Learning Pathways for 21st Century Seaport Managers

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This paper explains the dynamic environment of ports and why it is necessary for port managers to have the skills and abilities to recognise and manage disruptive events and stressors that increasingly affect supply chains. These skills and abilities are dependent in part upon education institutions offering maritime management related curriculums to expand their topics of study on port operations and management. Such expansion would include risk management modules related to logistics sustainability and resilience against disruption. We argue that maritime management institutions are presented with an opportunity if not an obligation to incorporate this important training within higher education courses, short professional short courses and ongoing revalidation/compliance training. Essentially, the paper explores gaps between the strategic and operational requirements of the regionalised port industry and the programs offered by educational institutions.

1. Introduction

The successful integration of ports into supply chain operations while minimising supply chain vulnerability is dependent upon the quality and reliability of port manager performance [1, 2]. Port performance reliability and sustainability is largely enabled by competent risk management against stress and disruptions which emerge as core port management problems. The economic and social flow-on effects of port disruptions can be substantial [3] and these aspects of today's turbulent global logistics environment actively encourage port managers to address their operational sustainability against unexpected threats [4].

Shrivastava [5, p. 121] describes today's industrial risks as '… global, pervasive, long term, imperceptible, incalculable, and often unknown. Shrivastava cautions against this environment of proliferating risks and inadequate remedies, and illustrates how management theory and practice must alter in order to cope with contemporary hazards and risk. In particular, the global shock of the 9/11 Trade Tower disaster marks the beginning of a maritime risk management renaissance, in which ports and their operations receive renewed risk management emphasis [6]. Further emphasis is provided by the newly perceived hydro-meteorological threats of climate change [7]. Port managers who just a decade ago might have employed risk management primarily against financial and legal liability are now addressing strategic and operational risks within their wider undertakings. Accordingly, port managers within the many logistics disciplines must become increasingly familiar with multiple risk management artefacts inclusive of safety planning and process, emergency response, risk mitigation, disruption management, business continuity, and corporate adaptability; all of which are argued as being necessary learning requirements for safe ports in the twenty-first century.

Haimes [8] recognises the universal need for risk-based process by all managers in all organisations within every aspect of management. However not all risk is bad – while some organisational risks present

threats others may present opportunities and managers require sufficient knowledge and experience to differentiate between the two. Risk management knowledge can be acquired through self-learning and through participation with educational institutions, but without foundational risk management knowledge port managers may be managing risk from a state of ignorance [9]. Engineers and safety practitioners receive risk management and resilience education within their university modules, however maritime university teaching of risk management theory appears to be uneven in terms of its application to logistics management courses. Maritime universities are not unaware of port-related risk and resilience, because recent post graduate research investigates port risk and resilience outcomes against stress and disruptions [7, 10, 11]. However this risk-based research interest is only thinly translated into maritime logistics education. Accordingly, some maritime logistics students might graduate in ignorance of the '… organisational and personal learning and knowledge transfer' that Wu and Blackhurst [12, p. 17] contend is so essential to contemporary logistics risk management.

As exemplified by the University of Tasmania's Australian Maritime College, global maritime universities play a pivotal role in providing high quality higher education and training, and endeavour to provide centres of expertise in all major maritime fields [13]. Courses of training are offered by these universities in diverse streams and subjects, for students who consequently find employment either at sea or onshore. Shore-side employment involves port-related responsibilities in logistics and transportation fields. When new port managers enter their shore side workplace, their initial professional competence is constructed upon fields of study provided by the relevant tertiary institution, and amended according to the various electives selected by the student.

Eraut [14] contends that a student is unlikely to know what specific knowledge areas or skill sets will be relevant to future employment, and that the tertiary institution's instructors and curriculum advisors may have little or no practical experience in what they teach. Further, port-related employers may not know or may have problems in articulating what vocational and academic qualifications they require of new-entry logistics and transport professionals [15, 16]. This creates potential for training gaps within the maritime curriculum, and important shortfalls impose limitations upon newly qualified maritime logistics professionals. Empirically, port-related managers are likely to be challenged by hazards and risks in their many operational and strategic performance decisions, for example those related to infrastructure investments and IT system risks [17, 18]. Consequently port management decision making processes become dependent upon risk management awareness and professional knowledge.

2. Management performance in a dynamic port environment

Supply chain risk managers are particularly concerned with potential for delays or failure at critical transport nodes and links, including seaports and airports [19, 20, 21]. Seaports (hereon referred to as ports) are important transport nodes with more than 90% of annual international trade equating to nine billion tonnes passing through at least two ports [22]. Because ports are embedded supply chain elements and value creation components [23, 24] any major ship and cargo delay at a port can readily transform the port from being a logistics bottleneck into a congested chokepoint.

Given the port's criticality to supply chain competitiveness and effectiveness, a competitive demonstration of hazard awareness capabilities, contingency planning measures and response preparedness against port failure provides evidence of transformational business continuity capabilities. Mindful managers learn to recognise and react early to adverse events, enact proactive risk management responses and if required, adapt to dynamically changing circumstances [4, 25]. Because many actors are involved in port logistics processes, the port's mitigation responses against system failure require effective demonstrations of risk management capabilities at both individual and organisational levels [26]. Circumstances of port failure are likely to involve complex systemic failures and interactions between multiple actors and agencies, rather than failures within a focal firm or dyadic interactions between firms [27].

Analysing the effectiveness of port risk management performance against external threats is a complex task involving many variables. For example there is little evidence of leadership structure across the diverse and multifaceted port community of actors, whose behaviour is likely to be fragmented and insufficiently binding to permit coordination of risk management responses against external threats [28]. Accordingly, Dalziell and McManus [19] suggest that port risk management capabilities might be measured on the basis of organisational recovery from stress or disruption being achieved when the pre-disruption levels of key performance are regained.

Port risk management processes become complex with individual ports supporting many supply chains. Each supply chain engages varying and multiple goods and service providers from within the port system, which creates overlapping networks of roles and alliances [29, 28]. The port's regionally extended and complex adaptive network might involve many hundreds of actors while a globalised supply chain might be reliant upon thousands of logistics and transport actors across many countries [30]. This systemic complexity and multiple sources of vulnerability suggests that logistics risk managers should develop analytic risk management skills of a high order. From this perspective the role of education becomes increasingly important in augmenting risk management capabilities for the next generation of port managers.

3. Effects of port disruption

The port is a critical node within the supply chain system [23] and the impact of a major port disruption can create a rippling effect across the wider, extended supply chain system thereby creating even further logistics risks and uncertainties [31]. Port disruption and safety malfunction might arise from human failure, intentional adverse acts such as terrorism and criminality, severe weather events and climate change, earthquakes and tsunamis, logistic and financial turbulence, and rapid technology changes [6, 32].

Port risks and uncertainties adversely affect the lean business practices of a globalised and widely outsourced supply chain which likely exhibits minimal redundancies [33, 32]. The compounding of risks, uncertainties and repercussions arising from a disruptive event in port has relevance to systems theory, where an incident that cascades across a network of linked agencies may have far greater impact than the originating event might suggest [8]. The port footprint extends well into the regional hinterland [34] and

relationships become blurred when trying to characterise actors and agencies as belonging to either the port or the supply chain.

Recent port disruption research focuses on climate change risks and port innovative contingency planning and resilience strategies [35, 7]. Examples of port disruption include Hurricane Sandy which shut the Port of New York-New Jersey [36, 37] plus a 10-day stevedore lockout in 2002 that closed 29 US West Coast ports [38, 39]. Recovery from a port disruption such as these involves either engineering or ecological resilience [19] whereby recovery is enabled to the previous state (engineering resilience) or, the organisation adapts to changing circumstances to assume a new steady state of equilibrium (ecological resilience). This alternative outcome process is shown in figure one, which is based upon Handfield's supply chain disruption graphics [21]. Figure one traces the logistically transmitted disruption impact from port to the supply chain, time lags in organisational awareness of the stressor or disruptive event, and potential alternative outcomes of disruption management response.

The port and the supply chain are shown here as two interconnected organisations. Within this connectivity a time lapse occurs between the inception of a disruption at the port, the port's realisation of the event and commensurate responses, and the transfer of disruptive impacts to the supply chain. Gurning and Cahoon [40] note that 53% of supply chain survey respondents generally become aware of a disruptive event affecting their organisation up to seven days after an incident, and that full recovery from a major disruptive event might take 90 days. Recovery directions following a disruption affecting the port and supply chain is shown as either Result A, where either organisation adapts to new circumstances or Result B, which is a return to their pre-disruption operating conditions. The recovery state outcome that is achieved by the port might not be one that can be replicated by the supply chain.

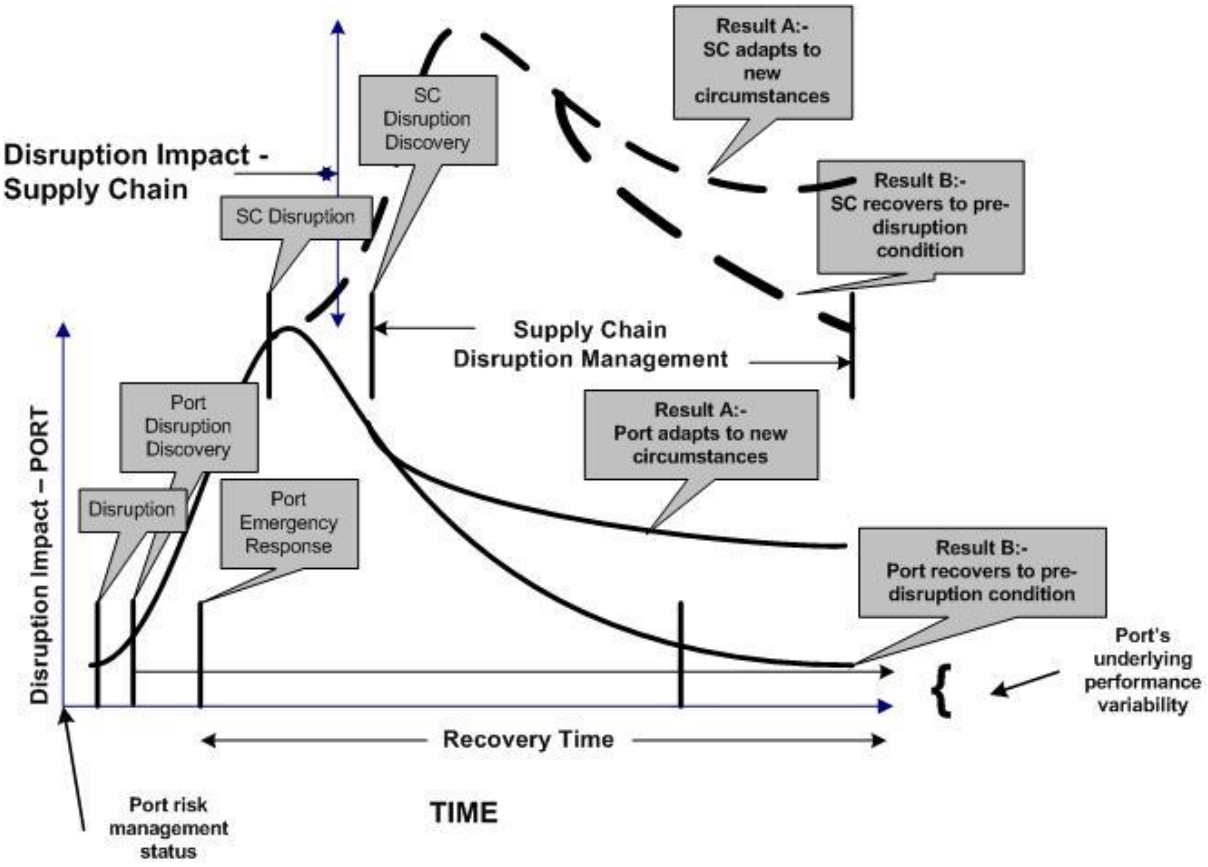

Figure 1: Port and supply chain disruption management (after Handfield 2007).

4. Port-related safety and contingency management

Conceptually, difficulty arises in perceiving how port actors' intermittent and self-interest driven operational alliances [41] can be effectively translated into a viable port organisation culture, from which positive, sustainable port safety behaviour might emerge. For example, the port organisational system has been described as a complex and potentially unstable networked system of unaligned actors, assets and infrastructure [42, 43]. From a contingency management perspective, comprehensive emergency response requires organisational regard for all hazards by all agencies [44]. Yet some port actors might not even choose to act at all in response to dynamic events, and instead adopt a 'wait and see' approach [45]. An organisational analogy that readily comes to mind is that of herding cats.

Contingency management involves planning, preparing, managing and responding to a major disruption, with the purpose of returning the port to an acceptable level of business normality [46]. In order that this might happen, the port's network of critical logistics and transport actors must be mindful in their risk awareness, and be adequately empowered to restore impaired critical infrastructure or services supply. The literature appears to overlook the study of top down port leadership effectiveness, and in the absence of evidence for port leadership or of its effectiveness, the attainment of holistic port risk management capabilities might rest upon a bottom-up driven approach. Methodology for this approach could, for

example, be approached by tertiary management learning and a resultant gradual dissemination of risk management skills across the port's freight task environment.

5. Port manager education

The attainment of risk management learning and disruption management cognition becomes increasingly salient for graduates of maritime tertiary institutions. These graduates enter diverse fields of employment that are crucial to port performance, including '… logistics, cargo handling, ports and terminals management, maritime law, operational planning and management, importing and exporting' [13]. Tools for 21st century port management include the use of technology and software companies provide risk management and resilience programs for planning, predictive and risk mitigation purposes. The effectiveness of these programs is closely related to the user's knowledge of risk management and information technology [47].

Neophyte port managers should acquire knowledge and skills to exercise their complete logistics risk management responsibilities. Risk management roles involve complicated concepts and processes, shrouded in a somewhat confusing and complex array of terminology. Appellations include hazards and vulnerability, safety management and contingency planning, risk management and disruption management, crisis management and emergency management, business continuity processes and threat mitigation [48]. Desirable outcomes arising from disruption are variously described as sustainability, resilience, reliability, robustness and effectiveness.

Despite the operational importance of effectively managing external threats, the triadic relationship between port business continuity, risk management and resilience outcomes in response to disruptions appears to rarely form part of the maritime university curriculum. In the absence of maritime university training, mainstream Australian universities including Monash University, University of Newcastle, and Charles Sturt University offer emergency and disaster specialist management courses plus associated electives for domestic and international students at graduate and undergraduate levels. Overseas mainstream universities offer similar learning opportunities, for example the University College London.

Empirically, port managers rely upon on-the-job experience and the use of external consultants or workshop facilitators when developing business continuity and risk management capabilities [37]. Smaller port organisations (less than 50 employees) are unlikely to appoint a dedicated risk manager; instead they might either assign this function to a staff member as a secondary role or contract external consultants [49]. Risk consultants who are unfamiliar with specific port logistics and transport hazards and risks may not be best placed to advise port managers, and at worst, their guidance might be misleading. Maritime university short courses are conceptualised as a remedy for familiarising both port industry managers and their risk consultants. Modules within a relevant curriculum might be aligned with intermodal logistics and transportation hazard identification, risk management, business continuity, contingency management and resilience outcomes in relation to port strategic and operational risks [4, 6, 8, 11]. Such modules might also assist port organisations in their continuation training needs.

On-the-job experience is an untenable learning pathway for either port managers or consultants, because this experience may be of uncertain quality and depth, and learning gaps potentially expose ports to the

ultimate risk of failure when confronted by disruption. This contention is illustrated by the post-disaster reports from Hurricane Sandy [50, 37]. From a learning perspective, a need exists for maritime management education that translates port resilience research into effective risk management practice, using well-designed learning modules based on real-life challenges [51, 52].

6. Future logistics risk learning pathways

Notteboom and Winklelmans [53] argue that the port logistics and transport environment is constantly and dynamically changing, presenting port managers with associated insecurities and risk. They note that predictive port risks include loss of clients, cost-related competitive pressures, rapidly evolving technology, larger ship sizes, rail and road company restructuring, terminal mergers and acquisitions, the imperative for future infrastructure investment, and increasing government willingness for port privatisation. Future logistics and transportation managers must manage and cope with these strategic and operational pressures, and successful, resilient and competitive outcomes across port actor networks are more probable through a sound educational basis rather than learning by shock.

From a maritime university perspective, theoretical risk management learning for logistics managers might parallel that of maritime engineering streams. Almost every engineering tertiary program carries a risk management module, and a common topic is project management risk. For example the Scottish University of Strathclyde provides undergraduate and post graduate courses with modules involving maritime safety and risk [54]. Contemporary risk management within the maritime transport sector is also taught by the World Maritime University in Sweden. This WMU course provides students with grounding in technical and operational risks, risk management concepts and procedures, and the application of risk management techniques in a maritime transport environment [55]. These engineering course subjects potentially provide templates for electives within maritime logistics course design.

7. Conclusions

Risk management and disruption management knowledge is salient to graduates from tertiary maritime management institutions who enter the many diverse fields of employment that are crucial to port performance. However there is scant evidence of logistics risk management electives, Masters' courses or even short courses being offered by maritime universities. Maritime University graduates employed in port-related logistics positions must therefore either engage in further time consuming and expensive training elsewhere, gain on-the-job experience in order to become better qualified in the risk management components of their employment, or negotiate an unenviable learning pathway through managing an unexpected perturbation.

The complexities associated with modern logistics risk management, coupled with the broad economic importance of disruption management provide well-founded grounds for introducing risk management education to the maritime logistics curriculum. Far better for port-related managers to learn these contingency planning and business continuity concepts by formal process of education as opposed to experience gained from a potentially stressful experience or disruptive shock.

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