea service	6	12	Senior officer	10-18 years	Old Seafarers
Vacations	4	12	Senior officer	10-18 years	Old Seafarers
Sea service	6	12	Senior officer	10-18 years	Old Seafarers
Vacations	4	13	Senior officer	10-18 years	Old Seafarers
Sea service	6	13	Senior officer	10-18 years	Old Seafarers
Vacations	4	14	Senior officer	10-18 years	Old Seafarers
Sea service	6	14	Senior officer	10-18 years	Old Seafarers
Vacations	4	14	Senior officer	10-18 years	Old Seafarers
Sea service	6	15	Senior officer	10-18 years	Old Seafarers
Vacations	4	15	Senior officer	10-18 years	Old Seafarers
Sea service	6	16	Senior officer	10-18 years	Old Seafarers
Vacations	4	16	Senior officer	10-18 years	Old Seafarers
Sea service	6	17	Senior officer	18 years and above	Old Seafarers

Formulated with assistance of Crewing Manager based on the general trends of time spent at sea, ashore during vacations, certification and promotions

^A total sea service of 30-36 months is required to appear for the first certificate of competency - COC Class 3

*A total of 18 months sea service is required generally achieved in 3 contracts to qualify for COC Class 2

**Additional 18 months of sea service is required to qualify for COC Class 1 (Ship Master or Chief Engineer)

ANNEX-4 SHIPBOARD ORGANIZATION CHART

Engine Department		Deck Department
Chief Engineer, 2nd Engineer	**Management Level**	Shipmaster, Chief Officer
3rd Engineer, 4th Engineer, Junior Engineer, Electro-technical Officer, Engine Cadet	**Operational Level**	2nd Officer, 3rd Officer, Deck Cadet
Oiler, Greaser	**Support Level**	Boatswain, Able Seaman, Ordinary Seaman
Chief Cook, Steward, Mess boy		

ANNEX-5 PARTICIPANT INFORMATION SHEET

Research aims

The study is about understanding the competitive reasons to promote automation and technology onboard merchant ships and its implications on seafaring skills and employment.

The findings will contribute to a better understanding of technological changes and the resulting demand for skills onboard ships. For shipping companies the findings will provide a better understanding of implications of new technologies on their employment and HR policies. For policy makers a better understanding of skill requirements will help to introduce policy measures to address the training and competency requirements of seafarers.

Methods of enquiry

The study includes over 50 semi-structured interviews with senior and middle managers in major international shipping companies and officers' onboard ships.

Research funding and ethical considerations

The study is being funded by Nippon Foundation of Japan and has been approved by the Cardiff University School of Social Sciences Ethical Committee.

I would like you to take part in this study because of your background and expert knowledge in the maritime sector. The interview will take about 45-60 minutes and if you agree I would like to audiotape the interview. I assure you that all recorded information will be accessible only for the purpose of research and will be kept securely, in accordance with the data protection act. An analysis of data obtained will form part of the research which will later become a public document in the form of a PhD thesis. However, your name, personal and professional identity will be not be revealed in any way in the reports of the study.

Your participation in this research is voluntary. You may chose not to answer to any question or withdraw from participating in this study, without giving any reason.

Contact Information

My name is Nippin Anand and I am based at the Seafarers International Research Centre (SIRC) within Cardiff School of Social Sciences which is a part of Cardiff University UK.

If you require further information about this project please do not hesitate to contact me at the following:

Nippin Anand

Email: Anandn1@cardiff.ac.uk

ANNEX-6 RESEARCH INFORMED CONSENT FORM

I .... (Name)
of .... (Company) have agreed to participate in this research project voluntarily and of my own accord.

I have / have not* agreed to a voice recording of this interview between me and the researcher.

The objectives and purpose of the exercise have been clearly explained to me and I have been assured of the confidentiality and anonymity of the interviews. A copy of participant information sheet has been handed over to me.

I hereby give permission for appropriate use of the information I give in any subsequent writings and publications.

Signature Participant: _____

Name: (Print)   _____

Date: _____

Signature Researcher: _____

Name: (Print)   _____

Date: _____

---

* Delete as necessary

ANNEX-7 WAGE COMPARISON BETWEEN EUROPEAN AND ASIAN SEAFARERS (US DOLLARS)

Rank	Category	British^	Indian (I)	% BI	Filipino (F)	% BF	Chinese (C)	% BC	Indonesian (ID)	% BID
Master	Senior officers	$97,415	$69,600	28.6	$60,400	38.0	$50,400	48.3	$47,200	51.5
Chief Officer	Senior officers	$74,970	$55,200	26.4	$44,400	40.8	$41,600	44.5	$28,400	62.1
Second Officer	Junior Officers	$60,900	$33,200	45.5	$26,800	56.0	$29,600	51.4	$15,360	74.8
Third Officer	Junior Officers	$51,136	$28,800	43.7	$23,584	53.9	$24,000	53.1	$12,200	76.1
Chief Engineer	Senior officers	$92,240	$68,800	25.4	$58,800	36.3	$46,400	49.7	$43,600	52.7
Second Engineer	Senior officers	$74,970	$55,200	26.4	$44,400	40.8	$41,600	44.5	$28,400	62.1
Third Engineer	Junior Officers	$60,900	$32,800	46.1	$26,800	56.0	$26,400	56.7	$14,000	77.0
Electrical Officer	Junior Officers	$70,662	$35,200	50.2	$32,400	54.1	$27,200	61.5	$14,000	80.2

Data source: Ship management company, Year 2011 (Dry sector)

^British seafarers are paid 6 months leave wages per annum. By contrast, other nationalities spend about 8 months at sea each year and are paid only during their sea service. Hence the above table reflect gross annual earnings of seafarers in the international labour markets.

%BI - Per cent age wage difference between British and Indian seafarers
%BF - Per cent age wage difference between British and Filipino seafarers
%BC - Per cent age wage difference between British and Chinese seafarers
%BID - Per cent age wage difference between British and Indonesian seafarers