Volume: 9 Issues: 58 Issue [December, 2024] pp. 78- 98
International Journal of Accounting, Finance and Business (IJAFB)
eISSN: 0128-1844
Journal website: www.ijafb.com
DOI: 10.55573/IJAFB.095808

ISSUES AND CHALLENGES OF THE FUEL SUPPLY CHAIN IN OMAN: A LITERATURE REVIEW AND OPPORTUNITIES FOR FUTURE RESEARCH

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Article history
Received date : 11-11-2024
Revised date : 12-11-2024
Accepted date : 21-12-2024
Published date : 22-12-2024

To cite this document:
Al-Tooqi, & Hamzah, H. S. (2024). Issues and challenges of the fuel supply chain in Oman: A literature review and opportunities for future research. *International Journal of Accounting, Finance and Business (IJAFB)*, 9 (58), 78-98.

Abstract: *The Sultanate of Oman is a member of the Gulf Cooperation Council (GCC) and, like the other member countries, is a significant producer and supplier of petroleum. Recent global incidents such as the COVID-19 pandemic and the Ukraine-Russia war, and more regional incidents such as, cyclones and the Arab Spring, have resulted in disruptions to the fuel supply chain across the globe and in Oman. In addition to these, there are other issues and challenges faced by the fuel supply chain in Oman. Therefore, this article aims to provide an improved understanding of the issues and challenges of the fuel supply chain, in general, and in Oman, in particular, in an endeavour to provide pathways for future research in the domain of the fuel industry.*

Keywords: *Fuel, petroleum, supply chain, challenges, Oman*

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Introduction

The Sultanate of Oman is a small country in the Middle East, situated in the south east of the Arabian Peninsula, with the Kingdom of Saudi Arabia (KSA), the United Arab Emirates (UAE) and the Republic of Yemen as its neighbours (CIA, 2023). The country is bounded to the east by the Gulf of Oman, the Sea of Oman, and the Arabian Gulf (Hereher et al., 2020). The coastline extends from the mouth of Hormuz Strait in the north all the way down to the south of the country, covering more than 2000 km (CIA, 2023). Oman is one of the member nations of the Gulf Cooperation Council (GCC) along with the KSA, Kuwait, the UAE, Qatar, and Bahrain (Miniaoui, 2020).

The production of natural resources dominates the Omani economy, and crude oil is a major catalyst for GDP growth. Oman is one of the largest oil and gas producers in the Middle East but is not a member of the Organization of the Petroleum Exporting Countries (OPEC) (Albarashdi & Farag, 2018; Balat, 2006). Oman is the largest exporter of oil outside of OPEC in the Middle East, but its reserves are lower compared to its neighbours in the Gulf. Oman produces around 1 million barrels per day of crude oil, and most of this production is sold to the international market while some quantity is refined in the country for domestic use (CIA, 2023). Petroleum Development Oman (PDO, 2018) reported that at the end of 2017 Oman had more than 8000 active wells, 46 rigs, 28 production stations, 209 oil fields, >30,500 km of pipelines and flowlines, and 600 drilled wells. In 2017, the country's proven oil reserves of the country were 5.4 billion barrels or 700 million tons, which represents 0.3 percent of the total oil reserves (British Petroleum Company, 2018). In 2017, the country's oil reserves to production ratio was 15.2 years (British Petroleum Company, 2018). Data from the Central Bank of Oman (CBO, 2018) indicate that the share of oil activities in the country's GDP reached 36 percent in 2018, and in 2021 the Sultanate recorded an average production of crude oil of 971,200 barrels per day and exported 289 million barrels of crude oil in that year (CBO, 2022).

Oman processes oil for domestic consumption in multiple oil refineries, including Muscat's Mina Al Fahal Refinery and the refinery in the Sohar Port Industrial Complex (Al Batina Governorate). These two refineries have the capacity to process 222,000 barrels of crude oil per day (Oxford Business Group, 2019). Furthermore, the Mina Al Fahal Refinery is situated in a coastal area in the capital Muscat. It is a pivotal area for the country's oil operations. Owned by OQ SAOC (formerly Oman Refinery Company), this refinery started operation in 1982 and has an operational capacity of 106,000 barrels/day (GlobalData, 2023). This refinery receives crude oil from PDO storage facilities in Mina Al Fahal through a pipeline and has the capacity to refine Omani crude oil into different types of fuel such as liquid petroleum Mogas 91, Mogas 95, Diesel, Kerosene, and Jet-A1 fuel. These products are transferred through a 45-kilometer pipeline from Mina Al Fahal to the Al Jifnain depot. The Duqm Refinery, which is currently under construction, is located in the middle of Oman. When the refinery commences operations, potentially by the end of 2023, the refining capacity in the country is anticipated to increase by 230,000 per day (OQ SAOC, 2023). This refinery will produce diesel and Jet A-1 fuel in addition to naphtha and liquefied petroleum gas. This refinery depot will serve the central Oman regions mainly with diesel products mainly and the remaining products will be for exporting. Figure 1 depicts the main oil and gas fields of the country.

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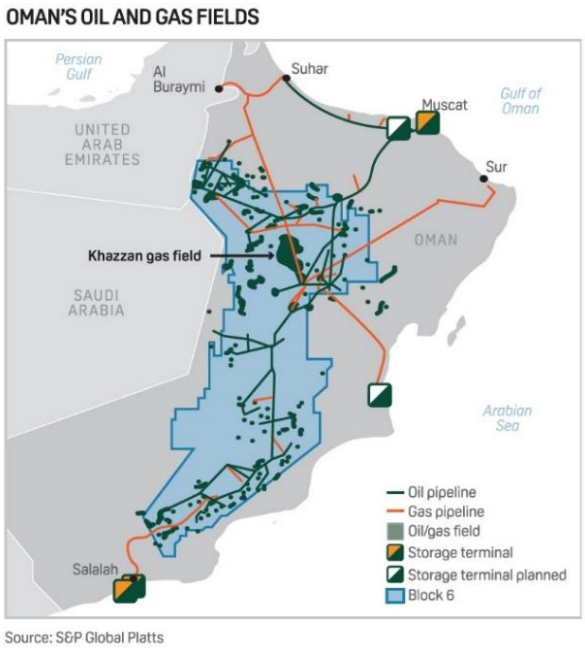

Figure 1 Main Oil And Gas Fields In The Sultanate Of Oman

Source: (Saadi, 2019)

Recent incidents, in and outside of Oman, have clearly indicated that a disruption in any part of the fuel supply process may have a direct impact on the ability of a business to continue its operations and to deliver essential services to its customers (Alamoush, Ballini, & Ölçer, 2021). For example, the Ukraine-Russian war caused supply chain disruptions, with companies facing challenges to pursue outsourcing and offshoring of the operations (Ngoc et al., 2022). This resulted in an increase in global prices of commodities due to the colossal spike in supply disruptions. Furthermore, Kerriou (2023) emphasized that the Covid-19 pandemic led to a significant increase in freight transport prices. This was followed by the war in Ukraine, which came as an exacerbating factor that would deepen and prolong the crisis over time. In Oman, cyclones are also a particular hazard, with the super cyclone Gonu in 2007 followed by Chapala in 2014, Mekunu in 2018, and Luban in 2018 (Al-Manji, Lovett, & Mitchell, 2021; Hereher et al., 2020). In addition, the repercussions of Arab Spring in 2011 resulted in demonstrations in major cities around Oman calling for political, economic and social reforms (Bank, Richter, & Sunik, 2014) that affected oil supplies (Darbouche & Fattouh, 2011).

The significance of the fuel supply chain for Oman's economic performance indicates that any disruptions could adversely impact the country's overall welfare. This requires knowledge of the prospective issues and challenges that can impede this supply chain. Consequently, with a focus on identifying the issues and challenges of the fuel supply chain in Oman, the objective of this paper is to gain awareness of the different issues and challenges to the supply chain, in general, and to the fuel supply chain, in particular, in order to identify areas for future research pertinent to the fuel supply chain in Oman. The following overarching research questions were formulated to inform the study. What are the issues and challenges of the supply chain as reported by existing research?; Which are the issues and challenges pertinent to the fuel supply chain analysed in this area of research?; and How can future researchers contribute to building this literature?

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The remainder of the paper is organised as follows: first, a brief overview of the methodology followed is offered followed by a review of the literature pertaining to the main concepts of interest to the paper. First, an overview of the petroleum supply chain is provided, followed by a discussion of supply chain risks and disruptions. This is followed by a discussion of risks and risk management in supply chains. Then, issues and challenges in the fuel supply chain in Oman are examined. This is followed by a discussion of the findings of the literature review. Finally, the research gap and resultant research opportunities are identified followed by the conclusions of the research.

Methodology

The methodology utilised by the study was a non-systematic review of the literature. Therefore, academic papers and publications were included if they addressed important aspects of the matter under consideration. The researcher utilized different databases including Elsevier, Emerald Journals, JSTOR, Sage Online Journals, Springer, Taylor & Francis Online, Wiley Online Library, Google Scholar, etc., to locate suitable literature for inclusion in the study. These different databases were utlised due to their wide and varied coverage of literature relevant to the study (Heck, Keller, & Rittberger, 2024). Google Scholar was additionally used to ensure that relevant articles not found in the other databases were not overlooked (Bramer, Rethlefsen, Kleijnen, & Franco, 2017; Gusenbauer, 2019). Moreover, the usage of these various databases ensured that the potential shortcomings of one database were offset by another (Kuckertz & Block, 2021). Keywords used in searching for relevant literature were “supply chain management”, “issues and challenges”, “fuel supply chain”, “petroleum supply chain”, “risks”, “supply chain risk management.” In addition, other facets explored included fuel supply chain issues in Oman and the petroleum industry in Oman.

The Petroleum Supply Chain

The petroleum industry has become one of the most critical businesses globally due to its impact on economies on global, national, and regional scales. The demand for this natural resource also continues to increase annually. Consequently, the continued global demand for petroleum and its by-products has increased the need for effective supply chains in the petroleum industry (Hussain, Assavapokee, & Khumawala, 2006). In the oil and gas industry, there has always been a supply chain, given that oil companies have required a group of vendors to ensure that their systems are constantly resupplied (Chima, 2007). The significant supply chain associations in the oil and gas industry can be summarised as follows:

Exploration→Production→Refining→Marketing→Consumer

These associations depict the interface between firms and materials that move throughout supply chains. There are various operations at each stage. For example, exploration operations comprise geophysical and geological processes. On the other hand, production operations comprise production, reservoir, drilling, and facilities engineering. Another complex operation is refining, the output of which is fed to marketing. Retail sale of refined products such as gasoline and engine oil, is under the purview of marketing. Each link in the chain can be an individual firm or a unit of an incorporated organisation (Chima, 2007).

The petroleum supply chain typically involves the exploration stage, procurement of crude, logistics associated with storage, transportation of the crude to refineries, processes at the refinery, delivery, and movement of the finished products (Shah, Li, & Ierapetritou, 2011). Figure 2 depicts the typical oil supply chain, whereas Figure 3 depicts a standard refinery system.

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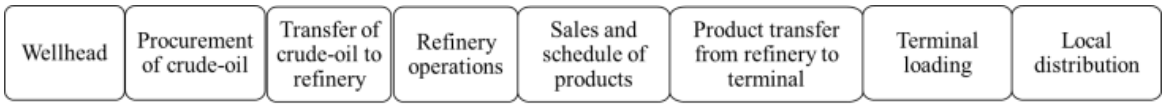

Figure 2 Petroleum supply chain

Source: (Shah et al., 2011, p. 1162)

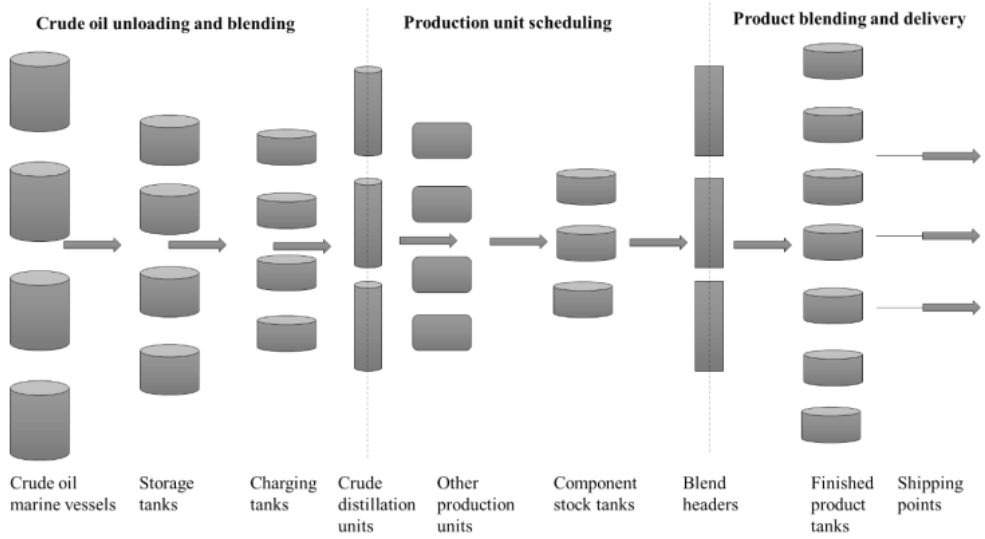

Figure 3 Standard refinery system

Source: (Shah et al., 2011, p. 1162)

Offshore petroleum operations can be organised into three principal sectors: upstream, midstream, and downstream (Al-Janabi, 2020). The function of the upstream sector is to explore, locate, and produce natural gas and crude oil from underground/underwater fields, which are termed onshore/offshore fields. Consequently, the upstream sector is often described as exploration and production (E&P). On the other hand, the midstream sector comprises transportation "(by pipeline, rail, barge, oil tanker, or truck), processing, storage, and wholesale marketing of crude or refined petroleum products" (Al-Janabi, 2020, p. 3). The movement of crude oil/natural gas to refineries and petrochemical factories from production locations is performed through pipelines and other systems of transport. Pipeline networks of natural gas collect gas from wells and from factories for separation and purification and then deliver this to the downstream sector. The operations of the midstream sector sometimes intersect with components of the other two sectors. For instance, natural gas processing factories in the midstream sector can not only refine raw natural gas, but also remove and produce elemental sulphur and natural gas liquids (NGLs). The downstream sector is the final component and includes refineries for crude oil, petrochemical factories, and the distribution of petroleum products. A significant element of this sector is crude oil refining. This results in fuels such as gasoline, diesel, and jet fuels, among others. Moreover, the downstream industry offers various other products including heating oil, jet fuel, asphalt, synthetic rubber, plastics, lubricants, antifreeze, fertilizers, pharmaceuticals, natural gas, pesticides, and propane (Al-Janabi, 2020). Hussain et al. (2006) highlighted that the upstream supply chain for petroleum includes the crude oil acquisition, which is typically performed by oil companies. Processes in the upstream include "exploration, forecasting, production, and logistics management" of delivering crude oil to refineries from oil wells in remote locations. The downstream supply chain for petroleum commences at the refinery. Here, the crude oil is converted into products for consumption and this is typically performed by refineries and petrochemical companies. In addition, the

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downstream supply chain includes the forecasting process, production, and the logistics management of transporting the derivatives of crude oil to global customers (Hussain et al., 2006). Petroleum marketing, on the other hand, refers to the distribution, wholesale and retail, of refined petroleum products to consumers (government, business, industry, and public). Typically, the flow of crude oil and petroleum is to markets that offer the supplier the greatest value. This, generally signifies that the nearest market receives the flow first due to lower cost of transportation and greater net profit for the supplier. However, in practice, the flow of trade may not adhere to this pattern because of other aspects such as, configurations for refinement, product-demand mix, and the quality specifications for the product (Kentucky Government, 2018).

The petroleum supply chain has certain characteristics that distinguish it from other supply chains. For example, petroleum is an outcome of the process industry, which distinguishes it from manufactured products such as automobiles. Petroleum products are extremely inflammable resulting in higher risks in handling, in contrast to other products. Moreover, petroleum products can be easily contaminated and they are produced and transported in bulk resulting in high carrying costs for inventory. In addition, volume flexibility does not exist either from the perspective of production or distribution. Furthermore, the petroleum supply chain has high transportation costs and is also much longer. Finally, in contrast to conventional traditional supply chains, the prices of raw material in the petroleum supply chain are highly volatile in the international market (Varma, Wadhwa, & Deshmukh, 2008). Varma and Deshmukh (2009) highlighted further that the industry's supply chain is characterized by fluctuating raw prices for materials, instability and poor predictability of raw material supplies, high costs of transportation, high inventory carrying costs, extreme difficulty in implementing postponement, low integration of supply chain partners, high risks of contamination / adulteration, long supply chain, inflexible, laggards in IT usage, high proneness to physical risks, high supply criticality, low costs of switching for customers. In addition, Varma and Deshmukh (2009) noted that the supply chain is required to be adaptive due to the dynamic nature of the environment.

Supply Chain Risks and Disruptions

Supply chains have been integral building blocks for international trade, and with increasing globalization, there has been a reported increase in the complexity of supply chains around the globe (Shishodia, Sharma, Rajesh, & Munim, 2021). Consequently, any disruption to them would result in perhaps a complete stoppage of operations. In addition, most supply chains operate in the global environment in the present day which exposes them to high levels of uncertainty. Therefore, the primary objective of organizations participating in a supply chain is not only predict disruptions but also to restore operations to their state prior to the disruptive event. Organizations therefore must carefully assess the risks associated with any strategies they intend to implement and those already in existence. Supply chain risk is "the likelihood of a disruption that would impact the ability of the company to continuously supply products or services" (Jacobs & Chase, 2023, p. 34). A disruption, in this regard, signifies a breakage in the normal workings of a process, system, or event. In the context of a supply chain, disruptions can be defined as "unplanned and unanticipated events that disrupt the normal flow of goods and materials within a supply chain" and consequently "expose firms within the supply chain to operational and financial risks" (Craighead, Blackhurst, Rungtusanatham, & Handfield, 2007, p. 132). Two fundamental aspects can be utilized to assess the risk of disruptive events. The first is the estimated probability of their occurrence whereas the second is the consequences

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of their occurrence on the supply chain. These two aspects were visually depicted using a simple risk matrix (Brown & Badurdeen, 2014) (Figure 4).

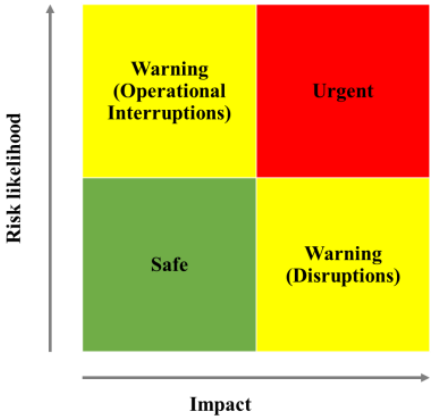

Figure 4 Risk Matrix

Source: (Brown & Badurdeen, 2014, p. 2)

Tang (2006, p. 453) defined supply chain risk management (SCRM) as "the management of supply chain risks through coordination or collaboration among supply chain partners so as to ensure profitability and continuity." Moreover, it has been observed that the issue of SCRM could be addressed in two dimensions. The first is the supply chain risk which may be operational or disruption risks (Brown & Badurdeen, 2014; Kleindorfer & Saad, 2005; Tang, 2006). This aspect deals with the level of risk of specific events. Characteristic uncertainties of a supply chain include unclear customer demand, unreliable supply, and indefinite costs, and are referred to as operational risks. Operational risks pertain to occurrences related to coordination of supply and demand, which may be caused by insufficient or broken-down processes, systems, people or control (Chen, Sohal, & Prajogo, 2013; Christopher & Peck, 2004; Ghadge, Dani, & Kalawksy, 2012; Yang, Pan, & Ballot, 2017). Operational risks have received considerable attention in research with explorations being performed in areas such as uncertainty of demand and supply, stochastic scheduling problems, and rework and machine failure (Brown & Badurdeen, 2011, 2013; Raheja & Subramaniam, 2002; Xia, Ramachandran, & Gurnani, 2011). On the other hand, significant disruptions resulting from man-made and natural catastrophes such as floods, terrorist attacks, earthquakes, hurricanes, etc., or financial disasters such as, strikes or currency evaluation, are referred to as disruption risks. Disruption risks typically cause a much greater business impact in contrast to operational risks. Overall, events can be considered from the point of view of probability and impact as disruption risks have a lower likelihood but high impact whereas operational risks have a higher likelihood but lower impact (Brown & Badurdeen, 2014). Disruption risks are unexpected occurrences that impede a supply chain system. These may be caused by "man-made" or "natural events disasters" such as technology changes, economic downturns, labour strikes, hurricanes, and terrorist attacks. Hence, in comparison, operational risks are easier to control than disruption risks (Shekarian & Parast, 2021). Samvedi, Jain and Chan (2013) reported that risks could be caused by factors which are internal or external to the supply chain. In contrast to operational risks, disruptions are a more recent phenomenon from the perspective of research attention.

Another classification of risks is as tactical, strategic, or operational. Christopher and Peck (2004) suggested that the risks to a supply chain could be internal to the organisation such as, process and control; external to the organisation but within the supply chain network such as supply and demand; and external to the supply chain network, that is, in the risks in the environment. Leat and Revoredo-Giha (2013) highlighted that risks can be encountered by

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individual firms and at the level of the supply chain. Risks encountered by individual firms can include production risks, market or price risk, institutional risks (i.e., due to modifications in regulations/policies); personal or human risks; and financial risks. On the other hand, supply chain risks include process risks; control risks; supply risks; demand risks; and environmental risks. Shekarian and Parast (2021) consequently summarised the different kinds of risks to supply chains (Figure 5). Park et al. (2016) suggested that the organisational factor could be considered to be part of the network factor and could encompass risks due to suppliers and customers. Table 1 provides details about different kinds of risks.

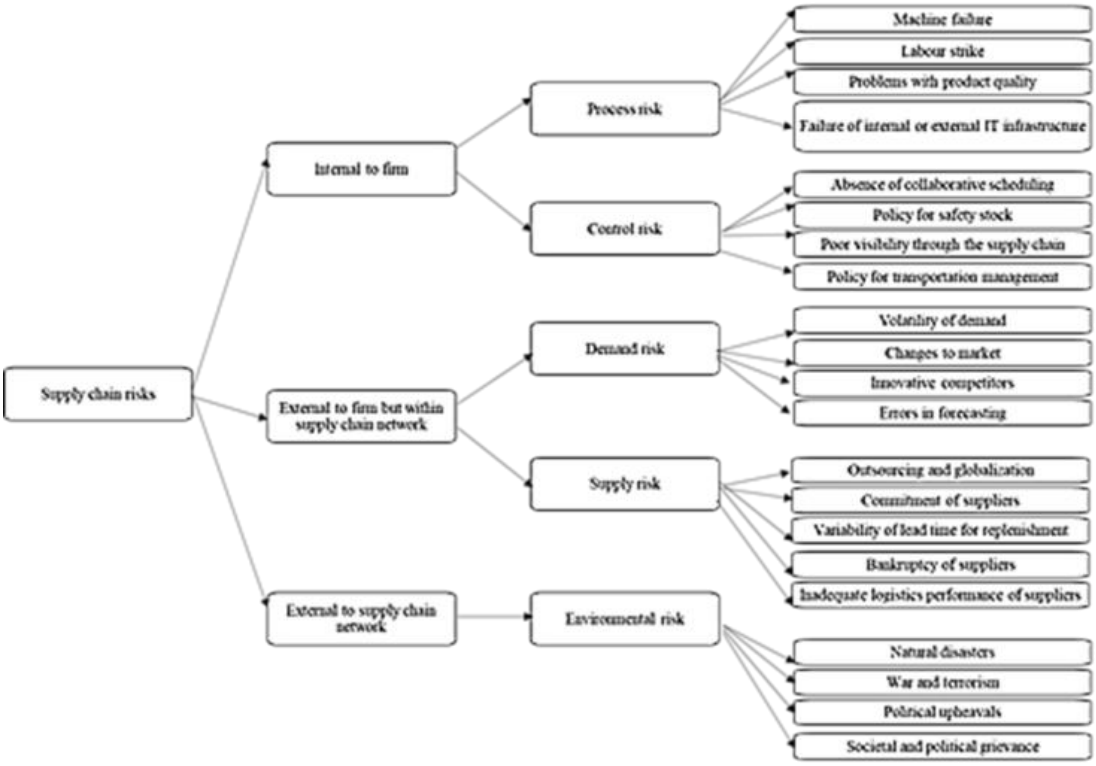

Figure 5 Supply chain risks

Source: (Shekarian & Parast, 2021, p. 430)

Table 1 Supply chain risks

Risk type	Description	Sources
Demand risk	Involves the difference (potential) between actual and forecasted demands; and also, disturbances (potential) in the product and information flows inside the network or among the market and focal firms.	Unexpected or unpredictable demand, inadequate or unclear information from customers regarding orders or demand amounts, atypical delays in customer payment, changes in market, errors in forecasting, and pioneering competitors
Supply risk	Involves the deviations (potential) among incoming supplies from the perspective of quality, time, and quantity; and also, disturbances (potential) to product and information flows from inside the	The logistics performance of suppliers is poor (e.g., regarding the dependability of delivery, or in order-filling capacity); problems with supplier quality; sudden supplier demise (e.g., owing to insolvency); logistics service providers'

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Risk type	Description	Sources
	network, the flow with regard to the focal firms is upstream	inadequate logistics performance; supply markets have fluctuation in capacity or shortages; issues due to globalisation and outsourcing; commitment of suppliers; and unpredictability of the lead time for replenishment.
Process risk	Involves deviations (potential) from manufacturing the required quantity and quality at the appropriate time. This form of risk consists of the risks to time, quality, and capacity that are related to inward and outward logistics and internal operations. Process risk can originate from the two principal kinds of unpredictability in a manufacturing system namely, flow variability and process variability. Also, process risk is associated with disruption in assets that are internally owned and the dependability of the subsidiary communication and transportation systems, and infrastructures.	Downtime or deficit in own capacity for production owing to disruptions in the locality or region (e.g., explosion, fire, labour strikes, industrial accidents); technical reasons (e.g., failure of machines, bottlenecks, rigid processes, unreliability of equipment, prolonged times for set-up); disturbance to or failure of internal IT setup (e.g., due to computer viruses, bugs in software); disturbance to or failure of external IT setup; unavailability of operators; and problems with product quality
Control risk (network risk)	Involves the theories, guidelines, techniques, and processes that regulate how a firm exercises control over its practices	Order amounts, batch volumes, policies for safety stock, processes that regulate management of assets and transportation, uneven power relationships, absence of collaborative scheduling and forecasts, and insufficient visibility down the supply chain
Environmental risk	These risks are external to the firm and may impact a certain value stream (e.g., contamination of products) or any node through the supply chain progresses	Political instability, war, terrorism, natural disasters, epidemics or diseases, political and social grievances, downturns in the economy, and changes in technology

Source: (Christopher & Peck, 2004; Leat & Revoredo-Giha, 2013; Samvedi et al., 2013; Shekarian & Parast, 2021)

The second dimension is the mitigation approach. In this regard, Tang (2006) suggested four fundamental methods that could be deployed by a firm through a synchronized and cooperative mechanism (Figure 6). The intention of each of these four methods is to improve the operations of the supply chain through synchronization or cooperation. Firstly, an organization can synchronize or cooperate with upstream partners to ensure that materials are efficiently supplied

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down the supply chain. Secondly, an organization can synchronize or cooperate with downstream partners to ensure that demand is influenced in a favorable manner. Third, the design of the product or process can be modified by a firm to make it simpler to ensure that demand is met by supply. Fourth, the partners in the supply chain can enhance their synchronized or cooperative effort if they have access to the different types of private information owned by individual partners in the supply chain (Tang, 2006). The four SCRM strategies were summarized by Brown and Badurdeen (2014) (Table 2).

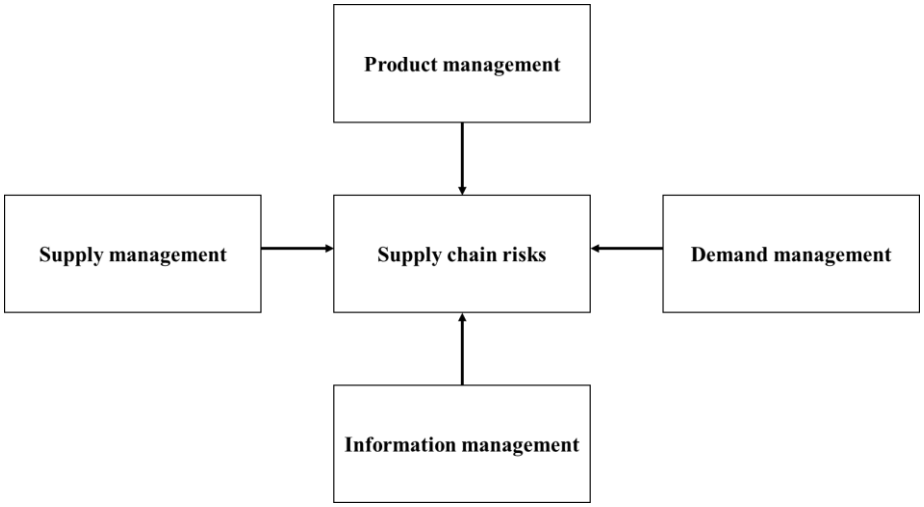

Figure 6 Fundamental approaches for supply chain risk management
Source: (Tang, 2006, p. 453)

Table 2 SCRM strategies

SCRM strategy	Implementation method(s)	Merits	Demerits
Product/ process management	Interchangeability Deferment of customization	Simplification Inventory control	Design requirements Need for design/planning
Demand management	Incentives for pricing	Maintain customer base	Alternate products must be available
Information management	Real-time information sharing Risk indices	Collaborative problem-solving Increased transparency	Intellectual property risk Conflicting interests impede reporting
Supply management	Strategic redesign Redundant capacity Safety stock Multiple suppliers Flexible deployment of capacity Cross-training Efficiency/lean operation	Long-term solution Enables quick response Flexible solution Leverage Quick response with lower loss of efficiency Skill development Cost savings	Expense, modelling complexity Loss of operating efficiency Holding cost Relationship management Capacity taken from another process Time/cost Increased exposure to risk

Source: (Brown & Badurdeen, 2014)

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Brown and Badurdeen (2014) also specified the issues applicable to SCRM, focusing on those associated with disruptions. These issues are subdivided on the basis of impact, likelihood, and design strategies and management operation (Figure 7).

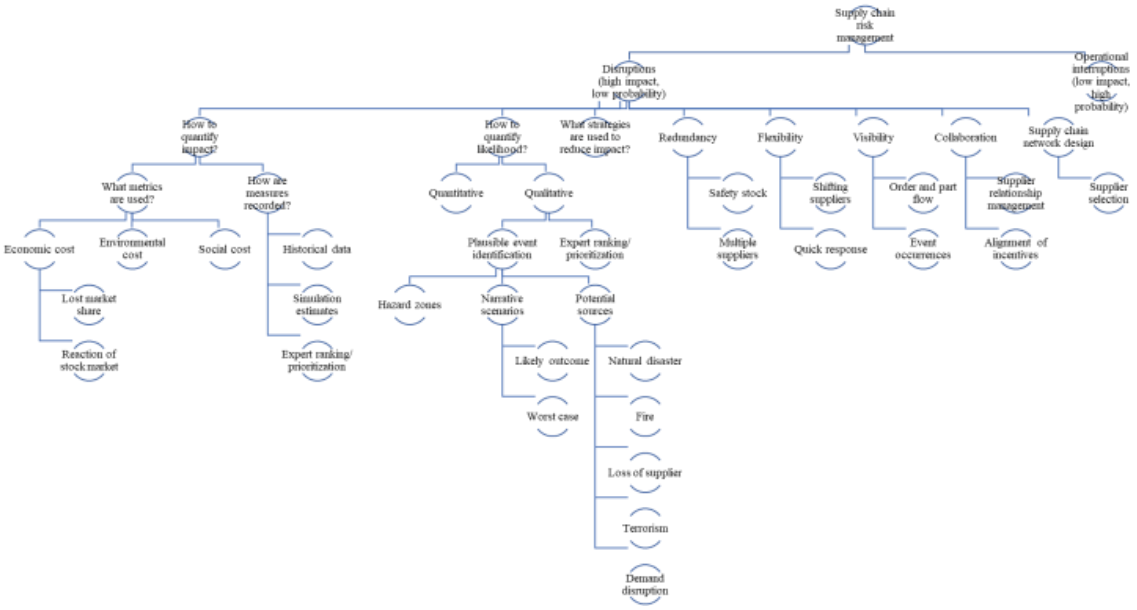

Figure 7 Supply Chain Disruption Framework

Source: (Brown & Badurdeen, 2014, p. 3)

Kumar and Sharma (2023) identified the different risks associated with the different process areas of the supply chain. They suggested that plan risks are the outcome of insufficient planning, leading to ineffective management. On the other hand, supply risks are the result of an interrupted flow of materials within the supply chain and the failure to satisfy customer demand. Process risk results from defective or non-existent model process for manufacturing, which lowers the rate of failure and defects. Finally, deliver risk is due to disruptions or delays in goods delivery, which impacts production and prompt delivery. Kumar and Sharma (2023) further classified the risk events into four process areas, namely, plan (planning risk), source (supply risk), make (process risk), and deliver (demand risk). Examples of planning risks include non-existence of a schedule production planning, mismatched human resource allocation, deficient raw material planning, and inconsistencies between actual and recorded inventory. Examples of supply risks include price increases, delayed delivery of raw materials owing to variation in demand, price increases due to material quality, among others. Examples of process risk include technical problems during the production process, additional labour costs, among others. Demand risks include product damage due to problems in the distribution system, sudden changes in the external environment and shipping process policy, poor visibility and incorrect understanding of customer delivery, and so on.

From a logistics perspective, Neeraja et al. (2014) highlighted that many costs and factors impact logistics. These include: External factors such as, Globalization, Workforce 2000, Technology, challenging nature of the workforce, environmental concerns; internal factors such as, customer service and quality, third party networks, SCM, changes in management and organization style; and other expenses such as, cost of transportation, cost of holding, cost of inventory, cost of order processing, and others.

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DOI: 10.55573/IJAFB.095808

Risks In Petroleum Supply Chains

Amor and Ghorbel (2018) drew attention to the high inflexibility and complexity of the petroleum supply chain. These facets result in the existence of various kind of risks. Overall, they indicated that the risks in the supply chain depended on the operations of the industry and also on the country importing or exporting the oil. For example, the scheduling domain was the focus of much study in Europe, the Middle East, China, and the USA. On the other hand, the adverse impacts of vandalism, kidnapping, and militant action on oil production was prevalent in certain countries such as, Nigeria. Moreover, the dependence on oil supply can cause political risks in one country to disrupt the petrol supply chain in another country as could be seen in the case of Libya's oil supply to China. On the whole, operations associated with procurement, regulation, infrastructure, and procurement were prone to risk due to the involvement of global markets (Amor & Ghorbel, 2018). Consequently, firms in the oil and gas industry must necessarily comply with the prerequisites of the global market for continued productivity (Khatib, Hammadi, Hamar, Oraby, & Abdulaziz, 2022).

Shah et al. (2011) highlighted the issues in the management of the petroleum supply chain. This study highlighted that the issues in this supply chain cover a broad spectrum ranging from the strategic to the operational level while encompassing the tactical level. In addition, issues are encountered in different operations in the supply-chain network such as, raw material procurement, manufacturing, distribution, and sales. Overall, the issues related to refinery systems are typically associated with scheduling regardless of whether this is at the stage of crude oil procurement or operations related to the crude oil, production unit and blending/distribution (Shah et al., 2011).

Leiras et al. (2011) classified uncertainty factors associated with refinery process operations as external (exogenous) and internal (endogenous) as well as long-term, medium-term, and short-term. They noted that external factors included long-term facets such as availability of oil supply sources, economic data related to raw materials, finished products, utilities, etc.; location; plans on capital investments for expansion of capacity and purchases of new equipment or replacements; costs of investing in processes; regulatory issues regarding regulations, laws, and standards; obsolete technology; and political issues. External factors also included medium-term issues such as economic data and oil type available. Short-term factors were typically internal and comprised facets such as oil type available, component properties, yields of product/process, options for blending, variations in process (rates of flow and temperatures), and availability of machines. Abdussalam et al. (2021) used the case study of Libya to highlight how political issues and instability resulted in a reduction in oil production. Using the analytical hierarchy process (AHP), Briggs et al. (2012) identified six significant kinds of risk associated with the petroleum supply chain, namely, exploration and production, environmental and regulatory compliance, transportation, availability of oil, geopolitical, and reputational. Based on the inputs of petroleum executives from across the world, this study found indications that the two highest priority risks were transportation and exploration/production. Moreover, they identified favoured approaches for risk management such as accepting and controlling risks, avoiding the risk by stopping the activity, or transferring/sharing risks to other companies/insurers. The most popular approach to mitigating risks in the petroleum supply chain was to internalize and manage risks instead of passing them on or stopping the activity. AHP was also used by Varma et al. (2008) to evaluate the performance of the petroleum supply chain. They found that customer, financial, internal business process, innovation and learning, were the four perspectives in descending order of

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importance. Additionally, the most significant factors were "purity of product", "market share", "steady supply of raw material", and "use of information technology".

Kumar and Barua (2022a) identified nine challenges in the context of the Indian petroleum supply chain. The study revealed that from the perspective of organizations in supply chain government policies, adverse weather conditions, and environmental regulations were the most influencing challenges, whereas resource availability was the least influencing. On the other hand, from the perspective of consumers, the most influencing challenges were quality and the price of products whereas social welfare was the least influencing. In another study, the same authors (Sourabh Kumar & Barua, 2022b) highlighted that fluctuations in crude oil price, product quality, and the inability to anticipate market change were the prominent risk factors for sustainable petroleum supply chains.

Issues And Challenges in The Fuel Supply Chain in Oman

The traditional work culture in the GCC nations has been to use a combination of native and expatriate staff. However, with the increasing trend to increase the use of native workers, the approach to management of human resources in a region has become the matter of research scrutiny. For example, Al Habsi, Farhana, and Karim (2021) investigated the impact of human resource practices in the Oman oil and gas industry and their impact on employee retention. This study found that human resource policies together with the staff retention strategy were important facets of employee retention. Gonzalez *et al.* (2008) reported that the human resource challenges faced by Oman were: native Omanis were more likely to be employed in the public sector, young Omanis encountered high rates of unemployment, the country's education system did not have the ability to produce workers with the competencies needed by employers, an uncoordinated training system, and fundamental concerns about disparate living standards. Porkodi *et al.* (2021) found that oil and gas companies also encountered various challenges during the COVID-19 pandemic, such as trouble with remote working, issues with maintaining wellbeing of employees, challenges with downsizing employees, and difficulty in assessing firm resilience.

Al-Abri (2020) indicated that the Sultanate, like many other oil-exporting countries, was adversely affected by two disruptions at the same time: the international virus outbreak and the decline in oil prices. Soon after the first reported cases of COVID-19 in Wuhan, oil prices fell spectacularly by nearly 30% (Sharif, Aloui, & Yarovaya, 2020). This was a significant decrease impacting oil-exporting countries such as Oman whose economy depends mainly on oil. The pandemic thus caused a health and economic crisis the repercussions of which affected all sectors in general (Al-Abri, 2020). Hospitality, transportation and storage, wholesale and retail, as well as small and self-employed enterprises have been especially hard hit by the pandemic. This was because these sectors involve direct customer interaction (face-to-face). Consequently, they were adversely impacted by the lowering in internal and external demand by tourists and business travellers, due to border closures (Al-Abri, 2020).

The Sultanate's Supreme Committee, which is in charge of assessing the procedures for dealing with developments emerging from the spread of Covid 19 had decided to close all the Sultanate's governorates and cities (WHO, 2020). Prabhu (2020) indicated that Oman recorded a decrease in fuel consumption rates by 50% during the second quarter of 2020. This is due to the precautionary measures applied by the government to limit the spread of coronavirus. The decision includes the closure of some cities, regions, many commercial establishments in addition to working from home, reduced public transportation and stop flying. The drop in

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demand for jet fuel to almost zero with the suspension of civil aviation traffic. Operations were limited for small number of cargo and exceptional flights. This decision had a significant impact on marketing companies.

The largest refinery in Oman is located in the Muscat Mina Al Fahal refinery and produces 106,000 barrels per day of various fuels. Muscat and surrounding cities experienced a fuel scarcity in most of their filling stations in 2012. According to the Oman Daily Observer (2012), the cause of the shortage of fuel supply at the filling stations was due to a minor fire at the Mina Al Fahal refinery. Subsequently all fuel tankers supplied from Mina Al Fahal were shifted to load from Sohar Refinery which is 200 kilometres from Muscat. The fuel shortage caused a state of confusion in northern and central regions as this incident took place before Eid al-Adha. This is a significant social event and people take an official holiday to commemorate the holy religious day which is marked by regular travel, tours, and visits between citizens and residents traveling between Oman's cities and villages.

According to the Times of Oman (2016), the Sohar refinery was closed in 2016 due to unanticipated technical issues and was subjected to a safe and comprehensive shutdown. This resulted in a disturbance in the supply of fuel in the country's northern stations. In order to avoid running out of fuel logistics teams transferred all fuel tankers to Mina Al Fahal in the capital Muscat. Fuel tankers were sent to the main depot to load and then drive to the north of the country according to the needs of each station so that customers did not go through any difficult experience in obtaining fuel requirement. In 2018, the Sohar refinery which produces approximately 116 thousand barrels per day of fuel was shut down and this closure extended between 10-15 days.

The focus of a study by Al Abbadi et al. (2021) was the challenges and opportunities associated with the logistics and supply chain management sector in Oman. Opportunities included Oman’s strategic location on the Strait of Hormuz which makes it a logical distribution hub for neighbouring countries; the country’s infrastructure; economic opportunities such as employment, free trade zones, and one-stop-shop window; and economic diversification. In particular, the logistics sector is progressively becoming an essential element of the nation’s economic development. Relatedly, the logistics sector is considered to be one of the most promising sectors that will contribute to diversifying the national economy in Oman Vision 2040. The Omani government is actively updating the different phases of this vision to ensure that ambitious development plans are carried out. To achieve its desired position in GDP, Oman has focused its efforts on supporting and expanding the logistics sector. The logistics sector is one of the economic activities that attracts investment because Oman with its view of the Indian Ocean, international roads, and its connection to many international ports. With specific regard to Logistics, the principal aims of the strategy are as follows:

- increase the contribution of the logistics sector to the gross domestic product growth in monetary terms,
- expand Oman's market share in the distribution of goods to the region,
- increase job creation by the logistics sector,
- improve Oman's ranking on global logistics and industrial indices, and
- promote Oman's global reputation in the logistics field.” (Economic Commission for Western Asia (ECWA), 2021)

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In contrast, issues and challenges faced by the country in the logistics sector include competency of human resources; international and regional (from other nations in the region such as the UAE and Saudi Arabia) competition; limited connection to airports and ports together with poor land connectivity; impacts of technology and inefficient business transactions (Al Abbadi et al., 2021).

Research Gap and Opportunities For Future Research

The current literature review revealed that there is a significant research gap related to the petroleum supply chain in Oman that will benefit from being addressed by future research. Review of the literature related to the petroleum supply chain, supply chains risks and disruptions, and issues and challenges in the fuel supply chain in Oman revealed the following gaps in research:

1. Although there are many definitions and descriptions of the different kinds of supply chain risks (Brown & Badurdeen, 2014; Chen et al., 2013; Christopher & Peck, 2004; Jena & Ghadge, 2021; Kleindorfer & Saad, 2005; Tang, 2006; Yang et al., 2017), their application in the context of fuel/petroleum supply chains seems to be overlooked.
2. While different approaches are suggested for SCRM or to mitigate risks in a supply chain (Brown & Badurdeen, 2014; Tang, 2006), their implementation in the context of both generic and fuel/petroleum supply chains appears to be under-researched and underreported.
3. Prominent risks in petroleum supply chains have received attention in research (Briggs et al., 2012; Sourabh Kumar & Barua, 2022b, 2022a; Leiras et al., 2011; Shah et al., 2011; Varma & Deshmukh, 2009; Varma et al., 2008). However, there appears to be nil to limited research from an Omani perspective that can draw attention to the specific risks associated with the fuel/petroleum supply chain in the country.
4. Similarly, empirical evidence of the approaches used to manage and mitigate risks in the context of the Oman fuel/petroleum supply chain also seems to be limited.
5. Empirical research detailing the current operations of the fuel/petroleum supply chain in Oman is also limited.

Based on these research gaps, Table 3 provides a summary of some opportunities for research and associated research questions as a guide for future researchers.

Table 3 Suggested Research Opportunities Related to the Fuel Supply Chain in Oman

Research Opportunity	Prospective Research Questions	Methods to Use
Opportunity 1: Investigating specific risks	What are the specific operational and disruption risks applicable to fuel/petroleum supply chains? What are the factors which cause these risks?	Case study approach using mixed methods (interviews, focus groups, observation, survey) of specific petroleum companies
Opportunity 2: Evaluating and measuring implementation of different risk mitigation/SCRM approaches	To what extent are different risk mitigation/SCRM approaches utilised in fuel/petroleum supply chains? What are the determinants for selecting and using a specific approach over another approach?	Mixed methods study (interviews, focus groups, observation, survey) with participants from the industry

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Research Opportunity	Prospective Research Questions	Methods to Use
Opportunity 3: Identifying and investigating country-specific risks	What are the prominent risks to the fuel/petroleum supply chain in Oman? What are the factors which cause these risks?	Mixed methods study (interviews, focus groups, observation, survey) with participants from the industry
Opportunity 4: Evidence of the efficacy of different risk management/mitigation approaches	Which are the most effective approaches used to manage and mitigate risks in the Oman fuel/petroleum supply chain? What are the determinants for selecting and using a specific approach over another approach?	Mixed methods study (interviews, focus groups, observation, survey) with participants from the industry
Opportunity 5: Evaluating operations of the fuel/petroleum supply chain	How do operations of the fuel/petroleum supply chain in Oman compare with other supply chains in the GCC countries? To what extent do the fuel/petroleum supply chains of OPEC and non-OPEC nations differ?	Mixed methods study (interviews, focus groups, observation, survey) with participants from the industry in GCC

Source: Author's Compilation

Conclusion

The overall objective of this paper was to gain awareness of the different issues and challenges to the supply chain, in general, and to the fuel supply chain, in particular, in order to identify areas for future research pertinent to the fuel supply chain in Oman. The literature review drew attention to the uniqueness of the petroleum supply chain as it differs from other supply chains due principally to the characteristics of its product. Existing literature also highlighted the different characteristics of the petroleum supply chain. Moreover, research related to the issues and challenges in the supply chain, in general, provided insights regarding different kinds of risks and mitigation approaches. However, it could be seen that there was a significant gap in research as regards the operations of the fuel supply chain and associated issues and challenges both in general, and in Oman, in particular. Consequently, there is a significant need for empirical research related to the operations of the fuel supply chain in Oman to uncover current issues and challenges and also to evaluate prospective approaches to manage these. A few opportunities for research are detailed in the preceding section.

The present study, however, is not without its limitations. First, the scope, objective, and associated research questions of the study were derived based on the researcher's experience and understanding of the topic. Second, a precise methodology such as, a systematic or semi-systematic approach, was not utilised for the review of literature. As a result, the literature reviewed in the study covers a broad spectrum and consequently the research outcomes are limited to being more descriptive than an in-depth analysis. Nevertheless, the paper has attempted to synthesize the present state of knowledge related to issues and challenges in the fuel/petroleum supply chain, and further to capture opportunities for future research.

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Journal website: www.ijafb.com
DOI: 10.55573/IJAFB.095808

References

Abdussalam, O., Trochu, J., Fello, N., & Chaabane, A. (2020). Supply Chain Planning in the Petroleum Industry : The Libyan Petroleum Sector Case Study. *13ème CONFERENCE INTERNA- TIONALE DE MODELISATION, OPTIMISATION ET SIMULATION (MOSIM2020), 12-14 Nov 2020, AGADIR, Maroc, Nov 2020, AGADIR, Morocco*.

Al-Abri, A.-M. (2020). *Impact of COVID 19 on development in Oman*. Sultan Qaboos University. Retrieved from https://www.squ.edu.om/research/Research-Output/Latest-Research-Highlights/ArticleID/865/Impact-of-COVID-19-on-development-in-Oman

Al-Janabi, Y. T. (2020). An overview of corrosion in oil and gas industry: Upstream, midstream, and downstream sectors. In V. S. Saji & S. A. Umoren (Eds.), *Corrosion Inhibitors in the Oil and Gas Industry* (pp. 3–39). Wiley-VCH Verlag GmbH & Co. KGaA. https://doi.org/10.1002/9783527822140.ch1

Al-Manji, S., Lovett, J., & Mitchell, G. (2021). Factors Affecting Disaster Resilience in Oman Integrating Stakeholder. *Risks, Hazards and Crisis in Public Policy*, *21*(1), 29–50.

Al Abbadi, M. S. M., Qureshi, M. I., Yasir, M., & Khan, N. (2021). Assessing Challenges and Opportunities in Optimizing Logistics and Supply Chain Performance in Oman. *Academy of Entrepreneurship Journal*, *27*(5S), 1–22.

Al Habsi, A. H., Farhana, N., & Karim, A. M. (2021). Impact of HR Practices on Employee Retention in Oil and Gas Industries of Oman. *International Journal of Academic Research in Business and Social Sciences*, *11*(9). https://doi.org/10.6007/ijarbss/v11-i9/10847

Alamoush, A. S., Ballini, F., & Ölçer, A. I. (2021). Ports, maritime transport, and industry: The immediate impact of COVID-19 and the way forward. *Maritime Technology and Research*, *4*(1), 250092. https://doi.org/10.33175/mtr.2022.250092

Albarashdi, S. H., & Farag, M. S. A. El. (2018). Oman Energy Policy. In G. Tiess, T. Majumder, & P. Cameron (Eds.), *Encyclopedia of Mineral and Energy Policy* (pp. 1–4). Berlin, Heidelberg: Springer, Berlin, Heidelberg. https://doi.org/https://doi.org/10.1007/978-3-642-40871-7_169-1

Amor, R. B., & Ghorbel, A. (2018). The Risk in Petroleum Supply Chain: A Review and Typology. *International Journal of Scientific & Engineering Research*, *9*(2), 141–163.

Balat, M. (2006). The position of oil in the middle east: Potential trends, future perspectives, market and trade. *Energy Sources, Part A: Recovery, Utilization and Environmental Effects*, *28*(9), 821–828. https://doi.org/10.1080/009083190951384

Bank, A., Richter, T., & Sunik, A. (2014). Durable, Yet Different: Monarchies in the Arab Spring. *Journal of Arabian Studies*, *4*(2), 163–179. https://doi.org/10.1080/21534764.2014.971647

Bramer, W. M., Rethlefsen, M. L., Kleijnen, J., & Franco, O. H. (2017). Optimal database combinations for literature searches in systematic reviews: A prospective exploratory study. *Systematic Reviews*, *6*(1), 1–12. https://doi.org/10.1186/s13643-017-0644-y

Briggs, C. A., Tolliver, D., & Szmerekovsky, J. (2012). Managing and mitigating the upstream petroleum industry supply chain risks: leveraging analytic hierarchy process. *International Journal of Business and Economics Pe2rspectives*, *7*(1).

British Petroleum Company. (2018). BP Statistical Review of World Energy. In *Statistical Review of World Energy*. Retrieved from https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2018-full-report.pdf

Brown, A. J., & Badurdeen, F. (2011). Optimization of queuing theory wait time through multi-skilled worker assignments. *IEEE International Conference on Industrial Engineering and Engineering Management*, 1416–1420. https://doi.org/10.1109/IEEM.2011.6118150

Brown, A. J., & Badurdeen, F. (2013). A queuing model for systems with rework and process

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International Journal of Accounting, Finance and Business (IJAFB)
eISSN: 0128-1844
Journal website: www.ijafb.com
DOI: 10.55573/IJAFB.095808

downtime. *IEEE International Conference on Automation Science and Engineering*, *2*(1), 789–794. https://doi.org/10.1109/CoASE.2013.6654043

Brown, A. J., & Badurdeen, F. (2014). *Supply Chain Disruption Management: Review of Issues and Research Directions* (No. 57949). Munich. Retrieved from https://mpra.ub.uni-muenchen.de/57949/

CBO. (2018). *CBO Annual report*. Retrieved from https://cbo.gov.om/sites/assets/Documents/English/Publications/AnnualReports/AnnualReport2018Eng.pdf

CBO. (2022). *2021 Annual Report*. Retrieved from https://cbo.gov.om/sites/assets/Documents/English/Publications/AnnualReports/Annual Report 2021 ENG.pdf

Chen, J., Sohal, A. S., & Prajogo, D. I. (2013). Supply chain operational risk mitigation: A collaborative approach. *International Journal of Production Research*, *51*(7), 2186–2199. https://doi.org/10.1080/00207543.2012.727490

Chima, C. M. (2007). Supply-Chain Management Issues In The Oil And Gas Industry. *Journal of Business & Economics Research (JBER)*, *5*(6), 27–36. https://doi.org/10.19030/jber.v5i6.2552

Christopher, M., & Peck, H. (2004). Building the Resilient Supply Chain. *The International Journal of Logistics Management*, *15*(2), 1–14. https://doi.org/10.1108/09574090410700275

CIA. (2023). Oman. Retrieved June 10, 2023, from The World Fact Book website: https://www.cia.gov/the-world-factbook/countries/oman/

Craighead, C. W., Blackhurst, J., Rungtusanatham, M. J., & Handfield, R. B. (2007). The severity of supply chain disruptions: Design characteristics and mitigation capabilities. *Decision Sciences*, *38*(1), 131–156. https://doi.org/10.1111/j.1540-5915.2007.00151.x

Darbouche, H., & Fattouh, B. (2011). *The Implications of the Arab Uprisings for Oil and Gas Markets*. https://doi.org/https://doi.org/10.26889/9781907555336

Economic Commission for Western Asia (ECWA). (2021). *SOLS Oman Logistics Strategy Summary 2040*. Retrieved from https://andp.unescwa.org/node/1214

Ghadge, A., Dani, S., & Kalawksy, R. (2012). Supply Chain Risk Management : Present and Future Scope. *International Journal of Logistics Management*, *23*(3), 313–339.

GlobalData. (2023). *Mina Al Fahal Refinery, Oman*. Retrieved from https://www.globaldata.com/store/report/mina-al-fahal-refinery-oman-profile-innovation-and-trend-analysis/

Gonzalez, G., Karoly, L., Constant, L., Salem, H., & Goldman, C. (2008). *Facing Human Capital Challenges of the 21st Century: Education and Labor Market Initiatives in Lebanon, Oman, Qatar, and the United Arab Emirates: Executive Summary*. RAND-Qatar Policy Institute. https://doi.org/10.7249/mg786.1

Gusenbauer, M. (2019). Google Scholar to overshadow them all? Comparing the sizes of 12 academic search engines and bibliographic databases. In *Scientometrics* (Vol. 118). Springer International Publishing. https://doi.org/10.1007/s11192-018-2958-5

Heck, T., Keller, C., & Rittberger, M. (2024). Coverage and similarity of bibliographic databases to find most relevant literature for systematic reviews in education. *International Journal on Digital Libraries*, *25*(2), 365–376. https://doi.org/10.1007/s00799-023-00364-3

Hereher, M., Al-Awadhi, T., Al-Hatrushi, S., Charabi, Y., Mansour, S., Al-Nasiri, N., … El-Kenawy, A. (2020). Assessment of the coastal vulnerability to sea level rise: Sultanate of Oman. *Environmental Earth Sciences*, *79*(15), 0–12. https://doi.org/10.1007/s12665-020-09113-0

Volume: 9 Issues: 58 Issue [December, 2024] pp. 78- 98
International Journal of Accounting, Finance and Business (IJAFB)
eISSN: 0128-1844
Journal website: www.ijafb.com
DOI: 10.55573/IJAFB.095808

Hussain, R., Assavapokee, T., & Khumawala, B. (2006). Supply Chain Management in the Petroleum Industry: Challenges and Opportunities. *International Journal of Global Logistics & Supply Chain Management*, *1*(2), 90–97.

Jacobs, F. R., & Chase, R. B. (2023). *Operations and supply chain management: The core* (Sixth). New York: McGraw Hill LLC.

Jena, S. K., & Ghadge, A. (2021). An integrated supply chain – human resource management approach for improved supply chain performance. *International Journal of Logistics Management*, *32*(3), 918–941. https://doi.org/10.1108/IJLM-03-2020-0151

Kentucky Government. (2018). *Introduction to the Fuel Industry*. Retrieved from https://apps.legislature.ky.gov/CommitteeDocuments/262/20726/Aug 18 2022 KPMA Intro to the Fuel Industry Handout.pdf

Kerriou, A. (2023). Inflation is invading the entire supply chain. Retrieved August 1, 2023, from Upply Market Insights website: https://market-insights.upply.com/en/inflation-is-invading-the-entire-supply-chain

Khatib, M. El, Hammadi, A. Al, Hamar, A. Al, Oraby, K., & Abdulaziz, M. (2022). How Global Supply Chain Management Is Disrupting Local Supply Chain Management Case of Oil and Gas Industry in UAE. *American Journal of Industrial and Business Management*, *12*(05), 1067–1078. https://doi.org/10.4236/ajibm.2022.125056

Kleindorfer, P. R., & Saad, G. H. (2005). Managing disruption risks in supply chain. *Prodution and Operations Management*, *14*(1), 55–68. https://doi.org/10.1109/ICEMMS.2010.5563408

Kuckertz, A., & Block, J. (2021). Reviewing systematic literature reviews: ten key questions and criteria for reviewers. *Management Review Quarterly*, *71*(3), 519–524. https://doi.org/10.1007/s11301-021-00228-7

Kumar, Saureng, & Sharma, S. C. (2023). Integrated Model for Predicting Supply Chain Risk through Machine Learning Algorithms. *International Journal of Mathematical, Engineering and Management Sciences*, *8*(3), 353–373. https://doi.org/10.33889/IJMEMS.2023.8.3.021

Kumar, Sourabh, & Barua, M. K. (2022a). A modeling framework and analysis of challenges faced by the Indian petroleum supply chain. *Energy*, *239*(122299). https://doi.org/https://doi.org/10.1016/j.energy.2021.122299

Kumar, Sourabh, & Barua, M. K. (2022b). Modeling and investigating the interaction among risk factors of the sustainable petroleum supply chain. *Resources Policy*, *79*(102922). https://doi.org/https://doi.org/10.1016/j.resourpol.2022.102922

Leat, P., & Revoredo-Giha, C. (2013). Risk and resilience in agri-food supply chains: The case of the ASDA PorkLink supply chain in Scotland. *Supply Chain Management*, *18*(2), 219–231. https://doi.org/10.1108/13598541311318845

Leiras, A., Ribas, G., Hamacher, S., & Elkamel, A. (2011). Literature review of oil refineries planning under uncertainty. *International Journal of Oil, Gas and Coal Technology*, *4*(2), 156–173. https://doi.org/10.1504/IJOGCT.2011.038927

Miniaoui, H. (2020). *Economic Development in the Gulf Cooperation Council Countries: From Rentier States to Diversified Economies* (H. Miniaoui, Ed.). Springer Nature Singapore.

Neeraja, B., Mehta, M., & Chandani, A. (2014). Supply Chain and Logistics for the Present Day Business. *Procedia Economics and Finance*, *11*(14), 665–675. https://doi.org/10.1016/s2212-5671(14)00232-9

Ngoc, N. M., Viet, D. T., Tien, N. H., Hiep, P. M., Anh, N. T., Anh, L. D. H., … Thao, L. T. H. (2022). Russia-Ukraine war and risks to global supply chains Leadership View project SMEs and Family business View project. *International Journal of Mechanical Engineering*, *7*(6), 633–640. Retrieved from

Volume: 9 Issues: 58 Issue [December, 2024] pp. 78- 98
International Journal of Accounting, Finance and Business (IJAFB)
eISSN: 0128-1844
Journal website: www.ijafb.com
DOI: 10.55573/IJAFB.095808

https://www.researchgate.net/publication/361701652

Oman Daily Observer. (2012, October 10). No major damage in refinery fire Fuel supplies normal. *Oman Daily Observer*. Retrieved from https://www.pressreader.com/

OQ SAOC. (2023). Growth Projects. Retrieved June 21, 2023, from About OQ website: https://oq.com/en/about-oq/growth-projects

Oxford Business Group. (2019). Discovery of oil reserves and new concessions in Oman leverage growth on global indices. Retrieved June 21, 2023, from The Report: Oman 2019 website: https://oxfordbusinessgroup.com/reports/oman/2019-report/economy/pumped-up-reserve-discoveries-new-concessions-and-efficient-technology-leverage-steady-growth-in-global-oil-indices

Park, K., Min, H., & Min, S. (2016). Inter-relationship among risk taking propensity, supply chain security practices, and supply chain disruption occurrence. *Journal of Purchasing and Supply Management*, *22*(2), 120–130. https://doi.org/10.1016/j.pursup.2015.12.001

PDO. (2018). *Fact File 2018: Building a sustainable future*.

Porkodi, S., Al-Zawaidi, A. M., Al-Muharbi, A. M., Al-Sarmi, L. M., Al-Shibli, H. M., & Al-Rahbi, W. N. (2021). Impact of Covid-19 HRM Challenges on HRM Practices for Routing the Post Pandemic: A Study with Special Reference to Oil & Gas Companies in Oman. *Advances in Social Sciences Research Journal*, *8*(9), 239–246. https://doi.org/10.14738/assrj.89.10876

Prabhu, C. (2020, June 20). Pandemic halves fuel consumption in Oman. *Oman Daily Observer*. Retrieved from muscat: The uptake of motor fuels across the Sultanate plummeted by almost 50 per cent during the second quarter of this year, as pandemic containment measures, including limited lockdowns, work-from-home practices, and the large-scale shuttering of many

Raheja, A. S., & Subramaniam, V. (2002). Reactive recovery of job shop schedules - A review. *International Journal of Advanced Manufacturing Technology*, *19*(10), 756–763. https://doi.org/10.1007/s001700200087

Saadi, D. (2019). Interview: Oman's top oil producer set to boost output 10% in 5 years. Retrieved August 2, 2023, from S&P Global: Commodity Insights website: https://www.spglobal.com/commodityinsights/es/market-insights/latest-news/oil/080519-interview-omans-top-oil-producer-set-to-boost-output-10-in-5-years

Samvedi, A., Jain, V., & Chan, F. T. S. (2013). Quantifying risks in a supply chain through integration of fuzzy AHP and fuzzy TOPSIS. *International Journal of Production Research*, *51*(8), 2433–2442. https://doi.org/10.1080/00207543.2012.741330

Shah, N. K., Li, Z., & Ierapetritou, M. G. (2011). Petroleum refining operations: Key issues, advances, and opportunities. *Industrial and Engineering Chemistry Research*, *50*(3), 1161–1170. https://doi.org/10.1021/ie1010004

Sharif, A., Aloui, C., & Yarovaya, L. (2020). COVID-19 pandemic, oil prices, stock market, geopolitical risk and policy uncertainty nexus in the US economy: Fresh evidence from the wavelet- based approach. *International Review of Financial Analysis*, *70*(101496).

Shekarian, M., & Parast, M. M. (2021). An Integrative approach to supply chain disruption risk and resilience management: a literature review. *International Journal of Logistics Research and Applications*, *24*(5), 427–455. https://doi.org/10.1080/13675567.2020.1763935

Shishodia, A., Sharma, R., Rajesh, R., & Munim, Z. H. (2021). Supply chain resilience: A review, conceptual framework and future research. *International Journal of Logistics Management*, *ahead-of-print*(ahead-of-print). https://doi.org/10.1108/IJLM-03-2021-0169/FULL/XML

Tang, C. S. (2006). Perspectives in supply chain risk management. *International Journal of*

Volume: 9 Issues: 58 Issue [December, 2024] pp. 78- 98
International Journal of Accounting, Finance and Business (IJAFB)
eISSN: 0128-1844
Journal website: www.ijafb.com
DOI: 10.55573/IJAFB.095808

Production Economics, *103*(2), 451–488. https://doi.org/10.1016/j.ijpe.2005.12.006

Times of Oman. (2016, December 3). Sohar Refinery undergoes safe shut down. *Times of Oman*. Retrieved from https://timesofoman.com/article/22868-sohar-refinery-undergoes-safe-shut-down

Varma, S., & Deshmukh, S. G. (2009). Evaluating petroleum supply chain performance. *Global Journal of Flexible Systems Management*, *10*(4), 11–11. https://doi.org/10.1108/13555850810890093

Varma, S., Wadhwa, S., & Deshmukh, S. G. (2008). Evaluating petroleum supply chain performance: Application of analytical hierarchy process to balanced scorecard. *Asia Pacific Journal of Marketing and Logistics*, *20*(3), 343–356. https://doi.org/10.1108/13555850810890093

WHO. (2020). WHO collaboration in Oman's response to COVID-19. Retrieved June 22, 2023, from https://www.emro.who.int/omn/oman-news/who-collaboration-on-omans-response-to-covid-19.html

Xia, Y., Ramachandran, K., & Gurnani, H. (2011). Sharing demand and supply risk in a supply chain. *IIE Transactions*, (43), 451–469. https://doi.org/10.1080/074817X.2010.541415

Yang, Y., Pan, S., & Ballot, E. (2017). Mitigating supply chain disruptions through interconnected logistics services in the Physical Internet. *International Journal of Production Research*, *55*(14), 3970–3983. https://doi.org/10.1080/00207543.2016.1223379