**AN EMPIRICAL REVIEW OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT SKILL REQUIREMENTS: A STAKEHOLDER PERSPECTIVE IN OMAN**

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**Introduction**

Due to their inherent focus and capability to manage the various functions of the business simultaneously, the disciplines of logistics and supply chain management have evolved from an administrative function into a strategic role (Giunipero et al., 2006). What once was looked upon as an activity for the management of operations, especially trucking and warehousing, is now accepted as a strategic level function (Murphy and Poist, 1994).

Whilst the importance of logistics and supply chain is not disputed, the question then must be asked as to how to appropriately design, implement, adapt and manage supply chains to the fullest of their capabilities in accordance with an ever changing business environment. The answer lies in the people who will undertake these roles. Many authors including Van Hoek, Chatham and Wilding were clear in their assertion that the ‘people dimension’ is the critical factor in the on-going success of a supply chain (Van Hoek, Chatham and Wilding, 2002). Authors such as Gammelgaard and Larson (2001), Ozment and Keller (2009), Christopher and Mangan (2005), Myers, Griffith, Daugherty and Lusch (2004), to cite some examples, have all researched logistics and supply chain in the context of the need to consistently enhance the skills of logistics and supply chain practitioners.

All the authors came to the same conclusion in that it was found that the logistics and supply chain industries lack adequately prepared personnel, there is no consensus on the contents of a logistics and supply chain third level course and subsequent teaching methodology and most importantly if the logistics and supply chain sector has access to better prepared staff, major improvements could be seen for the various stakeholders in the sector. This research endeavors to build upon previous studies, within the context and needs of the Sultanate of Oman in order to measure logistics and supply chain stakeholder views regarding the most valuable skills within their respective industries.

**Problem statement**

The economy of Oman is primarily driven by the hydrocarbon sector. Between 2011 and 2015, 44% of the GDP is derived from the oil sector (Tanfeedh, 2017). In addition, 46% of the population in the Sultanate are expatriates (TimesofOman, 2016). These two developments have led to two strategic initiatives. First, the Tanfeedh program to diversify the economy. It is envisaged that the oil sector will reduce to 26% of GDP by 2020 (Muscat Daily, 2016). Second, a workforce nationalization program, Omanisation, has been implemented to increase the share of Omani employees (Kemp and Madsen, 2014).

Whilst the expected rate of Omanisation varies from role, position and sector, the SOLS 2040 committee were clear in their assertion that currently “most logistics related posts are primarily held by expatriates” [MOTC, (2015), p 59] and that “the current high level of expatriates employed in this sector [logistics]” could be detrimentally affecting the career choice of local Omani’s [MOTC, (2015), p 58]. Furthermore, the report goes on to say that in the ‘short to medium’ future this high level of expatriate will continue. This high level of expatriate staff amongst the logistics sector is such that one of the 3 key issues within the report is to ensure that there are enough adequately trained and experienced staff available locally for the industry.

Many economies suffer from difficulties in attracting employees in the sector. McKinnon et al. (2017) found that all respondents to their global survey noted potential issues concerning the availability of adequately qualified employees but differences occurred between developed and emerging economies. Developed economies noted most difficulties in recruiting staff at the blue-collar level whereas the area with least problems was that of manager. In contrast emerging economies (including the Sultanate of Oman) were directly opposite to their developed counterparts, whereby the area of most concern is at the manager level. The emerging regions exhibited a linear correlation to attracting staff where it could be seen that 35% of respondents noted very low or low availability of suitably qualified staff at the blue collar level, 36% at the administrative staff level, 39% at the supervisor level and 50% at the manager level. The findings demonstrate that emerging economies exhibit greater staff challenges as they move up the skills ladder.

This research will identify the specific gaps and mismatches between the industry requirements and educator perception of skills requirements. Furthermore, the research will take the theme of the Omanisation program and seek to analyze the influence of the expatriate labor force on the perceived gaps and mismatches.

**Literature review**

Despite the fact that is accepted that people with high levels of competency add value to the supply chain (Sweeney, 2013; Bowersox et al. 2000; Kirby, 2003), debate and confusion still exists as to what exactly are the skills and competencies in question. Many authors have researched this area with slight variances in their approach and results. As the industry evolves researchers have failed to agree upon a set of universally accepted set of criterion for personnel. Table 1 outlines prominent authors and researchers in the area of logistics and supply chain management skills. As can be seen, the area has been growing in momentum and research results demonstrate that potential personnel in the logistics and supply chain sector are required to have a wide spectrum of skills.

|  |  |
| --- | --- |
| Author | Paramount Skills |
| *Ginunipero & Pearcy (2000)* | *decision making skills, teamwork, analytical, negotiation & communication skills* |
| *Johnson et al. (2003)* | *technical skills, soft skills* |
| *Handfield & Nichols (1999)* | *people skills, technological skills & functional skill* |
| *Rahman & Qing (2014)* | *environmental skills, decision making skills, teamwork, analytical, negotiation & communication skills* |
| *Murphy & Poist (2007)* | *business, logistics & management* |
| *Gammelgard & Larson (2001)* | *teamwork, problem solving, supply chain awareness, ability to take strategic view & listening* |
| *Myers et al. (2004)* | *social skills, decision making skills, problem solving & time management* |
| *Lutz & Birou (2013)* | *general knowledge, social skills, decision making skills, problem solving & time management* |
| *Okongwu (2007)* | *general management, business skills (engineering & operations) & supply chain management* |
| *Jordan & Bak (2016)* | *strategic, behavioral, process management, quantitative, people management, negotiation& decision making* |
| *Sohal (2013)* | *communication and teamwork, technology, initiative and enterprise & compliance and legal knowledge* |
| *Derwik & Hellstrom (2017)* | *functional, relational, behavioral & managerial*  |

Table 1: Review of previous research into logistics and supply chain skills

Although numerous studies have been conducted, two in particular are at the forefront of the subject area. In their seminal research, Murphy and Poist surveyed just under 250 logistics and supply chain management stakeholders seeking their opinion on the most valuable skills required in the logistics sector. The respondents to their survey were asked to rank 83 different skills under Business Skills, Management Skills and Logistics Skills; namely the BLM Framework. The authors updated their research in 2007. In both studies, whilst there were fluctuations in terms of specific skills, in a general sense management skills were ranked as number 1, followed by logistics skills and then business skills (Murphy and Poist, 2007). Of note from the studies is the relative stability of the skills under the logistics umbrella as they experienced much less fluctuation compared to those in the business and management skill sets in the intervening years between the first and second study.

Derwik and Hellstrom developed previously academically accepted research to the point that in their 2017 research on competence in supply chain management the authors categorized competence under four headings, namely; Functional, Relational, Managerial and Behavioral. The categorization of competence into four distinct skills sets, is based upon a review of 98 peer-reviewed journal articles. Renowned authors in the field of competence in supply chain such as Mangan, Christopher, Bowersox, Closs, Stank, Keller and van Hoek, to cite some examples, were all included in the study which give the research further credence. The study noted that 76 of the articles focused on Functional skills, 62 on Relational skills, 66 on Managerial skills and 45 on Behavioral skills.

As can be seen there are many views on what constitutes the required skill set of a logistics and supply chain professional and “there is no consensus in literature on how logistics capability should be disaggregated into specific skills nor is there any consensus about which skills to place in which skills sets”, [Kovacs et al., (2012), p 247]. Adding to this confusion, the terms of logistics and supply chain management are used interchangeably. Many of the academic articles based in the logistics and supply chain management discipline first define what are both logistics and supply chain management, and then make an argument that the topics will be treated either mutually inclusive or exclusive (Globerson and Wolburn, 2014). Authors such as Mangan and Christopher (2005), Ozmet and Keller (2011), Heyns and Carstens (2012) and Yen-Chun (2007) are clear in their assertions that logistics and supply chain are treated in the same context within their work. In direct contrast researchers such as Okongwu (2007) and Ballou (2007) clearly identify the differences between the subject matter and make no illusions as to the differential in treatment of the subjects.

**Methodology**

In the autumn of 2017 an online survey was sent to companies with an interest in logistics and supply chain management performance in the Sultanate of Oman. The respondents were asked to rank given logistics and supply chain management skills on a 10 point Likert scale. The authors categorized the skills under Derwik and Hellstroms research, i.e. relational, business, management and logistics. The authors utilized the relational, business and behavioral skills sets as per Derwik and Hellstrom but felt it prudent to use the logistics skills as previously identified in Murphy and Posits previous work as their findings were more exhaustive and comprehensive in terms of logistics skills. Similar to authors such as Thai et al. (2011), the authors tested and adapted the structure and wording within the skill sets where needed. Following the pilot surveys, it was considered necessary to include confidence as a relational skill and change management as a business skill. As a result, respondents were asked to rank 33 skills under four categories. 18 skills are functional, 6 are behavioral, 5 are managerial and the remaining 4 skills are relational.

The online survey was distributed to 111 logistics and supply chain companies trading in the Sultanate of Oman as well as a leading higher education institute offering training and education within the logistics and supply chain sector. An official list of logistics and supply chain companies was obtained from the Omani Chamber of Commerce. The list comprised of 111 registered logistics and supply chain companies and all registered were asked to participate in the online survey. The survey was emailed direct to the respondents with an email outlining the primary objectives and potential benefits. After 6 weeks and 2 email reminders, the survey was closed for public submission. The response rate was 33%.

**Results and analysis**

The survey resulted in 37 respondents. Two third of the respondents are Omani and one third are expats. Eighteen respondents work in logistics, 10 in supply chain management, seven in education and the remaining two respondents did not state where they work.

Table 2 indicates that *Teamwork* has the highest mean score of 8.86. The expats have ranked this skill as the highest while Omani employees consider it as the fourth most important skills. Further analysis reveals that employees in the Supply Chain Management rank this skill the 8th most important. Furthermore, all relational skills are ranked in the top 10 most important skills, with the lowest ranking assigned to *Communication* skills. This skill has been ranked by Omani’s as 14th most important skills and by employees in Logistics as the 18th most important skill.

The Omani employees assigned the highest rating to *Customer Service,* while the expats consider this skill, with a ranking of 19, not as important. *Customer Service* scores the highest in the functional skills and is the only functional skill in the top 10. *Customer Service* is also ranked the most important skill by employees who work in Logistics.

There is consensus with all respondents regarding most of the functional skills. For example, *Return Goods Handling* and *Parts and Service Support*. These skills are ranked 32nd and 33rd respectively and there is no significant difference in how different independent variables rank these skills. In contrast, *Purchasing* is ranked the most important skill by staff employed in Supply Chain Management, while overall the skill is ranked 23rd. Similarly, *Salvage and Scrap Disposal* is ranked 4th by Supply Chain Management and ranked 24th overall. Furthermore, *Facilities Location* is ranked 21st by the Omani’s and 32nd by the expats.

As can be seen in Table 2, *Self-Management*, with a ranking of three, is considered very important by expats, while Omani’s ranked this skill very low at 24th. This skill shows the highest difference between groups for the behavioral skills. Employees who work in education rank *Creativity* as the most important skill. Employees in supply chain management and logistics have ranked it 16th and 2nd respectively. In addition, it is ranked the highest behavioral skill. In the category Managerial skills, *Company and Industry Experience* is considered the least important and *People Management* the most important with a ranking of 18 and 7 respectively.

Table 2 also shows that the category *Relational Skills* are considered the most important, while *Functional skills* are considered least important. Further analysis reveals that there is a high standard deviation for the *Relational Skills*, which could be accounted to mainly two skills, namely *Self-management* and *Empathy*.

ANOVA tests are conducted to test whether there are effects of independent variables on assigning scores to skills. A One-way ANOVA is conducted to compare the effects of the independent variable “*Omani or Expat*” and of the independent variable “*what best describes your company*” on the rating of the skills. Whilst there is a difference on how skills are viewed, the results imply that there is no statistical significant difference for most of the skills. For some of the skills however, there is an effect of the nationality on the rating of the skills.

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| --- | --- | --- | --- | --- |
| Skills |   | Overall | Omani or Expat | What best describes your company |
|   | Mean | Rank | Omani | Expat | Supply chain management | Logistics | Education |
| **Functional Skills** | 7.6186 |  |  |  |  |  |  |
| Material Handling | 7.5135 | 25 | 26 | 24 | 11 | 23 | 32 |
| Inventory Management | 7.4865 | 26 | 29 | 22 | 12 | 30 | 21 |
| International Logistics | 8.1622 | 17 | 25 | 11 | 30 | 6 | 17 |
| Forecasting | 7.4595 | 27 | 22 | 27 | 21 | 32 | 15 |
| Data and Information Management | 8.2703 | 14 | 11 | 18 | 23 | 10 | 15 |
| *Purchasing* | 7.7027 | 23 | 19 | 25 | 1 | 28 | 21 |
| *Parts and Service Support* | 6.7027 | 33 | 33 | 29 | 33 | 28 | 31 |
| Production Scheduling | 7.1892 | 31 | 30 | 28 | 26 | 32 | 19 |
| Return Goods Handling | 6.7297 | 32 | 32 | 32 | 32 | 31 | 32 |
| *Facilities Location* | 7.1892 | 30 | 21 | 32 | 29 | 24 | 29 |
| Transport and Traffic Management | 8.1892 | 16 | 16 | 17 | 25 | 10 | 21 |
| Warehouse Management | 7.8919 | 20 | 14 | 21 | 22 | 15 | 25 |
| Personnel Movement | 7.2973 | 29 | 20 | 29 | 23 | 27 | 27 |
| Order Management | 8.0541 | 19 | 7 | 23 | 10 | 10 | 27 |
| Packaging | 7.3784 | 28 | 27 | 26 | 30 | 21 | 30 |
| Data and Information Regulation | 7.7568 | 22 | 22 | 20 | 28 | 21 | 21 |
| *Customer Service* | 8.4865 | 10 | 1 | 19 | 19 | 1 | 19 |
| *Salvage and Scrap Disposal* | 7.6757 | 24 | 8 | 29 | 4 | 25 | 25 |
| **Relational** | 8.7432 |  |  |  |  |  |  |
| *Communication* | 8.6216 | 6 | 14 | 4 | 2 | 18 | 3 |
| *Teamwork* | 8.8649 | 1 | 4 | 1 | 8 | 3 | 3 |
| Cultural and Cross-functional Awareness | 8.8378 | 2 | 5 | 1 | 3 | 3 | 9 |
| Confidence | 8.6486 | 5 | 6 | 6 | 4 | 7 | 3 |
| **Managerial** | 8.4000 |  |  |  |  |  |  |
| Business Analysis | 8.4865 | 9 | 12 | 12 | 8 | 9 | 14 |
| Business Management | 8.5676 | 8 | 9 | 9 | 4 | 10 | 13 |
| People Management | 8.5676 | 7 | 12 | 5 | 14 | 7 | 2 |
| Company and Industry Experience | 8.0811 | 18 | 28 | 10 | 26 | 18 | 17 |
| Change Management | 8.2973 | 12 | 17 | 12 | 16 | 16 | 9 |
| **Behavioral** | 8.3874 |  |  |  |  |  |  |
| *Self-Management* | 8.2973 | 13 | 24 | 3 | 18 | 20 | 7 |
| Self-Motivation | 8.2162 | 15 | 18 | 14 | 14 | 10 | 12 |
| Empathy | 7.8108 | 21 | 31 | 16 | 19 | 26 | 9 |
| Leadership | 8.7568 | 4 | 3 | 6 | 7 | 3 | 6 |
| *Creativity* | 8.7838 | 3 | 2 | 8 | 16 | 2 | 1 |
| Cognitive Skills | 8.4595 | 11 | 9 | 15 | 12 | 16 | 8 |
| \*The skills in Italics are discussed in further detail. |
| Table 2: Overall means, ranking by independent variables |

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| --- |
| ANOVA |
|   |   | Sum of Squares | df | Mean Square | F | Sig. |
| Facilities Location | Between Groups | 33.347 | 1 | 33.347 | 4.424 | .043 |
|   | Within Groups | 256.292 | 34 | 7.583 |   |   |
|   | Total | 289.639 | 35 |   |   |   |
|   |   |   |   |   |   |   |
| Salvage and Scrap Disposal | Between Groups | 45.125 | 1 | 45.125 | 6.946 | .13 |
|   | Within Groups | 220.875 | 34 | 6.496 |   |   |
|   | Total | 266.000 | 35 |   |   |   |
|   |   |   |   |   |   |   |

Table 3: ANOVA Omani or Expat: Customer Service, Facilities Location and Salvage & Scrap Disposal

As can be seen from table 3, the effect of nationality on *Facilities Location* is significant, *F* (1,34) = 4.424, *P* = .043. *P* is below 0.05; therefor it is statistically significant at 95% confidence interval. Post Hoc comparisons using the Turkey HSD test indicates that the mean score for Omani (M = 7.9) is significantly different from the Expats (M= 5.8). These results suggest that Omani’s and Expats have a different view on the importance of this skill. The effect of nationality on *Salvage and Scrap Disposal* is also significant. This skill scored a mean of 8.5 with the Omani, while it has a score of 6.1 with the expats.

|  |
| --- |
| ANOVA |
|   |   | Sum of Squares | df | Mean Square | F | Sig. |
| Creativity | Between Groups | 16.471 | 1 | 8.236 | 4.356 | .021 |
|   | Within Groups | 60.500 | 32 | 1.891 |   |   |
|   | Total | 76.971 | 34 |   |   |   |

Table 4: What best describes your company: Purchasing and Creativity

Table 4 shows the effect on *Creativity* on the other hand is significant at a confidence interval of 95%. *F* (2,32) = 4.356, *P* = .021. The Turkey HSD test indicates that the mean score of Educators (M = 10.0) is significantly different from the mean scores of Supply Chain employees (M = 8.0) and Logistics employees (M = 8.83). These results indicate that there is a significant difference on how educators regard the importance of this skill.

**Discussion and conclusion**

The overall results of this study show similarities with previous research completed by authors such as Murphy and Poist (2007) and Rahman and Qing (2004). Through the unique blending of previous research, the study provides an exclusive insight into stakeholder perceptions of skill requirements in the logistics and supply chain sector in Oman.

When comparing the results from Murphy and Poist’s 2007 research with this work, it can be seen that respondents maintain that it is the ‘soft’ skills which are of significance for supply chain and logistics personnel. A direct comparison to Murphy and Poist is difficult due to the fact that they utilized business, logistics and management skill sets whereas this research utilized relational, managerial, behavioral and functional skill sets, but a note must be taken of parallels. Respondents to Murphy and Poist signaled logistics skills as second in terms of importance when compared to management skills. Likewise, this research found that stakeholders deem hard skills such as functional skills as being of lesser importance when compared to relational, managerial or behavioral skills. With regard to the functional/logistics skills specifically (which can be analyzed in tandem) 6 of the top 10 skills correlate between the two pieces of research. A similar correlation was found in the bottom 6 skills, as 4 of the bottom 6 were repeated between the two pieces of research.

A similar likeness is confirmed when these results are compared with those from Rahman and Qing’s research into supply chain skills. Although different terminology and skill sets were utilized in the two pieces of research, 50% of the top ten found by Rahman and Qing can be directly correlated with the top ten functional skills found in this research.

Whilst comparisons of functional skills to those of Murphy and Poists logistics skills is plausible and provides reliability and credence to the research, such comparisons of the relational, managerial and behavioral skills would be invalid. This research was the first time that these skills were ranked and rated by stakeholders in depth in this format. It is believed that this research is unique in its adoption of Derwik and Hellstroms framework in primary research practice and as such the results are of significance for all stakeholders.

Although previous studies into skills and aptitude recognition have been cited throughout the research, this study is unique in that it has specifically explored how expatriates and non-expatriates view the importance of skills with in the supply chain sector. The paper clearly showed that there is no consensus on how different nationalities perceive the importance of skills. Not only do expatriates and Omani’s have a different view on the importance of skills, but also within the expatriate group there is a high variance suggesting that the importance of the skills is not homogenously viewed. Despite the fact that culture can be an influencing factor in determining and utilizing logistics skills (McKinnon et al. 2017), the cultural aspect was not within the scope of this study. However, the results do indicate that perception of importance of skills are culturally driven. From the results, it is deduced that Omani’s are more task oriented rather than people oriented. This warrants for further research as the expatriate community is not a homogenous group, but a multiplicity of nationalities and a deeper analysis is required.

The diverse nature of the sector and the difficulty in alignment between educators and the industry itself is clearly identified when the results are analyzed, as this study has shown that differences exist between the opinions and experiences of educators and practitioners whereby both sectors have a different view on the importance of skills sets.

Additionally, the results showed that logistics and supply chain respondents rank the skills sets required by personnel in the industry differently. The research has demonstrated that the way in which a person perceives themselves within the scope of logistics and supply chain management has a direct effect on their view regarding what skills are required within their sector. The literature review has shown that the terms logistics and supply chain are used interchangeably in previous research papers. This research has confirmed the need for future researchers to treat the subjects independently if a comprehensive and deep analysis is required.

Similar to any other piece of research, this research suffered from limitations which must be acknowledged by the authors. The primary concern of the authors was that of the response rate, whereby it was deemed possible that the fact that the survey was conducted in English could have had an adverse effect on the response rate. As noted earlier, the Sultanate of Oman relies heavily on expatriate labor and as such, numerous nationalities and languages are apparent. On the basis that English is the internationally accepted business language and the survey was designed for middle to top managers it was deemed sufficient to offer the survey in English format only as it was deemed impracticable to offer the survey in all possible languages that exist in the Omani business environment.

The fact that respondents were requested to rate a total of 33 competencies was of additional concern to the authors as it presented a disquiet over the time required to complete the survey and thus the response rate could have been affected. However, considering the exploratory nature of the research, it was deemed that the authors would be negligent to limit or edit the competencies any further. Additionally, the concerns of the authors were mitigated with the feedback from the pilot surveys.

The findings in this paper have implications for educators, regulators and practitioners. For educators the results can be used to bridge the identified gaps on the skills required and design curricula that will meet industry requirements. However, this will prove a challenge, as there is no consensus on how different practitioners, i.e. logistics and supply chain, view the importance of the skills required. For regulators the results can serve as a catalyst to successfully implement workforce nationalization programs such as the Omanisation program. For the practitioners the results will proof useful for the identification of training and educational needs for both expatriates and non-expatriate employees and can be used as a catalyst for staff training and retention.

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