

Digital public service supply chain: the core to Political and Social Stability in the MENA at Turbulent Times

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Abstract:

This paper draws on the literature on public service supply chain and political/social stability to explore the process of digitizing the supply chain relating to the government's effort to maintain political and social stability in the MENA at turbulent times. It utilizes the notion of a digital public service supply chain to explain the significant models of decision-making, communication, and sense-making taking into account the resilient interconnections and interdependence among relevant organizations; which is essential to understand how these impact on public system's ability to uphold societal stability at times of turbulence and crises. Following this, the paper focuses on the digital public service supply chain's imperative role in realizing the resilience of inter-organizational network capacity to ensure the sustainable flow of needed supply; by developing proper updating supply chain system strategies and responses necessary to enable societal stability in the MENA at turbulent times.

Keywords:

Public service supply chain, digitization, political stability, social stability

1. Introduction

In recent times, academics and policymakers have paid significant attention to the turbulence in the supply chain resulting from various sources of disruption (Tang, 2006); (Ivanov & Dolgui, 2022); (Xu, Sethi, Chung, & Choi, 2022). The concept of turbulence is used in physics to describe chaotic fluid dynamics such as stormy weather or complex river currents. Political and administrative turbulence is analogous. Turbulence occurs where the interaction of demands is experienced as highly variable, inconsistent, unexpected, and/or unpredictable (Rameshwar, et al., 2023). The turbulence in a supply chain is often commonly referred to as: "supply chain disruption". (Craighead, Blackhurst, Rungtusanatham, & Handfield, 2007) defined supply chain disruption as follows: "... supply chain disruptions are unplanned and unanticipated events that disrupt the normal flow of goods and materials within a supply chain". We have witnessed severe disasters in the form of earthquakes, floods, tsunamis, terrorist



attacks, SARS, financial crises, geopolitical crises, and more recently the COVID-19 crisis. Supply chain disruptions have occurred at different times for various reasons (Tomlin, 2006); (Chopra, S.; Sodhi, M., 2014). Some are man-made such as wars and terrorism whilst others are natural events such as hurricanes, earthquakes, and pandemics. The effects of both kinds of disruptions may be short-term or long-term and can be detrimental to the organization's performance (Craighead, Blackhurst, Rungtusanatham, & Handfield, 2007).

In 2003 and 2005, the World Summit on the Information Society called for the adoption of information and communications technologies (ICTs) as development tools. This prompted countries to begin developing information society agendas, focused mainly on narrowing the digital divide and boosting e-government and on raising awareness of the possibilities offered by ICTs, particularly in the areas of health and education. The enthusiasm of the early years resulted in institutional adjustments aimed at implementation; over time, however, these agendas lost priority in policy debates and actions (ECLAC, 2021). Digital technologies are one of the most transformational factors of our time, including their impact on effective public governance and potentially economic competitiveness. To reap the benefits, policies on the use of digital technologies need to be adequately embedded in public sector reform strategies. The OECD Recommendation of the Council on Digital Government Strategies (2014) offers guidance on their design and implementation. Countries in the MENA region are seeking to align their digital government strategies to the principles in this recommendation to enhance transparency, improve service delivery for citizens and businesses, and foster more productive, competitive and inclusive public institutions to maintain societal stability especially at time of turbulence (OECD, 2017).

Relatively, successfully implementing information and communication technology (ICT) in time, within budget and as intended has proven to be difficult in public service supply chains. Despite huge governmental investment in ICT, there is little evidence that the many years of spending on ICT infrastructure have led to long-term gains in either efficiency or effectiveness (Karwan & Markland, 2006); (Venkatesh, Chan, & Thong, 2012). For instance, amid COVID-19 as turbulent time, some inefficient and ineffective supply chain strategies and operations became more evident when the delay of essential supplies, like Personal Protective Equipment, put lives at risk (KPMG, 2021). Until now, research on the use of ICT in public services has mainly focused on single organizations or on digitizing citizen-government linkages, e.g. using e-mail in internal and external communications, moving from paper-based to electronic record-keeping or implementing electronic self-service systems (Dunleavy, Margetts, Bastow, & Tinkler, 2006); (Lindgren & Jansson, 2013); (Lupo &

Velicogna, 2018). Accordingly, research largely ignores inter-organizational linkages and services. The subject of public service supply chains and their digital transformation is at the cross-roads of several related streams of research, i.e. public management, service operations management, service supply chain management and information management. Thus, despite the potential benefits for public service settings, the inter-organizational nature of many public services is mostly ignored and digital transformation in inter-organizational public services (hereafter: public service supply chains) has not been well-investigated. Therefore, more research regarding the potential and role of ICT systems to digitize public service supply chains and its role to maintain political and social stability at turbulent time is needed.

Consequently, using analytical qualitative methodology, this article seeks to find the answer to the following research question: ‘how may digital supply chain contribute to political and social stability at turbulent time in MENA?’ The research aims to show how resilient digital supply chain influences stability to MENA countries at turbulent time; how the digital supply chain responds to the relevant hurdles; and how this yields the organizational change necessary for resilience societal stability. To this end, the study starts by exploring the notion digital supply chain and its relationship to stability at nowadays turbulent region as MENA region. It then proposes a framework that draws on digital supply chain to better understand and assess inter-organizational resilience to maintain societal stability at turbulent time. The study concludes with a discussion of digital supply chain resilience and its pursue to maintain stability in the context of current turbulent time at MENA, along with the challenges, consequences and outcomes.

2. Supply chain management in public service delivery significance

The traditional approach to supply chain management (SCM) concerns material flows, but the development of service orientation in this area has been apparent for more than 20 years (GA. & Gursoy, 2020); (JS., PV., & H., 2011); (Baltacioglu, E., MD., O., & YC., 2007); (Ellram, Tate, & Billington, 2004) . According to (Baltacioglu, E., MD., O., & YC., 2007), a service supply chain could be ‘the network of suppliers, service providers, consumers and other supporting units that performs the functions of transaction of resources required to produce services; transformation of these resources into supporting and core services; and the delivery of these services to customers’ (Katarzyna & Maciej, 2023). In such chains, flows are intangible, heterogeneous and volatile, distinguishing them from product supply chains (Kalra et al. 2021; (JS., PV., & H., 2011); (Baltacioglu, E., MD., O., & YC., 2007); (Ellram, Tate, & Billington, 2004). However, flow intangibility applies strictly to service provision and the use of adequate skills and knowledge. According to Aitken et al. (2016), many service processes have tangible results, e.g. repairing a car after a collision has a



tangible effect. In the public sector, the delivery of services also has a tangible effect. In service supply chains, operations aim to transform the resources of individual organizations into basic services (e.g. media provision or medical advice) and auxiliary services (e.g. the maintenance of technical infrastructure or medical examinations) that create value for the customer. Service providers in such chains deal with constant needs that may fluctuate periodically and require the ability to meet surplus demand for services.

However, as a result, they must also prepare for sudden, unpredictable events and the emergence of additional demands at turbulent time. Therefore, the management of service supply chains involves designing the service provision process and combining the roles, resources, knowledge and skills of various actors to jointly create high-quality service (Howard, Roehrich, Lewis, & Squire, 2017); (Callender, 2011); (Ellram, Tate, & Billington, 2004). It entails 'the management of information, processes, capacity, service performance and funds from the earliest supplier to the ultimate customer' (Ellram, Tate, & Billington, 2004). From a public sector perspective, the goal of service supply chain management is to deliver high-quality public services, not to profit from selling services. Public service supply chains operate within the scope that legal regulations establish and implement their initiatives through taxes and fees, as well as public involvement (e.g. voluntary work). Public service supply chain functions also entail transparency in their processes. As a result, their structure and the relations between their links are open and implemented on the basis of applicable legal regulations, system solutions and partnership agreements. Public service organizations often operate collaboratively to achieve their purposes (Noordegraaf, 2013); (Osborne, Radnor, & Nasi, 2012); (Voets, Van Dooren, & De Rynck, 2008), acting as a public service supply chain (Callender, 2011); (De Blok, Van Donk, Seepma, & Roukema, 2019). For organizations within such chains, such as healthcare and justice organizations, it is necessary to exchange information extensively.

Accordingly, public service supply chains, as opposed to their private equivalents, can be characterized by their goals, i.e. they strive for equity in addition to effectiveness and efficiency, their political control structures, and their regulated processes. Moreover, public organizations have pre-determined roles and responsibilities that are based in law (Andrews, Boyne, & Walker, 2011); (Berman, 2008); (Boyne, 2002); (Bozeman & Moulton, 2011); (Laing, 2023). These together with their diverse goals, i.e. equity, effectiveness and efficiency, mean that information in public service supply chains is judged on its availability, timing and accuracy (Yang & Maxwell, 2011). In highly regulated supply chains, such as criminal justice supply chains, demands related to information exchange are even more important because of privacy, confidentiality and authenticity concerns (Yang & Maxwell, 2011). These concerns stem from and formal policies that clearly define,

and possibly restrict, conditions and processes for information collection and sharing, influencing the possibilities, the modes and intensity of information exchange (Dawes, 1996); (Lam, 2005); (Yang & Maxwell, 2011). Taken together, the specific public performance requirements (i.e. efficiency, effectiveness and equity), the regulatory environment (i.e. legislation and policies), organizational independence (i.e. differences in the goals, procedures and rules of organizations, as set by government) and specific informational requirements influence interorganizational information flows (Gil-Garcia & Sayogo, 2016); (Lindgren & Jansson, 2013); (Yang & Maxwell, 2011); (Wenjing, 2011); (Kuipers, Higgs, Kickert, Tummers, Grandia, & Van Der Voet, 2014). These factors might, thus, influence digital inter-organizational information flows and the implementation and use of inter-organizational ICT.

3. Digitizing public service supply chain

The OECD Recommendation (2017) calls for a progressive and innovative approach to using technology that goes beyond the mere support of better public sector operations, to the full integration of digital technologies in shaping overarching strategies and agendas for public sector reform. It highlights the need for governments to reach new levels of maturity in the use of ICT: moving from e-Government to Digital Government. This concept of Digital Government implies an important paradigm shift in how the use of technologies in the public sector is conceived and implemented. Earlier on in the e-Government movement, the use of ICT focused on improving the efficiency of specific operations and areas of work. However, OECD countries have since realized that, with the rapid progress of digital, mobile and cloud technologies, this approach fails to take advantage of the full potential of digital technologies. The new digital paradigm recognizes the opportunity offered by new technologies to radically transform back-office operations in order to: improve public sector agility, enhance data management, and create more open and innovative societies that can drive social inclusiveness, and improve government accountability and effectiveness. All of these factors contribute to long-term inclusive and sustainable development.

Relatively, the key to supply chain capabilities lies in integrating various technological means, improving the level of digitalization in the supply chain, achieving supply chain collaboration and sharing, and promoting the development of a networked, intelligent, and sustainable supply chain (Yang, X.; Song, H., 2017). Building upon the research of Fang Wu, Rui Bi, and others, a two-tier structure to conceptualize supply chain capabilities is adopted, which includes four dimensions: information exchange, activity coordination, business integration, and supply chain responsiveness (Wu, Yenyurt, Kim, & Cavusgil, 2006); Bi et al., 2013). These four dimensions were chosen because they represent important activities involved in the supply chain process, and each dimension reflects the cross-functional and cross-



organizational capabilities required in supply chain management (Wu, Yeniyurt, Kim, & Cavusgil, 2006), aligning with the digital context of network collaboration (Ning & Yao, 2023). Previous studies have demonstrated the impact of supply chain capabilities on organizational performance, with supply chain capabilities representing a higher level within the hierarchy of organizational capabilities, which are more difficult to achieve and enjoy higher levels of protection against competitive imitation (Alfred et al., 2011). Supply chain capabilities have a positive impact on organizational performance, including financial and marketing performance (Zheng, Ma, & Wu, 2018).

Meanwhile, The use of ICT in service delivery processes has been empirically studied in general service settings (Ponsignon, Smart, & Maull, 2011) and public settings (Karwan & Markland, 2006); (Iannacci, 2010); (Iannacci, F., 2014). Both streams of literature identify criteria and aspects for consideration but lack a general overarching framework. It is clear that digital redesign and use of inter-organizational ICT in service settings are under-investigated. To investigate digital public service supply chains, they are considered as service systems. The foundational work of (Roth & Menor, 2003) provides an exhaustive list of service delivery design aspects, namely, structure (i.e. facilities, layout, technologies and equipment), infrastructure (i.e. roles of service providers, people, policies, practices, processes and performance systems) and integration (i.e. operations organization and coordination, service supply chains, integration technologies and learning and adaptive mechanisms), which should be taken into account in the provision of the final service to the recipient (Machuca, González-Zamora, & Aguilar- Escobar, 2007); (Meyer, Johnston, Duffy, & Rao, 2002); (Roth & Menor, 2003). The service delivery system aligned with the service concept (i.e. what is offered to the service recipient) and target market requirements provide the basis for service delivery (Giannakis, Doran, Mee, Papadopoulos, & Dubey, 2018); (Machuca, González-Zamora, & Aguilar- Escobar, 2007); (Meyer, Johnston, Duffy, & Rao, 2002); (Roth & Menor, 2003).

4. Digital public service supply chain to MENA stability at turbulent times: challenges and implications

The MENA region has experienced dynamic population growth (1.99% annual growth rate) and is becoming increasingly urban, as are most parts of the world. Urban population growth for the region in 2014 was 2.47%, reaching 63.74% of the total population (World Bank, World Development Indicators, 2014). This growth already poses significant organizational challenges in large urban areas and exerts pressure on governments, which must look for new ways of providing access to basic services. Governments must also create the necessary conditions to promote economies of scale and the competitive entry into global value chains. This population growth becomes more challenging when considering the unequal access to services and

economic opportunities that exist across the region, particularly in rural areas. Not ensuring access to digital technologies is likely to lead to uneven development and missed opportunities in the form of productivity gains, economic growth and social inclusion. Ensuring access to and the use of ICT in rural areas is a necessary basis for favorable integration into today's globalized economy (OECD, 2021). It can also improve access to information and services. For example, E-Health services can enhance the access, quality and cost-effectiveness of specialized healthcare. However, they rely on innovative delivery models to include those who are illiterate or not digitally connected. Digital technologies can also foster financial inclusion, facilitate access to insurance, and provide valuable information, all of which improve the ability of individuals and businesses to make strategic decisions. The knowledge economy has drastically changed the economic landscape. The public sector has never held the monopoly on skills, ideas, data, information, creativity or innovative potential, which means that sound approaches to digital government provide opportunities to leverage talent, data and capacities outside of the public sector to find innovative and collaborative ways of implementing policies and delivering services. This is in line with the demands of more informed and connected constituencies. ICT-enabled participation channels, alternative data collection channels, and crowdsourcing activities can help achieve these results (OECD, 2021).

Certain regional challenges are making countries more prone to economic uncertainty and political instability. These include: inequitable income distribution and access to public services, poor market conditions, falling commodity prices, insufficient private sector development and economic diversification, political unrest, massive migration flows and stocks (of different nature and unequally distributed across countries), and other forms of conflict. These challenges require governments to improve their data collection, sharing and processing capabilities in order to enhance public sector intelligence. New data collection and processing techniques, such as big data analytics or business intelligence, can help governments use predictive analytics to spot trends, create knowledge and take strategic action to prevent or address upcoming challenges. Leveraging the potential of government data to transform the public sectors requires the establishment of a context in which a "big data"-prone mentality and environment is nurtured among civil servants through a set of policy decisions, capacity building efforts and provision of incentives (OECD, 2021).

Accordingly, for sustaining public supply chain management during any unforeseen turbulent environment and to seek desired political and social stability; the dynamic capability view (DCV) theory (Teece & Pisano, 1997) and contingency theory (Fiedler, 1993) are considered. DCV theory is concerned with dynamic ability and strategic management abilities of a firm by which the firm can integrate, build, and reconfigure its internal and external capabilities to address any environmental



issue which is rapidly changing (Teece & Pisano, 1997). Thus, the issue is how firms can successfully sustain its supply chain resilience during any turbulent environment. In this context, the inputs of DCV theory are perceived to be helpful. In terms of DCV theory, it is known that dynamic capabilities emphasized on the abilities of the firms for responding and reacting timely and adequately to any abrupt external environmental change (Gregory & Jon, 2011). For exhibiting reactions and response, the firms must have to improve their several capabilities. Thus, to address any external environmental issue, the DCV theory suggests that the capabilities of the affected firms are needed to be developed by adopting appropriate strategies through improvement of the firms' several competencies (Felix & Lamar, 2018). In this perspective, the DCV theory helps to provide a transparent roadmap on how a firm can sustain its supply chain management during any turbulent environment. The DCV theory advocates that to address any turbulent environment, a firm needs to develop their several capabilities (Basiouni, Hafizi, Akhtar, & Alojairi, 2019). In the context of this study, the capabilities are perceived to cover technological, innovative as well as relational development aspects. Dynamic capability being the higher order capability explains the firms' abilities to face the highly dynamic and changing environment (Sheshadri & Ranjan, 2022). Consequently, they can sense, seize, and reconfigure so that in dynamic turbulent situation, the firms can develop their supply chain strategy to sustain their flow of supply chain (Eckstein, Goellner, Blome, & Henke, 2015). Again, contingency theory (Fiedler, 1993) approach is perceived to serve as a basic concept concerning nexus between external uncertain environment and emergent strategies needed to be adopted by the firms to sustain supply chain system. Contingency scholars argue that firm performance is considered as a function of congruence between the affected firms and the external environment as well as the strategies (Venkataraman 1989).

Thus, Contingency theory (Fiedler, 1993) posits that there is no best specific way to address any unstable turbulent environment to sustain supply chain system. What steps would be taken by a firm to address a turbulent environment depend on the nature of turbulence and on the firms' internal and external situation (Pratono, 2016). This is the main theme of contingency theory. Accordingly, it can be said that a firm must have an appropriate contingency plan to address any turbulent environment for sustaining supply chain management (Fredericks, 2005). Effective contingency plan is perceived to help a firm to adopt appropriate supply chain strategy. Firms adopt strategies to sustain supply chain resilience and the specific strategy to be adopted depends on the nature and level of the uncertain turbulence (Pratono, 2016); (Salam & Seny, 2017) . Accordingly, Information technology and digitizing are the most critical contingency variables in the external environment. (Zhu & Yan, 2010) Pointed out the importance of aligning IT infrastructure with the organizational structure to enhance organizational adaptability. In reality, this

involves improving the organization's information processing capabilities and providing robust support platforms for organizational transformation and digitizing supply chain creation. Then, digital Supply chain process has become borderless, and it is an invisible process that emphasizes on the flexibility and speed of the process (Bowersox, Closs, & Cooper, 2002). Flexibility is conceptualized as how the digital supply chain could estimate the nature of uncertainty it might have to face, and it could create resilient alignment by adopting effective strategy to restore societal stability (Schlittgen, Ringle, Sarstedt, & Becker, 2016).

Consequently, achieving the digital transformation to effective digital public service supply chain; is of strategic importance for countries of the Middle East and North Africa (MENA) region especially at current turbulent time. A successful digital transformation requires key enablers to be in place to support the creation of a dynamic digital government ecosystem that can drive digitization, cultural change, and innovation. In order for the government to deliver digital public services, collect data and crowd source ideas, the broader public must have access to information and communication technology (ICT). Creating a networked society requires governments to provide the necessary conditions for the development of ICT infrastructure, including a sound legal and regulatory framework and the establishment of a policy environment that supports optimal market conditions for the sustainable development of ICT infrastructure. These efforts should look at the supply of ICT services as well as the demand side, which can guarantee economic and social returns on investment.

Hence, the requirements to digital public service supply chain; which develop the conceptual framework to ensure resilient sustainability during turbulent environment could be identified as follows (see fig.1):

Technology capability (TC): there is need of accurate exchange of information as effective integration and collaboration, among the supply chain stakeholders (Errassafi, Abbar, & Benabbou, 2019). Developing technological capability of the firms, the information exchange system will be improved within the supply chain system helping to mitigate the uncertainty enabling the firms to promptly address any turbulent environment; the firms are needed to adopt appropriate supply chain strategy under such dynamic situation (Mofokeng & Chinomona, 2019).

Innovation capability (IC): Innovation capability (IC) of public organizations is considered to comprise of technological innovation and social innovation in the context of addressing any turbulent environment for keeping the digital public service supply chain system sustainable (Sarkis, 2020). In response to address any turbulent environment for sustaining supply chain, organizations needs to adopt industry 4.0 technologies like IoT, AI, cyber physical system (CPS), block chain technology, cognitive computing technology and so on (Kumar, Sharma, Singh, Naugriya, Gill, & Buyya, 2020); (Chatterjee, 2020). It is important to realize that social and



environmental crisis will occur in future. None knows when and in what level such turbulent incident would take place. But having necessary data driven system like big data, a firm can quickly and aptly respond and react to such social and environmental crisis (DesJardine, Bansal, & Yang, 2019).

Relationship management capability (RC): Relationship management capability (RC) of a firm is considered as a communication among different stakeholders of the firms in the context of relational view that would improve the sustainability of supply chain system in any turbulent environment (Paulraj, Lado, & Chen, 2008). RC has the power to acquire new skills and can enhance the collaborative activities among the stakeholders involved in supply chain (Kale et al. 2000). RC is also conceptualized as the ability to tighten relationship through development of trust and sharing knowledge (Park, 2015). RC includes the qualities like dedication, mutual trust as well as benefits which strengthen supply chain performance enhancing coordination among the partners (Wu et al. 2014).

Contingency plan (CP): What steps would be taken by a firm to address a turbulent environment depend on the nature of turbulence and on the firms' internal and external situation (Pratono, 2016). This is the main theme of contingency theory. Accordingly, it can be said that a firm must have an appropriate contingency plan to address any turbulent environment for sustaining supply chain management (Fredericks, 2005). Effective contingency plan is perceived to help a firm to adopt appropriate digital supply chain strategy (Chatterjee and Chaudhuri, 2022). Firms adopt strategies to sustain digital public service supply chain resilience and the specific strategy to be adopted depends on the nature and level of the uncertain turbulence (Pratono, 2016); (Salam & Seny, 2017).



Figure 1: The conceptual framework to resilient public service supply chain

Leadership team support (LS): leadership team support (LS) has an effective influence on the innovation abilities of a firm to address any turbulent environment (Zhang et al. 2018). For sustaining digital supply chain management of a firm at the time of turbulent environment, the firm needs to adopt a particular strategy that depends on the characteristics of the turbulence which is the concept of contingency theory (Fiedler, 1993). In such situation, the firm requires financial help and that can be ensured by the leadership team support (Lei, Phouvang, & Le, 2018). To implement a strategic plan, a firm needs appropriate fund and considerable efforts of the employees of the firm (Venkatraman, 1989); (Smart, Hemel, Lettice, Adams, & Evans, 2017).

Supply chain strategy (SS): Value of digital supply chain can be perceived from the fact that how a firm is being able to use its supply chain management as a strategic weapon (Ketchen & Hult, 2007). Flexibility is conceptualized as how the digital supply chain could estimate the nature of uncertainty it might have to face, and it could create an alignment by adopting effective strategy (Schlittgen, Ringle, Sarstedt, & Becker, 2016). Thus, the digital supply chain is needed to measure the operational performance of its process in the context of turbulent environment that can evaluate the effectiveness of its strategy (Ringle & Sarstedt, 2016).

Moderating role of government regulation (GR): It is recognized that the supply chain flow depends on the natural environment where it is embedded (Chopra & Meindl, 2013). Digital public service supply chain involves multiple firms dispersed geographically and as such, the firms are influenced by the



regulations of that land where they are operating (Manning, F., Von Hagen, & Reinecke, 2012); (Montabon, Pagell, & Wu, 2016). Consequently, regulatory policies at one place in the chain may be different for the other firms connected in the chain but functioning in another place. Three types of regulatory policies are there which are market-based policies, command-and-control regulations, and non-regulatory approaches (Darnall, Welch, & Cho, 2019). The regulatory authorities always encourage the forms' involvement in supply chain activities to reduce the environmental impacts throughout the process. In the turbulent environment, the firms encounter several constrains in the supply chain process and over this, if the impacted firms are to adhere to obey all the regulatory checks in the process in such situation, it is likely that supply chain sustainability in the turbulent environment is impeded (Gupta & Piero, 2013).

Conclusion

In this article, the digital public service supply chain significance role to maintain the stability of MENA at turbulent time is explored. Relatively, the key to supply chain capabilities lies in integrating various technological means, improving the level of digitalization in the supply chain, achieving supply chain collaboration and sharing, and promoting the development of a networked, intelligent, and sustainable supply chain. Meanwhile, certain regional challenges are making countries more prone to economic uncertainty and political instability. These include: inequitable income distribution and access to public services, poor market conditions, falling commodity prices, insufficient private sector development and economic diversification, political unrest, massive migration flows and stocks (of different nature and unequally distributed across countries), and other forms of conflict. These challenges require governments to improve their data collection, sharing and processing capabilities in order to enhance public sector intelligence.

Accordingly, for sustaining public supply chain management during any unforeseen turbulent environment and to seek desired political and social stability; the dynamic capability view (DCV) theory and contingency theory are considered. DCV theory is concerned with dynamic ability and strategic management abilities of a firm by which the firm can integrate, build, and reconfigure its internal and external capabilities to address any environmental issue which is rapidly changing. Effective contingency plan is perceived to help a firm to adopt appropriate supply chain strategy. Firms adopt strategies to sustain supply chain resilience and the specific strategy to be adopted depends on the nature and level of the uncertain turbulence. Accordingly, Information technology and digitizing are the most critical contingency variables in the external environment.

Consequently, achieving the digital transformation to effective digital public service supply chain; is of strategic importance for countries of the Middle East and North Africa (MENA) region especially at current turbulent time. A successful digital transformation requires key enablers to be in place to support the creation of a dynamic digital government ecosystem that can drive digitization, cultural change, and innovation. Relatively, the requirements to digital public service supply chain; which develop the conceptual framework to ensure resilient sustainability during turbulent environment are Technology capability, Innovation capability, Relationship management capability, Contingency plan, Leadership team support, Supply chain strategy and Moderating role of government regulation.

Hence, creating a networked society requires governments to provide the necessary conditions for the development of ICT infrastructure, including a sound legal and regulatory framework and the establishment of a policy environment that supports optimal market conditions for the sustainable development of ICT infrastructure. Eventually, the sustainable flow of needed supply can be ensured by developing proper resilient public service supply chain system necessary to enable societal stability in the MENA at turbulent times.

References

- Andrews, E., Boyne, G., & Walker, R. (2011). "Dimensions of publicness and organizational performance: A review of the evidence". *Journal of Public Administration Research and Theory*, Vol. 21 No. 3, 301-319.
- Baltacioglu, T., E., A., MD., K., O., Y., & YC., K. (2007). A new framework for service supply, chains. *Serv Ind J*, 27:105–124. <https://doi.org/10.1080/02642060601122629>.
- Basiouni, A., Hafizi, A., Akhtar, N., & Alojairi, A. (2019). Assessing Canadian Business IT Capabilities for Online Selling Adoption: A Net-Enabled Business Innovation Cycle (NEBIC) Perspective. *Sustainability* 11(13), 3662. <https://doi.org/10.3390/s11133662>.
- Berman, E. (2008). Productivity in Public and Nonprofit Organizations. *Sage Publications, Thousand Oaks, CA.*, 87-95.
- Bowersox, D., Closs, D., & Cooper, M. (2002). Supply Chain Logistics Management; McGraw Hill. *Irwin, NY, USA*, 65-78.
- Boyne, G. (2002). "Public and private management: what's the difference?". *Journal of Management Studies*, Vol. 39, No. 1, 97-122.



- Bozeman, B., & Moulton, S. (2011). “Integrative publicness: A framework for public management strategy and performance”. *Journal of Public Administration Research and Theory*, Vol. 21, No. 3, 363-380.
- Callender, G. (2011). Alignment of inter-agency supply chains to enhance public sector performance management. *Int J Product Perform Manag* 60, 9–23. <https://doi.org/10.1108/1741040111094286>.
- Chatterjee, S. (2020). AI strategy of India: policy framework, adoption challenges and actions for government. *Transform Govern People Proc Policy* 14(5), 757–775. <https://doi.org/10.1108/TG-05-2019-0031>.
- Chopra, S., & Meindl, P. (2013). *Supply Chain Management*, 5th edn. Pearson, Chandler, AZ, 101-111.
- Chopra, S., & Sodhi, M. (2014). Reducing the risk of supply chain disruptions. *MIT Sloan Manag. Rev.* 55 (3), 72–80.
- Chopra, S.; Sodhi, M. (2014). Reducing the risk of supply chain disruptions. *MIT Sloan Manag. Rev.* 55 (3), 72–80.
- Craighead, C., Blackhurst, J., Rungtusanatham, M., & Handfield, R. (2007). The severity of supply chain disruptions: design characteristics and mitigation capabilities. *Decis. Sci. J.* 38 (1), 131–156.
- Darnall, N., Welch, E., & Cho, S. (2019). Sustainable supply chains and regulatory policy. *Handbook on the Sustainable Supply Chain* Edward Elgar, Publisher, 45-56.
- Dawes, S. (1996). “Interagency information sharing: Expected benefits, manageable risks”. *Journal of Policy Analysis and Management*, Vol. 15No.3, 377-394.
- De Blok, C., Van Donk, D., Seepma, A., & Roukema, I. M. (2019). “Applying supply chain logic to criminal law enforcement - the case of The Netherlands”. in Radnor, Z. and Upton, D. (Eds), *Public Service Operations Management*, Routledge, Abingdon, 67-73.
- DesJardine, M., Bansal, P., & Yang, Y. (2019). Bouncing back: building resilience through social and environmental practices in the context of the 2008 global financial crisis. *J Manag* 45(4), 1434–1460. <https://doi.org/10.1177/0149206317708854>.
- Dunleavy, P., Margetts, H., Bastow, S., & Tinkler, J. (2006). “New public management is dead – long live Digital-Era governance”. *Journal of Public Administration Research and Theory*, Vol. 16No. 3, 467-494.
- Eckstein, D., Goellner, M., Blome, C., & Henke, M. (2015). The performance impact of supply chain agility and supply chain adaptability: the moderating

- effect of product complexity. *Int J Prod Res* 53(10), 3028–3046. [https:// doi. org/ 10. 1080/ 00207 543](https://doi.org/10.1080/00207543.2014.97070). 2014. 97070.
- Ellram, L., Tate, W., & Billington, C. (2004). Understanding and managing the services supply chain. *J Supply Chain Manag* 40, 17–32. [https:// doi. org/ 10. 1111/j. 1745- 493X. 2004. tb001 76.x](https://doi.org/10.1111/j.1745-493X.2004.tb00176.x).
- Errassafi, M., Abbar, H., & Benabbou, Z. (2019). The mediating effect of internal integration on the relationship between supply chain integration and operational performance: Evidence from Moroccan manufacturing companies. *J Indust Engin Manag* 12(2), 254–273.
- Felix, A., & Lamar, P. (2018). The behavioral and evolutionary roots of dynamic capabilities. *Ind Corp Chang* 27(2), 413–424. [https:// doi. org/ 10. 1093/ icc/ dtx050](https://doi.org/10.1093/icc/dtx050).
- Fiedler, F. (1993). The contingency model: New directions for leadership utilization. In Matteson and Ivancevich (Eds.), *Manag Organ Behav Class*, 333–345.
- Fredericks, E. (2005). Infusing flexibility into business-to-business firms: A contingency theory and resource-based view perspective and practical implications. *Ind Mark Manage* 34(6), 555–565. [https:// doi. org/ 10. 1016/j. indma rman. 2004. 09. 022](https://doi.org/10.1016/j.indma.2004.09.022).
- GA., A., & Gursoy, G. (2020). Strategic management perspectives on supply chain. *Manag Rev Q* 70, 213–241. [https:// doi. org/ 10. 1007/ s11301- 019- 00165-6](https://doi.org/10.1007/s11301-019-00165-6).
- Giannakis, M., Doran, D., Mee, D., Papadopoulos, T., & Dubey, R. (2018). “The design and delivery of modular legal service: implications for supply chain strategy”. *International Journal of Production Research*, Vol. 56 No. 20, 6607-6627.
- Gil-Garcia, J., & Sayogo, D. (2016). “Government interorganizational information sharing initiatives: understanding the main determinants of success”. *Government Information, Quarterly*, Vol. 33 No. 3, 572-582.
- Gregory, L., & Jon, P. (2011). A managerial perspective of dynamic capabilities in emerging markets: The case of the Russian steel industry. *J East Euro Manag Stud* 16(3), 215–236. [https:// doi. org/ 10. 2307/ 2328188](https://doi.org/10.2307/2328188).
- Gupta, M., & Piero, T. (2013). Environmental management is good business. *Industrial Management* 45(1), 14–19.
- Howard, M., Roehrich, J., Lewis, M., & Squire, B. (2017). Converging and diverging governance mechanisms: the role of (Dys)function in long-term



- inter-organizational relationships. *Br J Manag* 30, 624–644. <https://doi.org/10.2139/ssrn.3009191>.
- Iannacci, F. (2010). “When is an information infrastructure? Investigating the emergence of public sector information infrastructures”. *European Journal of Information Systems*, Vol. 19No. 1, 35-48.
- Iannacci, F. (2014). “Routines, artifacts and technological change: investigating the transformation of criminal justice in England and Wales”. *Journal of Information Technology*, Vol. 29, No. 4, 1-18.
- Ivanov, D., & Dolgui, A. (2022). The shortage economy and its implications for supply chain and operations management. *Int. J. Prod. Res.* 60 (24), 7141–7154.
- JS., A., PV., F., & H., d. H. (2011). Service supply chain management: a survey of lean application in the municipal sector. *Int J Phys Distrib Logist Manag* 41, 277–295. <https://doi.org/10.1108/09600031111123796>.
- Karwan, K., & Markland, R. (2006). “Integrating service design principles and information technology to improve delivery and productivity in public sector operations: the case of the South Carolina DMV”. *Journal of Operations, Management*, Vol. 24No.4, 347-362.
- Katarzyna, S. M., & Maciej, S. (2023). Understanding public service supply chain management: a systematic literature review. *Management Review Quarterly*, , 3-11. <https://doi.org/10.1007/s11301-023-00350-8>.
- Ketchen, D., & Hult, G. (2007). Bridging organization theory and supply chain management: The case of best value supply chains. *J Oper Manag* 25(2), 573–580. <https://doi.org/10.1016/j.jom.2006.05.010>.
- KPMG. (2021). DIGITAL SUPPLY CHAIN: Improving Efficiency, Security and Visibility for the Public Sector. *a Delaware limited liability partnership and a member firm of the KPMG global organization, UK.*, 2-7.
- Kuipers, B., Higgs, M., Kickert, W., Tummers, L., Grandia, J., & Van Der Voet, J. (2014). “The management of change in public organizations: a literature review”. *Public Administration*, Vol. 92No. 1, 1-20.
- Kumar, A., Sharma, K., Singh, H., Naugriya, S., Gill, S., & Buyya, R. (2020). A drone-based networked system and methods for combating coronavirus disease (COVID-19) pandemic. *Futur Gener Comput Syst* 115:1–19. <https://doi.org/10.1016/j.future.2020.08.046>.
- Laing, A. (2023). “Marketing in the public sector: towards a typology of public services”. *Marketing Theory*, Vol. 3 No. 4, 427-445.

- Lam, W. (2005). "Barriers to e-government integration". *Journal of Enterprise Information Management*, Vol. 18 No. 5, 511-530.
- Lei, H., Phouvong, S., & Le, P. (2018). How to foster innovative culture and capable champions for Chinese firms: an empirical research. *Chin Manag Stud* 13(1):51–69. <https://doi.org/10.1108/CMS-05-2018-0502>.
- Lindgren, I., & Jansson, G. (2013). "Electronic services in the public sector: a conceptual framework". *Government Information Quarterly*, Vol. 30No. 2, 163-172.
- Lupo, G., & Velicogna, M. (2018). "Making EU justice smart? looking into the implementation of new technologies to improve the efficiency of cross border justice services delivery". in Rodríguez Bolívar, M.P. (Ed.), *Smart Technologies for Smart Governmen Springer, New York, NY*, 95-121.
- Machuca, J., González-Zamora, M. D., & Aguilar- Escobar, V. (2007). "Service operations management research". *Journal of Operations Management*, Vol. 25 No. 3, 585-603.
- Manning, S., F., B., Von Hagen, O., & Reinecke, J. (2012). National contexts matter: the co-evolution of sustainability standards in global value chains. *Ecol Econ* 83:197–209. [https://doi.org/10.1016/j.ecolecon.2011, 08.029](https://doi.org/10.1016/j.ecolecon.2011.08.029).
- Meyer, S., Johnston, R., Duffy, J., & Rao, J. (2002). "The service concept: the missing link in service design research? . *Journal of Operations Management*, Vol. 20, No. 2, 121-134.
- Mofokeng, T., & Chinomona, R. (2019). Supply chain partnership, supply chain collaboration and supply chain integration as the antecedents of supply chain performance. *South African J Bus Manag*, 50(1):1–10. <https://doi.org/10.4102/sajbm.v50i1>, 193.
- Montabon, F., Pagell, M., & Wu, Z. (2016). Making sustainability sustainable. *J Supply Chain Manag* 52(2), 11–27. <https://doi.org/10.1111/jscm.12103>.
- Ning, L., & Yao, D. (2023). The Impact of Digital Transformation on Supply Chain Capabilities and Supply Chain Competitive Performance. *Sustainability* 2023, 15. 10107. <https://doi.org/10.3390/su151310107>.
- Noordegraaf, M. (2013). "Reconfiguring professional work: changing forms of professionalism in public services". *Administration&Society*, 1-28.
- Osborne, S., Radnor, Z., & Nasi, G. (2012). "A new theory for public service management? Toward a (public) Service- Dominant approach". *The American Review of Public Administration*, Vol. 43No. 2, 135-158.



- Park, C. (2015). Emergence of Inter-organizational Collaboration Networks: Relational Capability Perspective. *J Korean Opera Res Manag Sci Soc* 40, 1–18. <https://doi.org/10.7737/JKORMS.2015.40.4.001>.
- Paulraj, A., Lado, A., & Chen, I. (2008). Inter-organizational communication as a relational competency: Antecedents and performance outcomes in collaborative buyer–supplier relationships. *J Oper Manag* 26(1), 45–64.
- Ponsignon, F., Smart, A., & Maull, R. (2011). “Service delivery system design: characteristics and contingencies”. *International Journal of Operations & Production Management*, Vol. 31No. 3, 324-349.
- Pratono, A. (2016). Strategic orientation and information technological turbulence: Contingency perspective in SMEs. *Bus Process Manag J* 22(2), 368–382. <https://doi.org/10.1108/BPMJ-05-2015-0066>.
- Rameshwar, D. a., David, J., Bryde, b., . Yogesh, K., Dwivedi, c., Gary, G. d., et al. (2023). Thanos Papadopoulos, Dynamic digital capabilities and supply chain resilience: The role of government effectiveness. *International Journal of Production Economics* 258 (2023) 108790, 2-16.
- Ringle, C., & Sarstedt, M. (2016). Gain more insight from your PLSSEM results: The importance-performance map analysis. *Ind Manag Data Syst* 116(9), 1865–1886. <https://doi.org/10.1108/IMDS-10-2015-0449>.
- Roth, A., & Menor, L. (2003). “Insights into service operations management: a research agenda”. *Production and Operations Management*, Vol. 12, No. 2, 145-164.
- Salam, M., & Seny, K. K. (2017). Analyzing Supply Chain Uncertainty to Deliver Sustainable Operational Performance: Symmetrical and Asymmetrical Modeling Approaches. *Sustainability* 9, (12). <https://doi.org/10.3390/su9122217>.
- Sarkis, J. (2020). Supply chain sustainability: learning from the COVID- 19 pandemic. *Int J Oper Prod Manag* 41(1), 63–73. <https://doi.org/10.1108/IJOPM-08-2020-0568>.
- Schlittgen, R., Ringle, C., Sarstedt, M., & Becker, J.-M. (2016). Segmentation of PLS Path Models by Iterative Reweighted Regressions. *J Bus Res* 69(10), 4583–4592. <https://doi.org/10.1016/j.jbusres.2016.04.009>.
- Sheshadri, C., & Ranjan, C. (2022). Supply chain sustainability during turbulent environment: Examining the role of firm capabilities and government regulation. *Operations Management Research*, 15, 1081–1095. <https://doi.org/10.1007/s12063-021-00>.

- Smart, P., Hemel, S., Lettice, F., Adams, R., & Evans, S. (2017). Pre-paradigmatic status of industrial sustainability: a systematic review. *Int J Oper Prod Manag* 37(10), 1425–1450. <https://doi.org/10.1108/IJOPM-02-2016-0058>.
- Tang, C. (2006). Robust strategies for mitigating supply chain disruptions. *Int. J. Logist. Res. Appl.* 9 (1), 33–45.
- Teece, D., & Pisano, G. S. (1997). Dynamic Capabilities and Strategic Management. *Strateg Manag J* 18(7), 509–533.
- Tomlin, B. (2006). On the value of mitigation and contingency strategies for managing supply chain disruption risks. *Manag. Sci.* 52 (5), 639–657.
- Venkatesh, V., Chan, F., & Thong, J. (2012). “Designing e-government services: key service attributes and citizens’ preference structures”. *Journal of Operations Management, Vol. 30Nos 1/2*, 116-133.
- Venkatraman, N. (1989). The concept of fit in strategy research: Toward verbal and statistical correspondence. *Acad Manag Rev* 14(3), 423-444. <https://doi.org/10.2307/258177>.
- Voets, J., Van Dooren, W., & De Rynck, F. (2008). “A framework for assessing the performance of policy networks”. *Public Management Review, Vol. 10No.6*, 773-790.
- Wenjing, L. (2011). “Government information sharing: principles, practice, and problems-an international perspective”. *Government Information Quarterly, Vol. 28, No. 3*, 363-373.
- Wu, F., Yenyiurt, S., Kim, D., & Cavusgil, S. (2006). The impact of information technology on supply chain capabilities and firm performance: A resource-based view. *Ind. Mark. Manag.* 2006, 35, 493–504.
- Xu, X., Sethi, S., Chung, S., & Choi, T. (2022). Reforming global supply chain management under pandemics: the GREAT-3Rs framework. *Prod. Oper Manag.* <https://doi.org/10.1111/poms.13885>.
- Yang, T., & Maxwell, T. (2011). “Information-sharing in public organizations: a literature review of interpersonal, intra-organizational and inter-organizational success factors”. *Government Information Quarterly, Vol. 28 No. 2*, 164-175.
- Yang, X.; Song, H. (2017). Supply Chain Finance, Supply Chain Capability, and Competitive Performance: A Multi-case Study. *Manag. Case Stud. Rev.* 2017, 10, 491–507.



- Zheng, X., Ma, H., & Wu, J. (2018). Overview and Future Prospects of Capability Research from the Supply Chain Perspective. *Foreign Econ. Manag.* 2018, 40, 59–72.
- Zhu, X., & Yan, Y. (2010). Dynamic Matching: A Multi-case Study based on Structural Contingency Theory. *Case Res. Rev.* 2010, 3, 34–47.