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Critical Welcoming to Railway Transportation and Logistics in Oman: Views of Local Experts

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ABSTRACT

Purpose – By analyzing the perceptions and expectations of logistics and transportation experts in Oman, the study aims to get answer whether if Oman is ready for railway transportation and logistics, or not.

Design/methodology/approach – The study is descriptive and relied on first-hand quantitative data research. In January 2023 in Oman, the data was obtained from logistics professionals, academics, and governmental and private sector specialists. The questionnaire has been designed in-depth and in-length format based on scientific and specific investigation context to get answer the following research questions:

1. What are some of the goals that Oman has set for its railway transportation?

2. What are the potential benefits of using railroads for logistics in Oman?

3. What are some of the challenges that Oman's railway transportation and logistics face?

Findings – The overall interpretation of the data validated the participants' positive attitudes and optimistic thoughts towards Oman's railway logistics. Although the second largest factor is the lasting effect of economic growth, the participants identified environmental risks such as geotechnical qualities, climate, rugged terrain, sand dunes, and temperature as the greatest threat..

Discussion – Most participants felt that Public-Private Partnership would be the optimal operator for Oman's railroads. The Omani Government may run participative decision-making mechanisms with stakeholders in logistics. At the early-stage collaborations may facilitate further executive and operative strategic allies of PPP. The study recommends further actions in both academia and policymaking in the light of the findings of empirical research.

1. Introduction

The nations with strong logistical capabilities attract more foreign direct investments, reduce transaction costs, diversify their export structure, and grow more rapidly (Memedovic et al., 2008). Railway logistics specifically helps other economic sectors and may as well contribute to economic growth (Jianjun, 2012) as a useful tool for achieving national goals by employing a large labor force, boosting the economy, and decreasing vehicle carbon emissions (Asensio, 2000). According to (Tome et al., 2014), since this facility is an important component of the logistic sector, its competitive advantage, particularly from an administrative standpoint, must be evaluated as one of the current entry sites for public and private enterprises to expand it.

The Sultanate of Oman has potential in the energy and transportation industries, and its relationship with social relations, strategic interests, and extensive privileges has made it a focal point for international investors. Notwithstanding its progress in the area of logistics, again the Sultanate must consider constructing a rail network that connects all of its logistical facilities, including airports and ports. The growing popular interest in railway logistics may provide several possibilities to Oman. Although a significant amount of research has been conducted on the opportunities and threats facing the railway logistics sector, little research has been conducted on

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the existing situation of railway logistics in the Sultanate of Oman, the obstacles it may encounter when it is activated, and the opportunities it presents. Thus, academic research and studies that systematically collect, analyse, and conclude the opinions, perceptions, and expectations of logistics sector agents will not only contribute to the expansion of necessary knowledge, but also assist the multi-level and multi-dimensional analytical decision-making processes in Oman and other similar contexts.

1.1. Overview to Railway Logistics

For national economies, rail transport as a way to increase efficiency and global competitiveness is important (Giusti et al., 2019) and the role and potential of integrated services between rail transport and other related service providers are also put forward as an important condition (Cantelmo et al., 2022). However, even if markets generally respond positively to restructured rail services to meet industry needs, the gap between industry expectations and service standards provided by railways cannot be filled in the short term (Korovyakovsky and Szoltysek, 2006). Jarašūnienė et al. (2020) provides a basic framework for conducting economic research in order to develop the railway transportation and logistics industries, thereby increasing competitiveness and economic value, and states that railway transportation and its integrated services can undertake very important functions in internationalization efforts in the logistics sector, both locally and globally. To promote the expansion of railway transport on a worldwide scale, it is essential for railway logistics to assimilate into the global market and broaden its overseas operations (Yan, 2022). According to Rana et al. (2020), the advancement of railway logistics is driving the whole high-speed rail industry to shift into the era of intelligent technology. The High-Speed Railway (HSR) transportation system has considerable economic significance on a worldwide scale, deriving advantages from a conducive developmental context and a robust infrastructure (Zhong et al. 2021).

1.2. Railway Logistics in Oman and GCC

Although railway logistics is essential for effective supply chains since it cuts costs for both the firm and the end user and simplifies supply chain operations worldwide (Maes and Vanelslander, 2011). Only a few Gulf Cooperation Council (GCC) studies have been conducted on the potential consequences of initiating the railway project because it is a relatively new mode of transportation in the Gulf Region (Mahendran and Pillai, 2016). Due to their location, sophisticated infrastructure, and natural resources, the Gulf Nations may serve as regional and global commercial centers (Stojanovi and Puka, 2021). International supply chains profit from the logistical operations of free zone corridors (Ziadah, 2018). The GCC Railway corridor and network can promote upgrades to national transport infrastructure. The member states have recognized that a GCC-wide railway is anticipated to increase revenues, improve infrastructure asset efficiency, generate employment (Tayyeb et al., 2019), diversify economies, and facilitate GDP growth (Lloyd and Al-Ali, 2018). In order to support plans for greater economic alignment within the GCC prior to economic unification in the region, railway network has an important role (Oxford Business Group, 2022). However, in the past decade, oil revenues have affected government expenditure, generating economic shocks that have caused national economic instability and posed a danger to long-term private investments such as logistics projects (Moawad, 2016).

As one of the Gulf nations, the Sultanate of Oman expects the railway sector to increase the logistics industry, people and goods traffic, and commerce with her neighbors. The Omani Government's long-term logistics plan reflects the Sultanate's ambitions to be one of the top logistical country. Strategic Vision of Omani Government (Oman2040) sets an objective as '*a unique economic identity that integrates seamlessly with global production and service supply chains*` (Oman2040 Implementation and Follow-up Unit, 2020, 34). The Sultanate's railway logistics industry is important economically and promotes economic diversification, which economists expect to be the second source of GDP. The Sultanate would lead global indices due to its top-10 ranking in the global logistics performance

index (Rahman et al., 2021). According to Theophile (2019), the economic growth of the Sultanate of Oman relies on a balanced fiscal policy that increases public expenditure on current and operating costs and prioritizes significant development projects such as railway activation. Infrastructure expenditures and non-oil industry production, such as logistics, stimulate economic growth. As the economy diversifies, the logistics and railroad businesses will profit from shifting risks (Omaima and Imran, 2016). The expansion and investment in infrastructure enhances railroad logistics and economic growth. The railroads help the government of Oman shift to a low-carbon economy. It reduces greenhouse gas emissions and improves logistics and transportation (Al-Wahaibi, 2017). The Oman2040 calls for 300,000 additional logistics employment and 14 billion Riyal Omani (approx. 36 billion USD) in economic contributions by 2040 (the Oman2040 Implementation and Follow-up Unit, 2020).

The Logistics Plan 2040 aims to make Oman one of the top ten logistics hubs in the Middle East and North Africa (HSBC Global Connections, 2015). Oman is obligated by the intermodal logistics to combine seaports, airports, railroads, and roads into a logistical sector (Ziadah, 2018). The Omani Government intended to construct a 2100-kilometer railway from the United Arab Emirates border to Salalah Port on the east coast through Sohar, Muscat, and Duqm (Oxford Business Group, 2022). In 2022, Oman and the UAE have signed a $3 billion joint venture project to link Abu Dhabi and Muscat by rail. According to Lu et al. (2018), Chinese investments in the Sultanate will stimulate a plethora of benefits including industrial projects in industrial, economic, and free zones, national cadre employment, maritime commerce, an improvement in the trade balance, and economic diversification. Al Fazari and Teng (2019) who also studied the importance of the Belt and Road Initiative in Oman stated that, the Sultanate of Oman might assist China's Middle East and Indian Ocean Belt and Road initiative thanks to her capacity and close relations to China. This initiative agreement, signed by 126 states and 29 international organizations, including Oman and the Gulf Cooperation Council, accounts for forty percent of the global gross domestic product (OECD Business and Finance Outlook, 2018).

Despite its growth, railway logistics has many risks and threats in Oman (Bouraima et al., 2020). Initially, before laying down lines and addressing customer requirements, the market research and analysis must be done for railway logistics, and the trend must be expedited in order to create an appealing railway logistics business via transit regulatory frameworks and network architecture as well (Bešinović, 2020). Majerčák and Majerčák (2017) have claimed that the railway industry and logistics sector as a whole poses challenges that need innovative infrastructure models to support and provide services. To fulfil their commitments correctly, railways must adhere to particular requirements. Safety, flexibility, effectiveness, activity management, effective systems and routing (Bešinović, 2020).

Oman is inexperienced in logistics but even most logistics economies had labour shortages and lack of qualified workforce, especially in railway logistics (Rusakova and Bylkov, 2018). Railway logistics studies should include train operations, locomotive, station, building, and other asset maintenance, spare parts, railroad infrastructure support, and asset monitoring and management technology (Al Abbadi et al., 2021). Changes in the climate, difficult terrain, and sand dunes pose a danger to infrastructure, railway systems, and other human and business enterprises. High temperatures cause the rails to stretch and twist due to a lack of separating zones or a design flaw (Wang et al., 2020). At 80- degree Celsius, iron rails normally grow one foot every 1800 linear feet. How much the rails twist without spacers is determined on the heat source and rail length (Thornes and Davis, 2020). According to Saif and Khalil (2016), the Gulf Governments should prioritize addressing the problem of shifting sand on roads, which impedes the passage of trains, and finding solutions.

Trains often navigate a difficult terrain. Before expanding the railroads, it may be necessary to construct and study a cost-prohibitive blockage removal structure (Saif and Khalil, 2016).

It is an emerging concern in academic studies and industrial practices, after wide spectrum literature review, to initiate a few Omani contextual studies on railway transportation and logistics Thus, the study contributes to improve academic, technical and market-based insights about Omani railway logistics by presenting both theoretical and empirical information about Oman's railway logistics concepts, expectations, possibilities, and threats. This study examined logistics agents' railway logistics expectations in Oman. In this regard, the report describes railway logistics' potential and the logistics sector's chances from railway building, as well as Oman's railway logistics challenges. It will help public and private business decision-makers analyse opportunities and threats.

2. Research Design

The descriptive, quantitative data research has been designed for detailed delineation of railway logistics in Oman. The research process was illustrated in the Figure 1. The research was designed to answer the following questions:

1. What are some of the goals that Oman has set for its railway transportation?
2. What are the potential benefits of using railroads for logistics in Oman?
3. What are some of the challenges that Oman's railway transportation and logistics face?

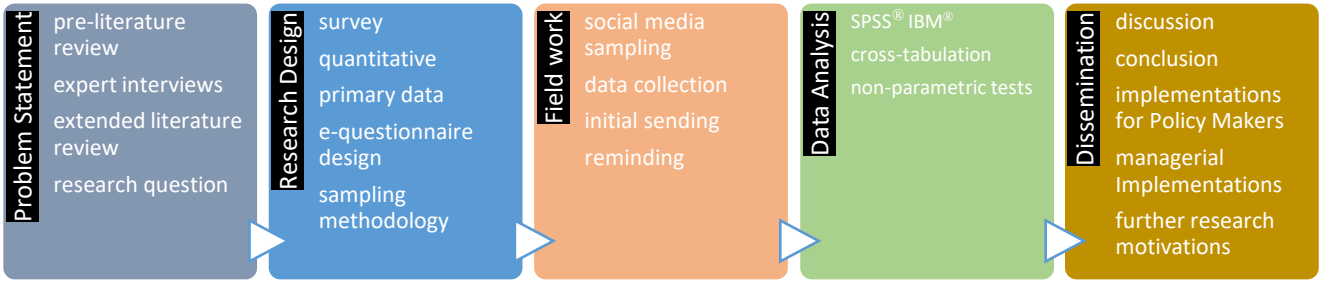

Figure 1. The Research Process

At the first stage of the research process, the research proposal has been submitted to UTAS-Ibri Scientific Research Department for ethical approval. The Ethical Board (UTAS-Ibri) has approved the research proposal on November 03, 2022.

The quantitative data was acquired using an online questionnaire placed on LinkedIn Platform. Research population has been considered as `*the total number of logistics experts*` in Oman. Sampling frame has been driven via LinkedIn Search engine by running for `logistics expert` with the location filter as Oman. The 983 profiles were found within the criteria and filtered. In the next stage, the profiles of students and the unemployed members were excluded in the planned sample. The 457 profiles were invited to complete an online questionnaire via LinkedIn private message in January 2023. At the end of data collection stage, the 54 responses were received from the participants of governmental bodies including the Ministry of Transport, Communication and Information Technology (henceforth MTCIT) and the Ministry of Commerce, Industry and Investment Promotion (henceforth MCIIP), as well as specialists, professionals, employees in logistics industry, and faculty members from various higher education institutions in Oman. Although the response rate (12%) is lower than expected, random internet sampling was used. The possible reasons for low response rate are firstly inflated spam and commercial messages that might irritate people using social media, secondly security concerns might make the people suspicious about the links embedded in messages, and thirdly the people who described themselves as logistics specialists may possibly be unaware about the specific aspects of railway logistics in Oman. As the questionnaire has been designed in-depth and in-length format based on scientific and specific investigation context, the actual sample size is satisfactory for specialist-driven pool survey.

The questionnaire has been designed in parallel with previous studies on railway logistics in various contexts. Especially, due to the Gulf context of transport corridor and The Gulf railway network project, the World Bank`s Trade and Transport Corridor Management Toolkit by Kunaka and Carruthers (pp.254-260, 2014) was one of the basic references for specific concerns and questions of railway logistics in questionnaire design process. The first section discussed the participants' demographics, experiences, and institutional information. The second component consists of dichotomous questions about the actual state of railway logistics in the Sultanate of Oman. The final portion assessed the advantages and disadvantages of railway logistics in Oman. The five-point Likert scale, dichotomous, ranking, multiple choice questions were utilized in e-questionnaire, analyzed, and tabulated via IBM SPSS®. To get conclusive evidence of significant differences if any, depends on the type of scale, either non-parametric tests such as Chi-Square and Fisher Exact or two-sample comparison tests have been employed for quantitative data analysis as well as cross tabulation and descriptive statistics.

3. Results

3.1. Perceptions of Participants

For better tabulation and detailed overview, the findings were analyzed in terms of two variables, which are sector and experiences of participants.

3.1.1. Perceptions of Participants by Sectors

Table 1 illustrates the perceptions of participants by sectors. In total, 56% of participants (30) are from private sector in the form of logistics companies, and 44% of participants (24) hail from two ministries. As seen on Table 1, the participants are optimistic about railway logistics while pessimistic about Omani capabilities, experience and administrative elements in general. Although there is no significant difference confirmed by analysis, it seems that the participants from private sector have a negative projection about Omani capabilities of railway logistics than participants from public sector do.

Table I. Perceptions of Participants by Sectors

Perception		Sector		
		Private	Public	Total
Will the Omani government take serious decisions regarding railway logistics in the future?	No	11.1%	14.8%	25.9%
	Yes	18.5%	24.1%	42.6%
	No Indicator Yet to Say Yes/No	25.9%	5.6%	31.5%
Is Oman capable of managing railway logistics and its administrations?	No	31.5%	20.4%	51.9%
	Yes	11.1%	14.8%	25.9%
	No Indicator Yet to Say Yes/No	13.0%	9.3%	22.2%
Will Oman have enough experience in facing the challenges of railway logistics?	No	35.2%	18.5%	53.7%
	Yes	9.3%	18.5%	27.8%
	No Indicator Yet to Say Yes/No	11.1%	7.4%	18.5%
Will railways be an important economic resource to the Sultanate of Oman?	No	7.4%	5.6%	13.0%
	Yes	46.3%	31.5%	77.8%
	No Indicator Yet to Say Yes/No	1.9%	7.4%	9.3%
Is the plan to establish a logistical railway commensurate with Oman's 2040 vision?	No	5.6%	9.3%	14.8%
	Yes	42.6%	31.5%	74.1%
	No Indicator Yet to Say Yes/No	7.4%	3.7%	11.1%
Are there highly efficient administrative elements to operate railway logistics in Oman?	No	22.2%	22.2%	44.4%
	Yes	3.7%	13.0%	16.7%
	No Indicator Yet to Say Yes/No	29.6%	9.3%	38.9%

3.1.2. Perceptions of Participants by Experiences

Table 2 illustrates the perceptions of participants by experience. In total, 18.5% of participants have 0-5, 24.1% have 6-10, 33.3% are stationed at 11-15, and 24.1% more than 15 years of experience in logistics related professions. The experiences of the participants have not significantly changed the perceptions of the participants.

Table II. Perceptions of Participants by Experiences

Perception		Experience (Year)				Total
		0-5	6-10	11-15	15+	
Will the Omani government take serious decisions regarding railway logistics in the future?	No	9.3%	3.7%	9.3%	3.7%	25.9%
	Yes	5.6%	14.8%	14.8%	7.4%	42.6%
	No Indicator Yet to Say Yes/No	3.7%	5.6%	9.3%	13.0%	31.5%
Is Oman capable of managing railway logistics and its administrations?	No	7.4%	11.1%	18.5%	14.8%	51.9%
	Yes	5.6%	3.7%	11.1%	5.6%	25.9%
	No Indicator Yet to Say Yes/No	5.6%	9.3%	3.7%	3.7%	22.2%
Will Oman have enough experience in facing the challenges of railway logistics?	No	11.1%	9.3%	20.4%	13.0%	53.7%
	Yes	5.6%	7.4%	5.6%	9.3%	27.8%
	No Indicator Yet to Say Yes/No	1.9%	7.4%	7.4%	1.9%	18.5%
Will railways be an important economic resource to the Sultanate of Oman?	No		3.7%	5.6%	3.7%	13.0%
	Yes	16.7%	20.4%	24.1%	16.7%	77.8%
	No Indicator Yet to Say Yes/No	1.9%		3.7%	3.7%	9.3%
Is the plan to establish a logistical railway commensurate with Oman's 2040 vision?	No	7.4%	5.6%	1.9%		14.8%
	Yes	9.3%	16.7%	25.9%	22.2%	74.1%
	No Indicator Yet to Say Yes/No	1.9%	1.9%	5.6%	1.9%	11.1%
Are there highly efficient administrative elements to operate railway logistics in Oman?	No	9.3%	9.3%	13.0%	13.0%	44.4%
	Yes	5.6%	3.7%	3.7%	3.7%	16.7%
	No Indicator Yet to Say Yes/No	3.7%	11.1%	16.7%	7.4%	38.9%

3.2. Expectations of Participants

3.2.1. Expectations of Participants by Sectors

In order to garner expectations of the participants about railway logistics, there are four different groups of questions. First is about main beneficiaries of railway logistics in Oman. The participants were able to opt for more than one option. Figure 2 shows the rank from the most frequent response to the least.

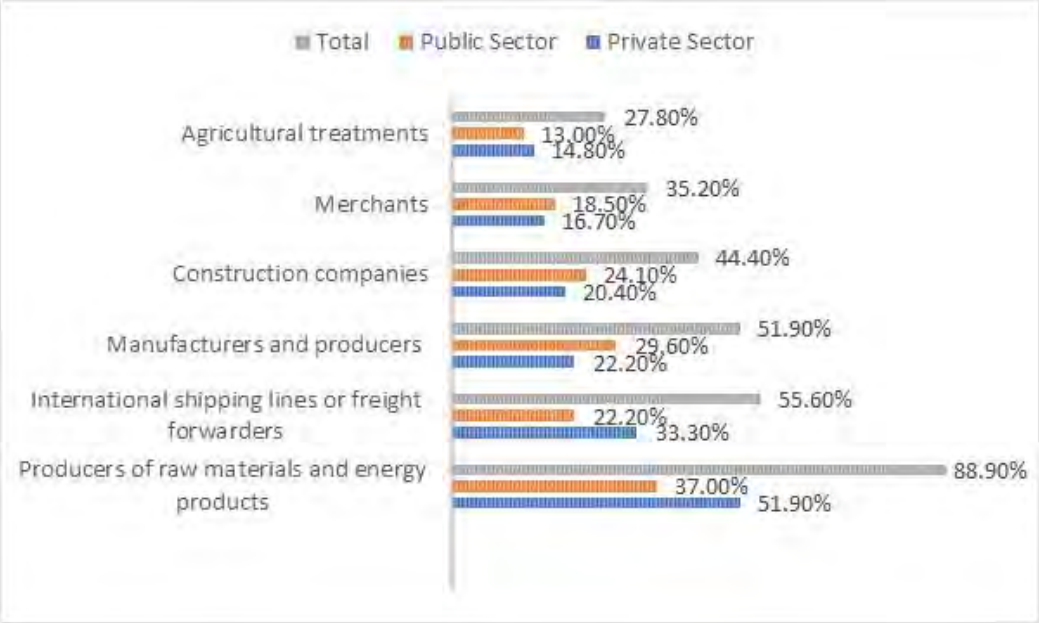

Figure 2. Ranking of Participants` Perceptions on Main Beneficiaries by Sectors

Table 3. Opportunities from Railway Logistics by Sectors

Opportunity		Sector		
		Private	Public	Total
The railway logistics sector can create mixed public-private partnerships that lead to the creation of a variety of job.	Strongly Disagree	0	1.9%	1.9%
	Disagree	3.7%	7.4%	11.1%
	Neutral	11.1%	7.4%	18.5%
	Agree	18.5%	14.8%	33.3%
	Strongly Agree	22.2%	13.0%	35.2%
Economic growth in the country by investing in railway	Strongly Disagree	0	0	0
	Disagree	1.9%	5.6%	7.4%
	Neutral	9.3%	5.6%	14.8%
	Agree	40.7%	27.8%	68.5%
	Strongly Agree	3.7%	5.6%	9.3%
The importance of the location in supporting logistical projects and its relationship to logistical performance.	Disagree	7.4%	3.7%	11.1%
	Neutral	27.8%	7.4%	35.2%
	Agree	16.7%	20.4%	37.0%
	Strongly Agree	3.7%	13.0%	16.7%
Strategic partnership with China in the Belt and Road project to enhance railway logistics.	Strongly Disagree	1.9%	1.9%	3.7%
	Disagree	20.4%	3.7%	24.1%
	Neutral	14.8%	11.1%	25.9%
	Agree	11.1%	20.4%	31.5%
	Strongly Agree	7.4%	7.4%	14.8%
Achieving efficiency in terms of time and effort for all beneficiaries of railway logistics services.	Strongly Disagree	1.9%	1.9%	3.7%
	Disagree	13.0%	1.9%	14.8%
	Neutral	24.1%	14.8%	38.9%
	Agree	13.0%	20.4%	33.3%
	Strongly Agree	3.7%	5.6%	9.3%

Second group is related to the opportunities of railway logistics in Oman. The questions have been designed in 5-point-Likert Scale. Table 3 shows the opportunities expected by participants as ranked by arithmetic mean (from the highest to the lowest).

In terms of opportunity, the highest arithmetic mean was calculated by activating *the railways' logistics The mixed public-private partnerships and job opportunities* stood at 3.89. On the other side *achieving efficiency in terms of time and effort for all beneficiaries of railway logistics services* was the lowest by 3.30. The opportunities, which have smaller than 2.5 arithmetic mean, were not considered as opportunities expected by participants in data analysis and not included in tabulation.

Table 4. The Challenges of Railways in Oman by Sectors

Challenge		Sector		
		Private	Public	Total
Among the environmental threats that may hinder railways are global warming, rugged terrain, and encroaching sand.	Strongly Disagree	0	1.9%	1.9%
	Disagree	1.9%	3.7%	5.6%
	Neutral	9.3%	16.7%	25.9%
	Agree	33.3%	13.0%	46.3%
	Strongly Agree	11.1%	9.3%	20.4%
Low oil prices may pose a threat to the state of the economies of the oil-exporting countries, which affects the logistical progress in all sectors, including railways.	Strongly Disagree		1.9%	1.9%
	Disagree	7.4%	3.7%	11.1%
	Neutral	11.1%	22.2%	33.3%
	Agree	14.8%	11.1%	25.9%
	Strongly Agree	22.2%	5.6%	27.8%
One of the long-term challenges emerging economies face with rail logistics is the shortage of human resource competencies.	Strongly Disagree	0	0	0
	Disagree	3.7%	7.4%	11.1%
	Neutral	25.9%	18.5%	44.4%
	Agree	16.7%	11.1%	27.8%
	Strongly Agree	9.3%	7.4%	16.7%

Third group is related to the challenges of railway logistics in Oman. The questions have been designed in 5-point-Likert Scale. Table 4 shows the threats expected by participants as ranked by arithmetic mean (from the highest to the lowest). In terms of threat, the highest arithmetic mean was calculated with *the environmental threats* at 3.78. On the other side, *shortage of human resource competencies in railway logistics* has the lowest figure at 3.50. The challenges, which have smaller than 2.5 arithmetic mean, were not considered as challenges expected by participants in data analysis and not included in tabulation.

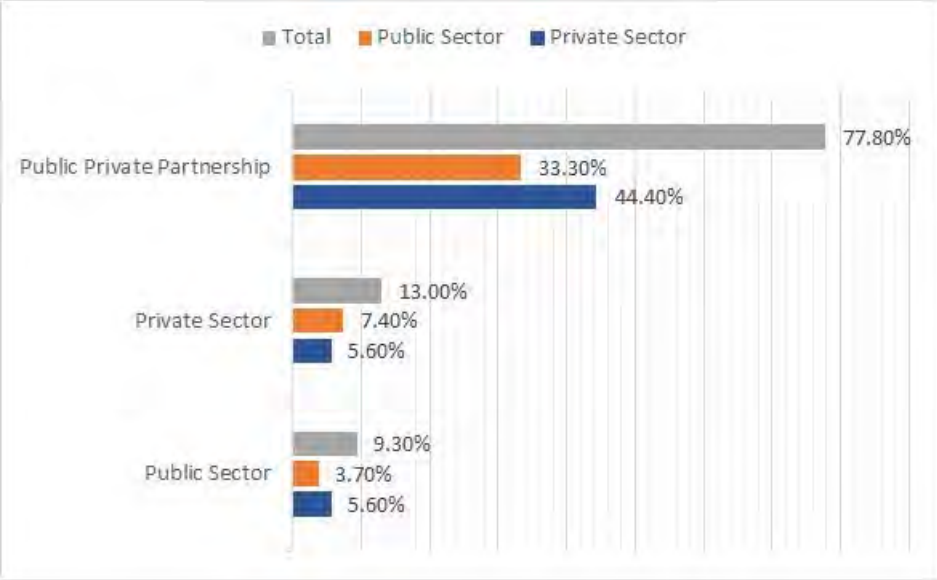

Figure 3. Railway Management in Oman by Sectors

Fourth group is linked to the management and operations of railways in Oman. The participants were asked to respond *which one can manage/operate the railways in Oman?* in the Multiple Choice Question format. As can be seen on Figure 3, 78% of the participants opted Public-Private Partnership in operation and management.

3.2.2. Expectations of Participants by Experiences

As visible in Table 5, the ranking of main beneficiaries of railways was slightly differentiated in terms of the experiences of participants, although the top three were the same.

Table 5. Expectations of Participants as Main Beneficiaries of Railway in Oman by Experiences

Rank	Main Beneficiary of Railways in Oman	Experience (Year)				Total
		0-5	6-10	11-15	15+	
1	Producers of raw materials and energy products	18.5%	16.7%	33.3%	20.4%	88.9%
2	International shipping lines or freight forwarders,	11.1%	14.8%	11.1%	18.5%	55.6%
3	Manufacturers and Producers	11.1%	14.8%	16.7%	9.3%	51.9%
4	Merchants	5.6%	9.3%	11.1%	9.3%	35.2%
5	Construction companies	11.1%	9.3%	11.1%	13.0%	44.4%
6	Agricultural treatments	1.9%	9.3%	9.3%	7.4%	27.8%

Table 6 shows the expectations of the participants as opportunities of railways ranked by arithmetic mean (from the highest to the lowest). As seen on Table 6, the rank was not changed by experience of the participants.

Table 6. Opportunities from Railways in Oman by Experiences of Participants

Opportunity		Experience (Year)				Total
		0-5	6-10	11-15	15+	
The railway logistics sector can create mixed public-private partnerships that lead to the creation of a variety of job.	Strongly Disagree		1.9%			1.9%
	Disagree	3.7%	3.7%	1.9%	1.9%	11.1%
	Neutral		7.4%	9.3%	1.9%	18.5%
	Agree	7.4%	9.3%	7.4%	9.3%	33.3%
	Strongly Agree	7.4%	1.9%	14.8%	11.1%	35.2%
Economic growth in the country by investing in railway	Disagree		3.7%	1.9%	1.9%	7.4%
	Neutral	1.9%	3.7%	3.7%	5.6%	14.8%
	Agree	13.0%	16.7%	27.8%	11.1%	68.5%

	Strongly Agree	3.7%			5.6%	9.3%
The importance of the location in supporting logistical projects and its relationship to logistical performance.	Disagree	1.9%	7.4%		1.9%	11.1%
	Neutral	3.7%	9.3%	14.8%	7.4%	35.2%
	Agree	11.1%	3.7%	11.1%	11.1%	37.0%
	Strongly Agree	1.9%	3.7%	7.4%	3.7%	16.7%
Strategic partnership with China in the Belt and Road project to enhance railway logistics.	Strongly Disagree			3.7%		3.7%
	Disagree	3.7%	5.6%	9.3%	5.6%	24.1%
	Neutral	5.6%	11.1%	5.6%	3.7%	25.9%
	Agree	1.9%	5.6%	13.0%	11.1%	31.5%
	Strongly Agree	7.4%	1.9%	1.9%	3.7%	14.8%
Achieving efficiency in terms of time and effort for all beneficiaries of railway logistics services.	Strongly Disagree			1.9%	1.9%	3.7%
	Disagree	3.7%	7.4%	1.9%	1.9%	14.8%
	Neutral	5.6%	9.3%	14.8%	9.3%	38.9%
	Agree	9.3%	5.6%	9.3%	9.3%	33.3%
	Strongly Agree		1.9%	5.6%	1.9%	9.3%

Table 7 shows the expectations of the participants as threats from railways ranked by arithmetic mean (from the highest to the lowest). As seen in Table 7, the rank was not changed by experience of the participants.

Table 7. The Challenges of Railways in Oman by Experiences of Participants

Challenge		Experience (Year)				Total
		0-5	6-10	11-15	15+	
Among the environmental threats that may hinder railways are global warming, rugged terrain, and encroaching sand.	Strongly Disagree	1.9%				1.9%
	Disagree		1.9%		3.7%	5.6%
	Neutral	3.7%	7.4%	9.3%	5.6%	25.9%
	Agree	9.3%	11.1%	13.0%	13.0%	46.3%
	Strongly Agree	3.7%	3.7%	11.1%	1.9%	20.4%
One of the long-term challenges emerging economies face with rail logistics is the shortage of human resource competencies.	Disagree	3.7%		3.7%	3.7%	11.1%
	Neutral	9.3%	9.3%	18.5%	7.4%	44.4%
	Agree	5.6%	9.3%	5.6%	7.4%	27.8%
	Strongly Agree		5.6%	5.6%	5.6%	16.7%
Low oil prices may pose a threat to the state of the economies of the oil-exporting countries, which affects the logistical progress in all sectors, including railways.	Strongly Disagree	1.9%				1.9%
	Disagree	3.7%	1.9%		5.6%	11.1%
	Neutral	3.7%	11.1%	11.1%	7.4%	33.3%
	Agree	5.6%	3.7%	13.0%	3.7%	25.9%
	Strongly Agree	3.7%	7.4%	9.3%	7.4%	27.8%

As seen in Figure 4, the experiences of the participants have not significantly changed the expectations about operation and management of railways in Oman.

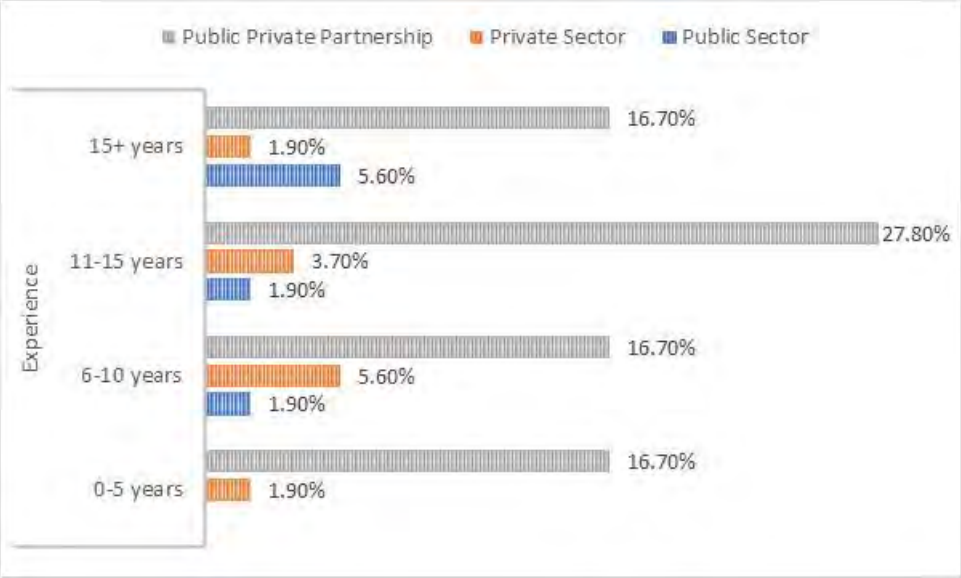

Figure 4. Management of Railways in Oman by Experiences of Participants

4. Discussion

Although the railway transportation and logistics are a new phenomenon in Oman, the perceptions, and expectations of the experts in logistics and transportation industry in Oman were observed in parallel with the previous studies either directly or indirectly related with railway logistics and/or Omani context. So, validity and reliability of the study have been confirmed by the results.

The experts linked to the research, ranked *creating mixed public-private partnerships and job opportunities* as the highest opportunity which is also mentioned in the study of Tayyep et al. (2019). The second strongest opportunity of railway logistics has been ranked as *economic growth* that is in parallel with Al-Wahabi (2017), Lloyd and Al-Ali (2018), Oxford Business Group (2022), Tayyeb, et al. (2019), and Theophile (2019) studies. The participants have ranked third strongest opportunity as *the geo-economic location* that is in parallel with Rahman et al. (2021), Ziadah (2018) studies. The fourth opportunity has been ranked by the participant as *strategic partnership with China in the Belt and Road project to enhance railway logistics* that is supporting to Lu et al. (2018), Al Fazari and Teng (2019) studies. The fifth opportunity has been ranked by the participants as *achieving efficiency in terms of time and effort for all beneficiaries of railway logistics services* which is in parallel with Al-Wahaibi (2017) and Omaima and Imran (2016) studies.

The higher optimistic perceptions have been observed, as railways *are an important economic resource to the Sultanate of Oman and the railway logistics study is commensurate with Oman's 2040 vision*. These results are in parallel with Al Wahabi (2017) and Oman2040 Vision Statement. On the other hand, the lower optimistic perceptions have been observed as *capability of Oman in managing railway logistics and its administrations and experience in facing the challenges of railway logistics*. These results are in parallel with the studies of Bouraima et al.(2020), Bešinović (2020), Majerčák and Majerčák (2017), and Al-Abbadi et al. (2021).

The biggest challenges identified by the participants as *the environmental threats that may hinder railways are global warming, rugged terrain, and encroaching sand* that support the studies of Bouraima et al. (2020), Saif and Khalil (2016), Thornes and Davis (2020), and Wang et al. (2020). The participants have ranked the second strongest challenge as *shortage of human resource competencies* that is mentioned by Rusakova and Bylkov (2018). The participants believe that the third strongest challenge is the *lowered progress in logistics as well as in all others due to fluctuating oil markets*. Moawad (2016) also discussed this risk in his study.

5. Conclusion

The Sultanate of Oman is among a group of nations with extensive expertise in directing intercontinental logistics operations. While she has not connected her logistics network with trains yet, strategic viewpoints at every level and logistics sector offer her faith that she will do so soon.

Even though strategic viewpoints at a higher level include railway infrastructure and network initiatives, few research studies on railroads in Oman have been mentioned in the literature review. Hence, extending theoretical and academic understanding and knowledge is one of this study's contribution. Because of the in-depth point of views, the data acquired from experts in the public and private sectors who work in logistics-related fields is another particularly strong aspect of the research.

Participants are generally positive about railway logistics and projects in Oman, even though private sector specialists are less optimistic than the public sector. The participants identified job generation as the top opportunity presented by railroads. That may be owing to the transitory and quantifiable character of railroads' employment generation. Although the second largest factor is the lasting effect of economic growth, the participants identified environmental risks such as geotechnical qualities, climate, rugged terrain, sand dunes, and temperature as the greatest threat.

Further research areas in railway logistics may potentially be the ownership and structural design of the managerial and operational body, vocational and technical education needs, and integration of various logistics types of services in Oman. In other words, researchers from both academia and non-academic sectors can answer how PPP would come true in Omani railway operations. On one side the railway logistics are expected to create thousands of jobs but on the other side, the participants agreed that a lack of skilled human resources would be a danger to Oman's railroad logistics. For further research, analysis of educational needs, programs, curricula, environments etc. of railway logistics in Oman, are the main areas to be examined in applied sciences and technical and vocational training as well. As a fast tracked and cost-efficient practice Omani institutions may cooperate and work with other nations that have extensive expertise in railway logistics management, operation, and training. PPP models also need to be supported with conclusive evidence by conducting basic and applied research as well. As technical and applied research agenda, these environmental, geotechnical challenges would be opportunities for researchers from academia and industry. To optimize scarce resource utilization, unique context of Omani land and geographical attributes enforce integration of logistics services based on mindset enriched by scientific research methodology.

6. Political and Managerial Recommendations

The relationship between economic growth and railways is well emphasized by the participants and the previous studies as well. Omani Government in conjunction with the other Gulf Nations, priorities economic diversity since a period earlier than last decade. Besides, Oman2040 has a clear vision about the process of achieving global competitive supply chain and logistics advantages. Hence, at this stage, it is time to develop strategic plans not only for adding value by integrating railways into logistics network, but also for creating value by awakening and pushing idle production capabilities in all sectors of Oman.

The biggest challenge identified by the participants, as the environmental threats that may hinder railways are global warming, rugged terrain, and encroaching sand etc. Oman is not the only one nation which is facing these challenges. Saudi Arabia and UAE have some good practices as well as some other parts of the world. Therefore, the cooperation and collaboration with other GCC nations will help Oman to overcome geotechnical and environmental challenges.

Most participants felt that Public-Private Partnership (PPP) would be the optimal operator for Oman's railroads. This is an essential factor to be considered by policymakers in Oman. Hence, PPP cannot be overlooked, particularly when multimodal and/or intermodal logistics are in place. The Omani Government may run participative decision-making mechanisms with stakeholders in logistics. At the early-stage collaborations may facilitate further executive and operative strategic allies of PPP.

It seems that Omani educational institutions might explore providing a variety of railway and logistics specialist programs. At this stage, policy makers might consider some good practices like European Union Countries, Turkiye and far eastern examples.

At the micro level, logistics operators not only in Oman but also in Gulf region, need to get ready for welcoming railways to their services portfolio. Once they proactively engage in the process, they will be a part of intermodal logistics with railways as well as being a dominant role player in policy making stages.

References

Al-Abbadi, S.M., Qureshi, M.I., Yasir, M. and Khan, N. (2021). Assessing Challenges and Opportunities in Optimizing Logistics and Supply Chain Performance in Oman. *Academy of Entrepreneurship Journal*, *27*(5). https://www.researchgate.net/publication/357635189_Assessing_Challenges_and_Opportunities_in_Optimizing_Logistics_and_Supply_Chain_Performance_in_Oman (Accessed on: 13.09.2023)

Al-Fazari, H. and Teng, J. (2019). Adoption of One Belt and One Road initiative by Oman: lessons from the East. *J. Global Business Advancement*. http://dx.doi.org/10.1504/JGBA.2019.099921 (Accessed on: 24.09.2023)

Al-Wahaibi, M. (2017). Oman Railway: Logistics Connectivity, environmental protection and Traffic Safety. University of Illinois. https://www.researchgate.net/publication/323258511_Oman_Railway_Logistics_Connectivity_environmental_protection_and_Traffic_Safety (Accessed on: 21.07.2023)

Asensio, J. (2000). The success story of Spanish suburban railways: Determinants of demand and policy implications. *Transport Policy*, 7(4), 295–302.

Bešinović, N. (2020). Resilience in Railway Transport Systems: A literature review and research agenda. *Transport Reviews*, *40*(4), 457–478.

Bouraima, M.B., Qiu, Y., Yusupov, B. and Ndjegwes, C.M. (2020). A study on the development strategy of the railway transportation system in the west African economic and monetary union (WAEMU) based on the SWOT/AHP technique. *Scientific African*, *8*. https://doi.org/10.1016/j.sciaf.2020.e00388 (Accessed on: 20.11.2023)

Cantelmo, G., Amini, R.E., Monteiro, M.M., Frenkel, A., Lerner, O., Tavory, S.S., Galtzur, A., Kamargianni, M., Shiftan, Y., Behrischi, C., Azevedo, Carlos, M.L., Haustein, S. and Constantinos, A. (2022). Aligning users' and stakeholders' needs: How incentives can reshape the carsharing market. *Transport Policy*, *126*, 306-326.

Giusti, R., Iorfida, C., Li, Y., Manerba, D., Musso, S., Perboli, G., Tadei, R. and Yuan, S. (2019). Sustainable and de-stressed international supply-chains through the SYNCHRO-NET approach. *Sustainability*, *11*(4), 1083.

HSBC. (2015, May 15). *Oman pushes ahead with logistics goal.* Retrieved from HSBC Global Connections: http://globalconnections.hsbc.com/uae/en/articles/oman-pushesahead-logistics-goal (Accessed on: 21.10.2022)

Omaima, B.N. and Imran, H. (2016). Economic projects in the Sultanate of Oman: Investment and development. *CyberLeninka*. https://cyberleninka.ru/article/n/economic-projects-in-the-sultanate-of-oman-investment-and-development (Accessed on: 01.06.2023)

Jarašūnienė, A., Sinkevičius, G., Čižiūnienė, K. and Čereška, A. (2020). Adaptation of the management model of internationalization processes in the development of railway transport activities. *Sustainability*, *12*(15), 6248.

Jianjun, W. (2012). The research on efficiency and effectiveness of rail transport. *IERI Procedia*, *3*, 126–130. https://doi.org/10.1016/j.ieri.2012.09.021

Korovyakovsky, E. and Szoltysek, J. (2006). Creating International Supply Chains in Europe and Russia. In O.-P. Hilmola (Ed.), *Contemporary Research Issues in International Railway Logistics* (pp. 43-52). Kouvala: Lappeenranta University of Technology.

Kunaka, C. and Carruthers, R. (2014). Trade and Transport Corridor Management Toolkit. Washington DC: World Bank. doi:10.1596 /978-1-4648-0143-3

Li, W. and Hilmola, O. (2019). Belt and Road Initiative and Railway Sector Efficiency Application of Networked Benchmarking Analysis. *MDPI*. https://www.mdpi.com/2071-1050/11/7/2070/pdf?version=1554702921 (Accessed on: 27.01.2023)

Lloyd, E. and Al-Ali, L. (2018, October 30). The Development of Rail Infrastructure Projects in GCC. https://www.tamimi.com/law-update-articles/the-development-of-rail-infrastructure-projects-in-the-gcc/ (Accessed on: 21.10.2022)

Maes, J. and Vanelslander, T. (2011). The use of rail transport as part of the supply chain in an urban logistics context. Macharis, C and Melo, S. (Eds.) *City Distribution and Urban Freight Transport.* ElgarOnline. 251-273.

Mahendran, Y. and Pillai, R. (2016). The Impact of the GCC/Etihad Railway on the Aviation Sector in the UAE. In A. H. Obaide (Ed.), *Proceedings of the 3rd International Aviation Management Conference*, *IAMC. Dubai:* Emirates Aviation University.

Majerčák, J. and Majerčák, P.. (2017). Logistics assessment of functional performance of material flows in Railway Transport. *MATEC Web of Conferences*, *134*, 00035. https://doi.org/10.1051/matecconf/201713400035 (Accessed on: 07.08.2022)

Memedovic, O., Ojala, L., Rodrigue, J. and Naula, T. (2008). Fuelling the global value chains: what role for logistics capabilities? *International Journal of Technological Learning, Innovation and Development*,, *1*(3), 353-374.

Moawad, A. S. (2016). The Impact of Oil Prices on the Economic Growth and Development in the MENA countries. *MPRA*. https://mpra.ub.uni-muenchen.de/id/eprint/89073 (Accessed on: 05.09.2022)

OECD Business and Finance Outlook. (2018). China's Belt and Road Initiative in the Global Trade, Investment and Finance Landscape. *OECD*. https://www.oecd.org/finance/Chinas-Belt-and-Road-Initiative-in-the-global-trade-investment-and-finance-landscape.pdf (Accessed on: 09.04.2023).

Oman Vision 2040 Implementation Follow-up Unit. (2020) *Vision Document*, Available at: https://www.oman2040.om/assets/books/oman2040-en/index.html#p=1 (Accessed on: 26.12.2022).

Oxford Business Group. (2022, May 11). *How GCC Railway Could Revolutionize Trade and Transport Gulf*. https://oxfordbusinessgroup.com/news/how-gcc-railway-could-revolutionise-trade-and-transport-gulf (Accessed on: 21.10.2022).

Rahman, N.S.F.A., Al-Balushi, S.A.M., Hamid, A.A., Al-Kalbani, K.S., Alemu, A.E. (2021). Logistics Sector Development Integration with Oman Logistics Vision 2040: Analyzing Using Porters` Value Chain Theory. *Academy of Strategic Management Journal*. https://www.abacademies.org/articles/logistics-sector-development-integration-with-oman-logistics-vision-2040-analyzing-using-porters-value-chain-theory-12425.html (Accessed on: 18.12.2022).

Rana, P.B. and Ji, Xianbai. (2020). BRI and Southeast Asia. *China's Belt and Road Initiative: Impacts on Asia and Policy Agenda*, 93-111.

Rashid, M. N., Ngalawa, F. and Cil, I. (2016). Comparative study of logistic industry of Tanzania and Turkey. *International Journal of Operations and Logistics Management*, *5*(2), 2309–8023.

Rusakova, O. and Bylkov, V. (2018). Formation of need for human resources in implementation of high-speed and superhigh-speed railway projects. *Proceedings of the International Conference "Aviamechanical Engineering and Transport" (AVENT 2018)*. https://doi.org/10.2991/avent-18.2018.67 (Accessed on: 20.09.2023)

Saif, M. A., Ghulman, B. A., Ahmed, I. and Khalil, H. (2016). Challenges to the Development of Railway Infrastructure in Remote and Formidable Terrain: A Case Study from Saudi Arabia. In J. Pombo (Ed.), *Proceedings of the Third International Conference on Railway Technology: Research, Development and Maintenance (pp. 1-22). Stirlingshire:* Civil-Comp Press.

Stojanović, I. and Puška, A. (2021). Logistics Performances of Gulf Cooperation Councils Countries in Global Supply Chain. *Decision Making: Applications in Management and Engineering,* 4(1), 174-193.

Tayyeb, H., Kassim, A. and Al-Falahi, Mubarak. (2019). Modelling Freight Transportation Impacts of the Gulf Cooperation Council Region us in GIS. *IOP Conference Series: Materials Science and Engineering* (pp. 1-12). IOP. doi:10.1088/1757-899X/603/5/052015

Theophile, G. (2019). Railways of the MENA Region, tools of national and foreign policy. *Centre International De Formation Europeenne*, 2. https://www.ie-ei.eu/Ressources/FCK/image/RECHERCHE/Theses_2019/Thesis_Theophile_Galloy.pdf

Thornes, J. E. and Davis, B.W. (2020). Mitigating the impact of weather and climate on railway operations in the UK. *ASME/IEEE Joint Railroad Conference* .Available at: https://doi.org/10.1109/rrcon.2002.1000089.

Tomeš, Z., Kvizda, M., Nigrin, T. and Seidenglanz, D. (2014). Competition in the railway passenger market in the Czech Republic. *Research in Transportation Economics*, *48*, 270–276. https://doi.org/10.1016/j.retrec.2014.09.052

Yan, K. (2022). Rethinking China's quest for railway standardization: competition and complementation. *Journal of Chinese Governance*, 7(1), 111-136.

Wang, T., Qu, Z., Yang, Z., Nichol, T., Dimitriu, D., Clarke, G., Bowden, D. and Lee, P.T. (2020). Impact analysis of climate change on rail systems for Adaptation Planning: A UK case.

Transportation Research Part D: Transport and Environment, *83*, 102324. https://doi.org/10.1016/j.trd.2020.102324 (Accessed on: 11.09.2023)

Zhong, G., Xiong, K., Zhong, Z. and Ai, B. (2021). Internet of things for high-speed railways. *Intelligent and Converged Networks*, *2*(2), 115-132.

Ziadah, R. (2018). Constructing a logistics space: Perspectives from the Gulf Cooperation Council. Environment and Planning D: Society and Space, 36(4), 666–682.