

Talent Management and Organizational Innovation for Enhanced Logistical Efficiency in Port Logistics

Zouhair Roggani¹, Ouail El imrani¹

¹Abdelmalek Essaadi University , Tetouan, Morocco

ABSTRACT: This study examines the interplay between talent management and organizational innovation as key drivers of logistical efficiency in port logistics. In an increasingly competitive and dynamic global trade environment, ports face persistent inefficiencies despite significant investments in infrastructure and technology. This paper argues that enhancing human capital through structured talent management practices such as recruitment, competency development, performance management, and leadership planning , combined with organizational innovation mechanisms, can significantly improve operational performance. Drawing on theoretical perspectives including the Resource-Based View, Dynamic Capabilities, and Sociotechnical Systems Theory, the study highlights the importance of aligning people, processes, and technological advancements within port ecosystems. Furthermore, it explores how digital transformation, collaborative networks, and knowledge management contribute to optimizing cargo handling, yard operations, and overall supply chain integration. The findings emphasize that sustainable improvements in port efficiency require a holistic approach integrating talent and innovation strategies, supported by effective governance and continuous performance evaluation.

Keywords: Talent Management ,Organizational Innovation ,Port Logistics , Logistical Efficiency , Human Capital , Digital Transformation

1. INTRODUCTION

This section should be succinct, with no subheadings.

The ports sector serves as a vital component of global trade and the economy. However, ferocious competition continues to threaten the logistics industry (Liu et al., 2009) , particularly among port operations, which experience inefficiencies. Time-sensitive cargo needs require high logistical efficiency yet remain unmet even at top-ranked global ports. Developing talent and fostering organizational innovation

could boost port operations (Jiang et al., 2021). Port management, however, tends to emphasize capabilities and process innovation over the development of people and talent management (Ivanov, 2020).

In the wake of COVID-19, talent shortages in logistics have intensified. Talent management approaches in ports remain immature. Hence, port organizations are urged to rethink how logistical efficiency, people, and process innovations are interconnected. They should also review talent management literatures and systematically assess their talent processes.

2. LITERATURE REVIEW

The shipping sector has encountered substantial difficulties brought on by the COVID-19 epidemic, resulting in reduced seaborne trade and difficulties in port and coastal traffic. In response to growing demand for smoother and more affordable transportation, operators and institutions have increased the pace of digitalization and significantly spent resources on updating and integrating ports, terminals, and similar facilities (Jiang et al., 2021). Modern ports contain a plethora of human resources, cargo, and information flow. Facility and equipment upgrades, which can be executed quickly, are essential investments to unify ports directed towards steadfast operation and embedded improvements for broader digitalization (L. Chapman et al., 2002).

Port logistics is recognized as the lifeblood of transportation circulation and a primary national resource for global civilization. Two types of materials and resources, personnel and cargo, are collected and directed through ports. Personnel operations in ports, also known as handling, gauge unloading, and surveying, occupy a high proportion of the end-to-end transportation cycle. Instead of products, numerous personnel are involved in the indirect operation of a vessel order. Although reviewed from many angles, talent management still has indeterminate characteristics and its significance in domain-specific subjects is still under investigation. Hundreds of operations and tens of personnel engage in one vessel order accomplishment and so far, insufficient evidence of port-specific human-innovation-management customization track has been disclosed. The current strategies cannot effectively tackle the allocated independent deployment of port human-management define.

A maritime-adjacent university logistics-orientation-industry-academic project has been conducted, during which the talent-acquisition process of various modules of the nearby port operator and the mismatch between the operator requirements and theoretical modules have been tracked. Hence, retaining predominantly port-logistics human resources based on organization-specific and port-centric attributes has become an additional independent indicator. Port and talent-centric dual management have been studied. Port process-remittance topic from customer-appointment-topic remains less focused, which actualizes the designation of process innovation subject and configured-structure safeguard of the accompanying topic continues to stay uncovered in the strategy at length.

Talent management remains an active research topic in many fields, especially in logistics and supply chain management. Management scholars and organizations focus on the strategies, policies, and best practices to attract, select, measure, develop, reward, and retain key talents, as success factors depend not only on material resources but also on the availability of talented professionals with the relevant capability, motivation, and commitment to executing responsibilities. Each of the above factors was already acknowledged and is involved in the port talent-acquisition cycle; nevertheless, a systematic framework, mapping, technique, or modeling has not been established to date.

Talent refers to individuals with the commitment and capability to perform an assignment successfully. Talent management arose in the late 1990s and can be defined in multiple ways. The latest definition refers to the systematic attraction, identification, development, retention, and deployment of talented individuals within an organization; the focus has moved from individuals to systems, processes, and contexts across different disciplines. Talent-acquisition frameworks in logistics, science, educational, and construction CVT scenarios have been reviewed and local academic talent-trade cycles remain less covered. Descriptions of port-specific CVT talent management have been reviewed; however, the operability of detailed implementation technique for view system settings has not been conveyed yet.

Talent management remains a subject of great interest in the logistics and supply-chain field. Academic studies and enterprise practices have explored talent-management strategies needed to attract, select, measure, develop, reward, and retain essential talent. The importance of these factors in port operations makes the investigation of port-specific human-innovation-management practices especially relevant.

2.1. Talent Management in Logistics

Talent management, understood as the continuous cycle of acquisition, development, and retention of organizational resources (Jiang et al., 2021), has become a matter of survival in the logistics industry due to complex global-dynamics and perennial uncertainty in commodity prices. Most international ports depend on operationally intense and low-margin throughput activities that rely on port equipment and computer-based systems. Consequently, the search for rapid returns must balance the satisfaction of both functional and non-functional requirements (L. Chapman et al., 2002). Consequently, port operators usually avoid spending excessive time on equipment procurement decisions or innovation proposals. Port operators frequently settle for the inherited infrastructure and procedures of the acquired facilities. Under the influence of massive Information-Communication-Technology investments on all port tasks relative to cargo handling, transfer, and storage operations have struggled to find a new way for more competitive development.

Aiming at operational excellence, many ports initiate formal training and qualification programs as early as the perspective selection of ground-staff controller, but the actual implementation scopes are limited. Port labor is generally recognized as a “hazardous occupation” and the delivering extra basic operational training often fails to demonstrate clear improvement and measurable benefit on safety incident-rates.

2.2. Organizational Innovation in Port Operations

According to (L. Chapman et al., 2002) and (Jiang et al., 2021), maritime and port-logistics innovation is tightly linked to business drivers outside the traditional remits of ports and is stimulated through collaborative ecosystems rather than merely technology adoption, yet there are parallels. The authors call for a broader interpretation of the term “innovation” to include people, process, organizational, and business-model dimensions as well as the full range of talent dimensions, along with a greater understanding of the interactions between talent and technology to facilitate the design of effective and efficient talent-management systems by global corporations.

2.3. Intersections of People and Process Innovations

Individual and organizational performance depend increasingly on having the right people in the right jobs at the right time. To sustain a competitive advantage, companies must manage their talent proactively rather than reactively when constrained by the economic cycle. Indeed, buoyant economic conditions encourage investments to sustain momentum, whereas leaner times drive cost-cutting efforts that typically overlook

talent. The focus on talent acquisition must shift to core skills, competencies, and enabling capabilities: what do ports require to perform excellently; what is needed to increase efficiency now and in the future; how well do the required jobs fit the people available; what gaps remain; and how can the ports thrive in a competitive market.

Ports orchestrate multiple organizations, but within this collaborative environment, there remains plenty of opportunity for individual organizations to develop their own talents to improve excellence, commitment, and retention. Talent management works best when aligned with career development—planning and keeping track of the stages, moves, and times frames across a selection of talent pools of interest to each candidate. Talent monitoring must be cross-organizationally based and track movements across ports, carriers, and logistics operations. Cross-organizational co-operation on talent management thus becomes a shared objective of individual organizations within the overall supply chain or logistics sector encompassing ports, shippers, carriers, and logistics operations (Jiang et al., 2021).

3. THEORETICAL FRAMEWORK

Talent and innovation are critical resources, shaping the current landscape of global port operations and determining their future course. Despite substantial investments in physical assets and technology, many terminals struggle to leverage these resources fully. As disruptions such as the COVID-19 pandemic and geopolitical tensions resurge, enhancing logistical efficiency by nurturing talent and fostering innovation will be vital to build resilience, address systematic choke points, and maintain competitiveness. Talent management and organizational innovation are therefore particularly compelling areas for study. Resource-based view (RBV) and dynamic capabilities frameworks can help elucidate how these two factors together facilitate the ongoing development of port operations. Building on this foundation, insightful recommendations for talent citizenship and broader port innovations can be crafted, potentially enhancing logistical performance across this multifaceted ecosystem (Jiang et al., 2021).

3.1. *Resource-Based View and Dynamic Capabilities*

Human capital and organisational innovation, as underlying themes in talent management, play a critical role in enhancing port logistics efficiency and are explored using the Resource-Based View and Dynamic Capabilities theoretical lenses. Human capital embodies individuals' skills and knowledge that enable them to perform tasks relevant to value creation. It is a key driver for developing process and organisational innovations. Port operations encompass activities involved in the importation, exportation, and transshipment of cargo. Organisational innovations comprise changes in policies and practices associated with an organisation's operations. In port logistics, they refer to modifications in inter-organisational coordination policies and management practices for operational processes that facilitate collaborative and synchronised product and information flows among shippers, carriers, terminals, and inland transport operators.

The Resource-Based View explains how firm-specific resources such as human capital and collective organisational capabilities can generate sustained competitive advantages. The concept of Dynamic Capabilities extends the Resource-Based View to consider how organisations can build, integrate, and reconfigure firm-specific resources and capabilities in highly dynamic business environments. Human capital and organisational innovations are particularly crucial for ports in the current environment, characterised by rapid technology advancements, growing service integration, and an increasing emphasis

on sustainability. Port activities encompass a wide range of operational processes that directly affect logistics efficiency and, consequently, overall supply chain performance (García Sánchez et al., 2018).

3.2. Sociotechnical Systems Theory

Port logistics comprises a wide range of operations at terminals, spanning container handling, yard management, sub-terminal activities, and inland transportation (Jiang et al., 2021). Numerous innovations have been adopted to enhance performance and address sector challenges. Yet evidence suggests that people and process transformations often occur in isolation without effective interaction. Port organizations report a shortage of necessary capabilities, raising concern about achieving planned transformational goals across technology, processes, organization, and people.

Sociotechnical Systems Theory provides a framework for investigating the interplay among crucial talent attributes and process innovations in logistics, where sustained competitive advantage hinges on operational excellence and service reliability.

3.3. Change Management and Organizational Learning

Within logistics, change management encompasses various strategies, structured and unstructured processes, evaluation and audit techniques, and improvement deployment (Hisano Barbosa et al., 2019). Change management involves balancing multiple forms, dimensions, and perspectives that are integrated to improve performance through change and thus enhance competitiveness. Transformation of the logistics and supply chains is one of the significant forms of change where design and delivery of the service continues to be the primary focus. Change is positioned as an opportunity for an organization and proactive management of change is taken to sustain logistics excellence in order to gain sustainable competitive advantage. Management of continuous change has been suggested to provide the most substantial opportunities to achieve this. Continuous change enables the logistics discipline to take important steps to reach higher levels of quality, productivity, corporate social responsibility, worldwide reach, collaboration and information technology integration. Balancing the need for change against the value of continuity is therefore seen as a prerequisite to effective change management and transformation.

In ports, the biggest challenges faced relate to human capital; the ports, perhaps across the board, signify a ‘people business’ that entails a significant range of port operations that are carried out manually; to maintain or enhance safety and operational excellence, which directly correlates with the organisation’s willingness to change (Jiang et al., 2021). Although, many of the incumbent port operations and procedures do not broadly change, pacing and communities in ports do change, which consequently means that the capability and motivation to embrace and enact change do require continual upgrade. It has been established that the port that captures the most talent or curiosity or even inventiveness is the organisation that remains quickest in terms of its collective ability to adopt change.

4. TALENT MANAGEMENT PRACTICES FOR PORT LOGISTICS

A port is a complex and hectic environment where terminals engage in various activities associated with the movement and transfer of cargo. Enhancing port operation service is crucial and requires the engagement of the entire terminal workforce. Efficient port operations significantly improve productivity, enhance service quality, and contribute to maintaining global supply chains (Jiang et al., 2021).

Talent management practices constitute processes and mechanisms implemented to accomplish the immediate and future needs of an organization by acquiring, developing, retaining, and utilizing a skillful

and competent workforce with a sufficient level of motivation. In port logistics, attracting, selecting, and retaining appropriate talents is vital for maximizing operational excellence, safety, and customer satisfaction.

4.1. Recruitment and Selection for Operational Excellence

Ports and terminals are core components of the global supply chain that require increased operational efficiencies and cures to inefficiencies that contribute to global trade delays. There is a clear need for process and people innovations in the port and terminal industry to address logistical inefficiencies. The development of human capital and adherence to the harbour innovation ecosystem can facilitate these needed improvements. Talent management by reference to talent acquisition, development, retention, and redeployment coupled with organisational innovation provide a dual foundation for port and terminal firms that seek to prevent decline and realise improvement.

4.2. Competency Models and Training Protocols

Managing operations in ports has become increasingly complex and challenging. Hence, ports have to develop operational competencies to improve competency improvements. Talent and people competencies models play essential roles in successfully port operations since they help identify required competencies and training for port personnel. Competency refers to “a statement of performance that outlines the knowledge, skills, and attitudes an individual should possess to perform effectively” (Northaw et al., 2019). Using competency-based models in organizations are central in enhancing human capital and labour competence. Organization can enhance training programs and people competencies by developing competency models and organizations and ports could improve organizational runtime and safety level.

Port operations involve a wide range of activities such as cargo handling, ships berthing, intermodal convoy scheduling and yard management. Due to the various of activities in ports, it is crucial to have operational competence. Competency expected for operating activities widely varies across organization and continues to change, and developing port operational competency model could help organization to pin point critical learning associated with different operational activities. Competency model should involve competencies, core as well as specific, that are relevant in support of organizational objective, strategy, and future target (Jiang et al., 2021).

4.3. Performance Management and Incentive Systems

As organizations increasingly realize the need for business and culture transformation to remain relevant and competitive, talent management has acquired great significance. Indeed, talent management is traditionally construed not only of talent acquisition and retention, but also of performance management (Jiang et al., 2021). As a conceptual anchor, it appears relevant for ports and terminal operators to properly shape, refine, and design a performance management system set up to promote and reward sustained accountability, operational excellence, innovation innovation, or such kind of competencies that may be harbinger of organization rediscovery and renewal.

Drawing from the previous insight, organizations may be required—if not obliged—to prioritize identifying, designing, and refining performance management frameworks as those concerns permeate across working life domains. Ports and terminals facing critical challenges press forward in transforming and renewing are well advised to explore elaborating thought through talent management concepts associated with performance management-related practices dedicated to revitalizing commitment toward operational excellence, safety, reliability, agility, efficiency, innovation, or collaboration in a well-

recognized, appealing manner to nurture the spirit of rediscovery, change encouragement, or participative environment as well.

4.4. Leadership Development and Succession Planning

Succession planning entails preparing talented personnel to assume greater leadership responsibilities when current incumbents transition out of their roles. It serves to build internal capabilities and a pipeline of talent for strategic positions, promoting timely and effective development in line with the organization's long-term goals. Effective leadership plays an essential role in developing organizational talents and driving innovation in logistics and other sectors (Jiang et al., 2021). As port systems undergo modernization, succession planning processes should consider the desirability of establishing training programs in logistics and supply chain management for operatives with potential for leadership positions. Within the ongoing effort to counteract the impacts of COVID-19, telecommuting requirements and their associated restrictions have yet to be fully lifted at port authorities and private terminals, hindering both service delivery and innovation. Emphasis on situational and transformational leadership styles, which stimulate innovative behaviour and ideation while fostering employee participation and dialogue, would benefit the overarching goal of innovating port processes to enhance efficiency and resilience.

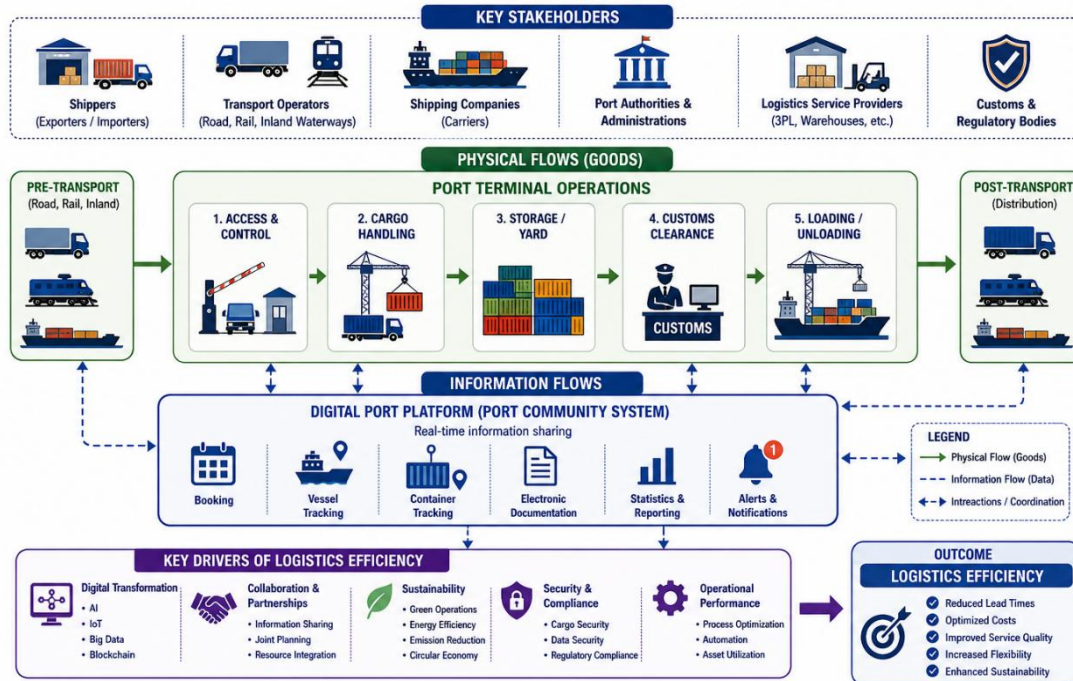
5. ORGANIZATIONAL INNOVATION MECHANISMS

Against this backdrop, efficiency-enhancing process innovations take centre stage. Leading ports favour agile cargo handling, streamlined yard operations, and maximized terminal throughput. Digital transformations embracing data-oriented platforms and systems integration enable transparency and traceability throughout logistics chains. Collaborative ecosystems with shippers, carriers, and regulatory bodies advance operational coordination, rapid clearance, and process continuity. Access to upfront demand visibility, combined with comprehensive deployment of risk-management techniques and awareness of governance issues, fosters control over the uncertainties central to freight operations. Innovation governance structures serve to reduce the risks associated with R&D investments, and dedicated executive rolessafeguard resource allocation across an array of initiatives (Jiang et al., 2021).

Ports also exhibit signs of maturity in terms of talent management. Relevant capabilities are increasingly regarded as pivotal to continuous improvement in operational excellence, organizational agility, and safety performance. Yet profound concerns persist in certain areas, which have hindered broader enhancements to productivity and quality within the logistical systems that ports incorporate. Long-standing imbalances in workforce structures and investor interests threaten both competitiveness and the achievement of sustainability objectives. Such limitations, furthermore, have the potential to impede progress on digital initiatives, smart-port schemes, and other efforts aimed at upgrading the supply-chain ecosystem.

PORT LOGISTICS ECOSYSTEM AND FLOW INTEGRATION

Integration of stakeholders, physical flows, and information flows for optimal logistics efficiency



Source: Author's own elaboration.

The figure illustrates the integrated port logistics ecosystem by emphasizing the dynamic interaction between key stakeholders, physical flows, and information flows within port operations. It highlights how goods move through sequential stages while being supported by real-time data exchange through digital platforms such as Port Community Systems. The visualization underlines the central role of coordination and collaboration among actors, including shippers, carriers, port authorities, and logistics service providers. Furthermore, the figure demonstrates that logistical efficiency is not solely dependent on physical infrastructure but also on the effective integration of digital technologies, information sharing, and organizational alignment. Key drivers such as digital transformation, sustainability, and operational performance act as enablers that enhance system responsiveness and reduce inefficiencies. Overall, the figure supports the argument that optimizing port logistics requires a holistic approach combining process innovation, technological advancement, and coordinated stakeholder engagement, ultimately leading to improved service quality, reduced costs, and increased flexibility.

5.1. Process Innovation in Cargo Handling and Yard Operations

Cargo handling and yard operations play a key role in port logistics, but also constitute the main bottleneck due to large idle times and safety concerns among operators (Vacca et al., 2008). The increasing level of containerization worldwide entails the need for ports to be well-positioned in the supply chain to maintain a competitive advantage. This translates into the ability to increase throughput, decrease the time containers remain idle, and enhance safety features for assets and operators. All of these factors are critical in determining the quality of service offered at ports and the associated customer satisfaction (Liu et al., 2009). At the organizational level, on-going process innovation is vital to maintaining port competitiveness, especially in the area of yard operations where the highest level of improvement is still required.

5.2. Digital Transformation and Information Sharing

Digital technologies play an essential role in port logistics by facilitating digital transformation and enabling information sharing within and across organizations. Digital transformation encompasses the integration of digital technologies into all aspects of port operations and permeates the entire port ecosystem. Full digital transformation is a demanding challenge for ports because the immediate operating pressures on labor-intensive organizations often take precedence over comprehensive systemic solutions, leaving process and collaborative gaps that a digital approach could fill (Min, 2022). Information sharing consists of the proactive exchange of relevant, accurate, complete, and confidential data in a timely manner with supply chain partners, as well as the communication of long-term plans and strategic objectives (Jardas et al., 2018). Ports play a critical node role within supply chain ecosystems through information systems that provide an integrated view of containerized cargo across all transport modes and allow various interactions. These systems serve to increase visibility, synchronize planning and operations, analyze performance, and improve supply chain collaboration (Pagano et al., 2021).

5.3. Collaborative Ecosystems with Shippers and Carriers

The Collaborative Ecosystems with Shippers and Carriers reinforce the pivotal role that collaborative frameworks within port logistics play in optimizing organizational traffic and, by extension, enhancing logistical efficiency.

Collaborative ecosystems among the truck transporters form the backbone of communal trip-sharing solutions, thereby allowing autonomous and confederated scheduling. Different partners each utilize their own systems, yet elastic arrangements permit frequent sharing of real-time information through data-exchange mechanisms, such as an application programming interface or cloud-sharing models. Such community-based architecture fosters an agile arrangement of trip-sharing containers, adeptly accounting for unpredictable events such as road accidents, delays at customs, and inclement weather. First-party (shippers) and second-party (carriers) components can be implemented independently, hence permitting sticker-to-container as well as truck-to-vehicle trip-sharing. This degree of flexibility allows for continual optimization of the logistics—improving the real-time, dynamic-sharing status and thus enhancing the overall system and organizational efficiency (Rebecchi, 2018).

5.4. Innovation Governance and Risk Management

Enhancing logistics efficiency through talent management and organizational innovation hinges on a solid foundation of governance structures and effective risk-management practices. Innovation policies shape the organizational climate by outlining priorities, strategies, support platforms, and performance targets, while governance frameworks establish clear authority, decision-making processes, and mechanisms for aligning people with innovation objectives. Governance also determines risk-assessment criteria and appropriate risk-taking levels, guiding the route, speed, and flexibility of change initiatives. The objective of enhancing cargo handling, port connectivity, safety, and turnaround times drives innovation in the ports sector. Evolving regulations, growing digitalisation, and the introduction of technologies such as robotics, AI, the Internet of Things, and blockchain reshape operational and business processes, compelling ports to transform existing practices and explore, secure, and exploit new changes (Gularte Quintana et al., 2017).

Before ports can adapt to these demands, however, they must focus on upgrading key capabilities and aligning resources to address structural, managerial, financial, and non-financial challenges and accompanying risks. A critical need for competent management expertise and continuous, comprehensive operating systems underpins this need. The urgency to modernise technologies, reconfigure functionalities,

and combine processes with diverse parties and applications regarding equipment, facilities, and systems escalates further the demand for adequate technical and experiential endowments, knowledge bases, diverse assets, and awareness of change approaches (Jiang et al., 2021).

6. ALIGNMENT OF TALENT AND INNOVATION WITH LOGISTICAL EFFICIENCY

To enhance logistical efficiency in ports, organizations should nurture a culture of talent and innovation in tandem. Analysis of shared logistical efficiency literature indicates that fostering organizational innovation goes hand in hand with strengthening human capital. Desirable competencies, procedures, and change readiness for process innovation must align with workforce profiles and capabilities. Moreover, alignment with orchestrated multi-tier supply chains and an overall logistics ecosystem promotes flexibility, adaptability, and resilience while simultaneously reinforcing local engagement and knowledge flows.

A study examining the innovation-performance relationship from the perspective of ports underscores the importance of fit between talent and processes in relation to both capabilities and the operating environment. It emphasizes that securing the right people, fostering a conducive environment, and ensuring job-appropriate talents and cultural alignment are critical for fostering innovation at ports (Gong et al., 2019). Ports and terminals face complex and evolving challenges from macro trends affecting the entire supply chain. To bolster performance, continuous improvement, waste reduction, and change enablement emerge as vital. Ports must pursue process innovations, establish collaborative ecosystems, embrace data-enabled transformation, and implement innovations in a structured manner. Adapting configuration and alignment to local contexts remains essential for sustained progress.

6.1. Workforce Demographics and Skills Supply Chains

The port logistics sector in South Africa requires an urgent intervention regarding skills replenishment to counter the foreseen attrition of its skills base. Workforce demographics are alarming and reflect a marked ability to maintain a healthy supply chain of skills. Port-related workforces in South Africa exhibit an ageing profile and graduation rates remain low, especially for engineering disciplines, resulting in a stagnated supply. The expected substantial increase in retirements mandates strategic interventions targeting supply chain skills-hubs and developing sector-wide or industry-specific cooperation frameworks. Instances of similar efforts within the logistics and transport sector exist, but the implementation lacks co-ordination. The success of such serious ventures relies on attracting, retaining, and developing high-potential young professionals. Support structures concentrating on post-graduate studies complement other incentives motivating young graduates to participate in the supply chain domain (P Goffnett et al., 2016).

Existing literature concerning skills requirements in the South African supply chain context specifically highlights strategic thinking, leadership, people management, technological proficiency, and business processes as the highest priority skills. The transport and logistics sector reflects similar observations despite sector-specific competency requirements still considered comparatively understated in the academic discourse. The South African logistics and transport context is noteworthy for two reasons. South Africa is regarded as the sub-Saharan continent's primary logistics hub, and the productivity of its ports and corridors critically define national economic performance and development objectives (Luke & J. Heyns, 2019).

6.2. Change Readiness and Cultural Adaptation

The continuous evolution of the global port industry necessitates an understanding of how organizational culture can adapt to, and accommodate, a dynamic and uncertain world. The ongoing identification of relevant people and process innovations highlights that the first step to adapting to change is the

organizational capacity to comprehend and react to that change. This change readiness should be catalysed at an early stage within port organizations themselves, through the delicate management of internal human processes in appropriate macro, meso, and micro contexts (Jiang et al., 2021). Port operators possess a cultural advantage: the nature of their operations invokes broad sensitivity to the behaviours of external agents that may herald, or even foreshadow, forthcoming changes. Hence, the capacity to anticipate change is often underpinned by deeply embedded skills and capabilities. Cultural change that emerges following the adaptation of fresh external ideas has a tendency to exert a stronger effect than at a later stage. Indeed, change acceptance may be easier in response to external signals than when the impetus arises from an internal call for improvement.

6.3. Knowledge Management and Learning Loops

Before an organization can absorb and apply knowledge gained from new ventures, it must develop its own knowledge management capacity specifically, the capability to recognize knowledge, assimilate it, and generate new concepts within the organization. Knowledge management is vital for companies planning to innovate, and an efficient and carefully planned knowledge management system creates an environment conducive to successful innovation implementation (Al Ayub Ahmed et al., 2018).

Knowledge management consists of two elements: two types of knowledge and two channels through which knowledge is shared. Firms can obtain knowledge from external sources or acquire it internally from prior experience; they can then disseminate this knowledge through explicit means (templates, models, reports) or implicit means (oral explanations, experience transfer) (H. Liao, 2013). Knowledge management includes understanding new trends, practices, technologies, business models, and regulatory obligations; sharing information about customer requirements, competitors' activities, and level of expertise; and absorptive capacity—the extent to which a firm can observe, measure, transform, utilize, and create knowledge.

Port logistics organizations face a series of complexities arising from large workforces, multiple processes and sequences, long operational cycles, and the participation of several stakeholders. Well-defined knowledge management and feeding-back mechanisms are critical to ensure that knowledge generated from various functioning segments is archived, fed back, and made accessible for future projects, thereby facilitating continuous improvement through learning loops.

7. POLICY IMPLICATIONS AND MANAGERIAL RECOMMENDATIONS

Sustainable port operations hinge on skilled workers, new technologies, and innovative practices. Ports face a labor shortage due to an aging workforce and high turnover. Public policy can help address the gap, but ports also need to invest in talent and build organizational ecosystems that foster innovation (Jiang et al., 2021).

7.1. Strategic Workforce Planning in Ports

Freight industry dynamics necessitate a strategic workforce-planning approach to meet operational excellence and safety standards and proactively guide recruitment and development. Ports face escalating cargo volumes and intensifying geopolitical competition, yet are unable to retain sufficient human resources for port operations within truck and vessel turnaround times. Integrated framework designs for cargo-handling, yard, gate, and staff workflows advocate enhanced collaboration among port, waterway, and rail operators, and govern the level of automation and authority to digitize administrative interfaces. Despite

limited precedence, competence and skills-mapping studies indicate shared fundamental abilities across large ports (Jiang et al., 2021).

Digital transformation influences ports' competitive positions and business scopes. Cargo with distinctive attributes or propulsion systems invites innovative cargo-handling and yard-management procedures.

7.2. Investment in Human Capital for Digital Ports

Rapid technological advancements have revolutionized manufacturing and services globally, including supply chain logistics, where digital transformation promises higher efficiency through automation and information sharing. Ports act as logistics nodes for loading and transshipping goods, and human capital directly contributes to terminal productivity. Various port functions rely on heavy equipment and automate less than other modes in the supply chain; hence, the talent–innovation nexus warrants further exploration (Jiang et al., 2021).

Prospective analysis shows that ongoing economic growth will give rise to a burgeoning middle class that demands more goods, affecting ports. Moreover, e-commerce facilitates more point-to-point transportation, while the port industry still measures productivity indirectly (e.g., TEU moved per crane) rather than directly in delivery (e.g., day spent with the reliever), signaling that extensive room for improvement exists. Ports constitute part of a supply chain ecosystem and subsequently need to enhance exit efficiency and destination delivery through complementary collaborative policies. Similar arguments arise for air and transportation corridors, where ongoing intensive window-certificate activities across upstream-line-based economies may raise extra transaction costs. Boosting rear-end link delivery matters substantially, while enlarging entry window-certificate-constrained export throughput remains less urgent.

7.3. Governance, Regulation, and Public–Private Partnerships

Governance, regulation, and public–private partnerships (PPPs) significantly influence the effectiveness of private capital and talent investments within port logistics (D. Gracia et al., 2022). Some countries have enacted or updated legislation establishing state-owned port authorities as commercial enterprises and providing them with greater autonomy; other nations consolidate various state port authorities and establish permanent port authorities at the national level. Improved governance practices have been widely implemented across Latin America, but further refinement is still needed. Stakeholder engagement and collaboration represent an opportunity to influence port-system efficiency.

Governance, regulation, and PPPs strongly affect the deployment of private talent and investment-specific service innovations. Ports established the governance and regulatory framework necessary to engage the private sector in port operations and infrastructure investment over the last two decades. Meanwhile, some countries approved or updated legislation to confer national port authorities the status of commercial enterprises and foster private sector participation and investment. It is still unclear, however, to what extent good governance and regulatory practices exert a positive influence on logistics-system efficiency.

Frequent changes in sector regulations, weak enforcement, poor transparency, and lack of stakeholder–government dialogue hinder the sector's capacity to reform port governance and regulations. Port governance remained stable in Latin America, yet countries still face substantial delays in adopting modern port-governance practices. Certain areas of intervention would contribute to enhancing the sector's overall port-logistics performance.

8. MEASUREMENT AND EVALUATION OF IMPACT

Achieving logistical efficiency in port operations benefits from monitoring measures that assess the effects of concurrent talent management and organizational innovation initiatives. To this end, two sets of metrics become relevant. The first comprises general indicators associated with logistical efficiency and operational performance, specifying target levels that reflect good practices. The second encompasses elements that capture the anticipated outcomes of talent and innovation developments.

Lyons and Duran propose a comprehensive structured framework for evaluating logistics system performance, which breaks down its dimensions into twelve categories supported by more than sixty relevant efficiency metrics. Following the well-known supply chain metrics scheme, Sambracos and Ramfou identify seven classes of high-level performance metrics that concern logistics operations: Time, Quality, Flexibility/Agility, Cost, Environment, Security and Risk, and Information. The extensive literature on logistics performance indicators ensures a suitable selection of leading efficiency measures. The anticipated impact of talent and innovation initiatives on logistical efficiency also has connections to performance and resource management. These links enable a specification of particular talent and innovation metrics that further clarify measurement and assessment.

8.1. Metrics for Logistical Efficiency

Effective assessment of the logistics efficiency of a port terminal and its related operations can facilitate the identification of the root causes of issues in logistical performance. The metrics proposed in this section aim to gauge logistical efficiency and port performance, taking into consideration recent research that has identified pertinent drivers of efficiency within the logistics services sector (CORINNA CAGLIANO et al., 2014). The former study emphasizes the key performance indicators to be monitored, whilst the latter outlines the main attributes associated with a logistics service provider's rise to excellence. In reference to the increasing significance of logistics efficiency in the performance and global-competitiveness of ports, Cagliano et al.'s proposed logistical efficiency metrics are examined, adapted to the operative context of port logistics. Several port-specific resilience performance metrics are incorporated in response to recent developments around concerns of global supply-chain security, risk management in logistics operations, and the disruptions arising from the COVID-19 pandemic.

8.2. Methods to Assess Talent and Innovation Outcomes

Ports are knowledge-intensive environments characterized by a wide range of activities performed by heterogeneous organizations. To achieve a competitive advantage, ports need to enhance the overall innovation capacity and performance of the organizations that operate within them. This study proposes an assessment model that considers person–environment fit and innovation performance in port logistics activities (Jiang et al., 2021). Talent management (TM) and organizational innovation (OI) are crucial for establishing and improving the logistics capabilities of ports. A considerable amount of equipment has been purchased to increase terminal capacity, upgrade cargo handling technology, and decrease turnaround time, yet ports still struggle to attract and retain talented people. TM and OI are considered two of the most important enablers of logistic efficiency (Gularte Quintana et al., 2017). TM needs to be sustained by simultaneously introducing and combating OI. TM and OI are of critical importance to the operational performance of ports. In turn, TM and OI play fundamental roles in enhancing overall logistic efficiency across port activities and facilities. Ports must focus on both TM and OI, which are crucial to developing an overarching logistics-port capability.

8.3. Longitudinal Assessment and Benchmarking

Longitudinal assessment, benchmarking, and continuous improvement are critical for gauging the impact of talent management and organizational innovation on logistical efficiency in port operations. The significance of these processes increases in cases involving multiple interventions over extended periods, as tracked in the current study. Such evaluations provide organizations with empirical feedback on the evolution of key initiatives, enabling identification of improvement opportunities and alignment with strategic priorities (Bhattacharya & Albert David, 2018).

Logistical efficiency is appraised through fifteen operational performance indicators reflecting cyclical service delivery targets, CFS transit times, and distribution processing times within interconnected sub-systems. Performance is monitored monthly, with data accumulated since early 2017. Organizational and talent management innovations are evaluated via thirteen metrics covering recruitment, onboarding, training, career development, succession planning.

9. CONCLUSION

Global port logistics faces critical inefficiencies that hinder supply chain performance and economic growth. While process innovations have increased cargo throughput and terminal efficiency, further improvement opportunities remain. Addressing people-related challenges is essential for unlocking full process potential. Talent management and organizational innovation, focusing on system-wide optimization rather than individual entities, are fundamental to port logistics efficiency. Ports operate in intricate supply chains influenced by shippers, carriers, inland transporters, and regulatory bodies; thus, ecosystems involving multiple players are conducive to innovation. Ports can implement both talent and organizational innovations to enhance logistical efficiency (Liu et al., 2009). These concerns reflect the interplay of talent management and organizational innovation, insightful for theory and practice (Jiang et al., 2021).

REFERENCES

- Liu, W., Xu, H., & Zhao, X. (2009). Agile service oriented shipping companies in the container terminal.
- Jiang, D., Liu, T., Chen, Z., Zhang, X., Wang, S., Huang, T., & Ning, L. (2021). The Effects of Congruence Between Person and Environment on Innovation Performance in Ports.
- L. Chapman, R., Soosay, C., & Kandampully, J. (2002). Innovation in logistic services and the new business model : a conceptual framework.
- García Sánchez, E., Guerrero-Villegas, J., & Aguilera Caracuel, J. (2018). How Do Technological Skills Improve Reverse Logistics? The Moderating Role of Top Management Support in Information Technology Use and Innovativeness.
- Hisano Barbosa, D., Andreotti Musetti, M., Barbosa Careta, C., & Sayuri Kurumoto, J. (2019). Management of change in logistics: an exploratory study of companies in the agricultural capital goods sector.
- Northaw, J., Tungkunanan, P., & Manon, W. (2019). The Competency Model of Graduated student in Air cargo Management Program of Thailand: Civil Aviation Training Center Thailand.
- Vacca, I., Bierlaire, M., & Salani, M. (2008). Optimization at Container Terminals: Status, Trends and Perspectives.
- Min, H. (2022). Developing a smart port architecture and essential elements in the era of Industry 4.0.
- Jardas, M., Dundović, Čedomir, Gulić, M., & Ivanić, K. (2018). The Role of Internet of Things on the Development of Ports as a Holder in the Supply Chain.

- Pagano, P., Antonelli, S., & Tardo, A. (2021). C-Ports: a proposal for a comprehensive standardization and implementation plan of digital services offered by the Port of the Future.
- Rebecchi, I. (2018). Optimizing multiple truck trips in a cooperative environment through MILP and Game Theory.
- Gularte Quintana, C., Munhoz Olea, P., Raggi Abdallah, P., & Costa Quintana, A. (2017). Port environmental management: innovations in a brazilian public port.
- Gong, Y., Chen, L., & Jia, F. (2019). Logistics innovation in China: the lens of Chinese Daoism.
- P Goffnett, S., Williams, Z., J Gibson, B., & S Garver, M. (2016). Identifying critical skills for logistics professionals: Assessing skill importance, capability, and availability.
- Luke, R. & J. Heyns, G. (2019). Skills requirements in South African supply chains : a higher education perspective.
- Al Ayub Ahmed, A., Ahmed Siddiqui, D., & Sultan, H. (2018). Impact of Shipping Knowledge and Absorptive Capacity on Logistical Value of 3PL Firms in Pakistan.
- H. Liao, S. (2013). Knowledge Management and Innovation: The mediating effects of organizational learning.
- D. Gracia, M., G. González-Ramírez, R., M. Ascencio, L., & Mar-Ortiz, J. (2022). Assessing the implementation of governance best practices by Latin American ports.
- Corinna Cagliano et al., (2014). Analysing the Determinants of Logistics Service Provider Efficiency in Urban Distribution.
- Bhattacharya, A. & Albert David, D. (2018). An empirical assessment of the operational performance through internal benchmarking: a case of a global logistics firm.