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Impact of Mobility on Supply Chain Management

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Abstract: Purpose: In recent studies, there has been much interest in mobility (mobile-wireless technology and devices) especially in the supply chain industry due to changing market dynamics. The ubiquity of smartphones and internet access has led to a new era of digital consumerism, which has affected the business-consumer ecosystem. This research examines the impact of mobility in supply chain management – the relationship between the factors influencing the same. Accordingly, the hypothesis are defined and modeled for the influencing factors.
Methodology: The model and hypotheses were tested with a sample of 257 respondents from various business functions (supplier, manufacturer, warehouse management, transport management, logistics management, retailer, e-commerce and end customer) in the supply chain industry throughout all the geographies.
Findings: The individual variables omni-channel retailing, mobility devices, real-time access and customer expectation have a positive relation to mobility in supply chain management. However, converging technologies and integration of the supply chain do not have a direct impact on mobility in supply chain management.
Practical implications: Mobile and cloud technology and big data adaptation and implementation will increase in the future with an increase in awareness and ever changing customer expectation in this era of digital consumerism.
Originality/value: This research provides a new description for the SCOR model incorporating mobility and supply chain management.
Keywords: Mobility, supply chain management, omni-channel retailing, mobility devices

1. Introduction

Mobility (mobile-wireless technology and devices) is having an impact on the supply chain industry and has become a necessity to remain competitive in the changed business environment of the supply chain industry to support the shift from the single channel to omni-channel marketplace (Napolitano, 2012). Just as mobility has brought tremendous change to the consumer experience by having access to information and the ability to buy on the go anytime anywhere, it has also helped organizations with increased data accuracy, better efficiency, and informed decision making through the connected supply chain.
The literature review reflects that limited studies have been conducted on the impact of mobility in supply chain management and how the contributing factors impact the same. Based on the findings, the following areas have scope for further research:

a. Omni-channel retailing (Kraemer, 2015; Napolitano, 2013)
b. Converging technologies (Udhas, Mittal & Chandrasekaran, 2013)
c. Integration of supply chain (Yan et al., 2014)
d. Real-Time Access (Frandsen, 2014)
e. Mobility Devices (Michel, 2015a)
f. Customer Expectation (McCrea, 2012)

As such, the above areas need to be addressed and studied further with respect to the impact of mobility in supply chain management. This research aims to deliver key insights into these measures to prove the importance of mobility (mobile-wireless technology and devices) and how mobility enhances and aids the

conduct of supply chain activities, by providing anytime anywhere access to information and real-time responsiveness on the GO.

2. Review of Literature and Research Structure

The secondary data through the literature review was collected from 61 academic journals leading to the identification of the scope for future research for independent variables explaining the impact of mobility in supply chain management. The existing literature finds out the driving forces for the impact of mobility on supply chain management, which is affected by factors such as omni-channel retailing, converging technologies, integration of the supply chain, real-time access, mobility devices and customer expectation. The literature review deals with independent variables and sub variables through which the survey questions were formed. The path coefficient is presented along with the literature review to ensure strong statistical validity for the questionnaire. Though the normal practice is to present the path coefficient along with the data analysis section (and it is too early to present it here), it is felt that the reliability of independent variables as well as questionnaire representing sub variables can be given in the literature review itself to indicate the perfect fit with the literature with its quantitative validity.

2.1 Omni-channel Retailing

Omni-channel retailing means all channels of purchases i.e. physical store, smart mobiles, on-line catalogue, websites, social media, kiosks, and computers are available to the consumer and are connected (Kraemer, 2015). Smartphones and internet access have increased customer touch points. The omni-channel philosophy is to give the customer a seamless buying experience across all channel of purchases, i.e. buy from anywhere and ship from anywhere (Napolitano, 2013). The major parameters influencing omni-channel retailing are digital consumerism (Udhas, Mittal & Chandrasekaran, 2013), personalized consumer engagement (Kraemer, 2015) and transformation of business strategy (McCrea, 2015).

H1: Omni-channel retailing has a positive impact on mobility in supply chain management due to digital consumerism, consumer engagement and transformation of business strategy.
H2: Omni-channel retailing has a positive impact on customer expectation due to increase of service level, ease of return and tracking.

2.1.1 Digital Consumerism

The ubiquity of smartphones and internet access has empowered today's consumer like never before. The rising use of smartphones and internet access has transformed consumer buying habits. The modern day consumer moves around across all channels of purchases and expects to be able to shop anywhere, at any time and from any location with a consistent buying experience across all channels of purchases (Udhas, Mittal & Chandrasekaran, 2013).

2.1.2 Personalized Consumer Engagement

Innovation in technology has enabled multiple touch points for the customer and also supports new capabilities in personalized consumer engagement through smart-sensor based systems for customer recognition, predictive and virtual assistance. The increasing trend of "social commerce" – social media and e-commerce are the key drivers for personalized customer engagement beyond the store through virtual expert advice, prompting customer preference though use of business intelligence, location based automated services and product customization (Kraemer, 2015).

2.1.3 Transformation of Business Strategy

Meeting the multichannel consumer's increasing customer expectation of higher service level and convenience due to technological advancement and ubiquity of smartphones and information access has forced the transformation of business strategy in the supply chain in todays changed competitive business environment to give a seamless and consistent buying experience in omni-channel retailing (McCrea, 2015).

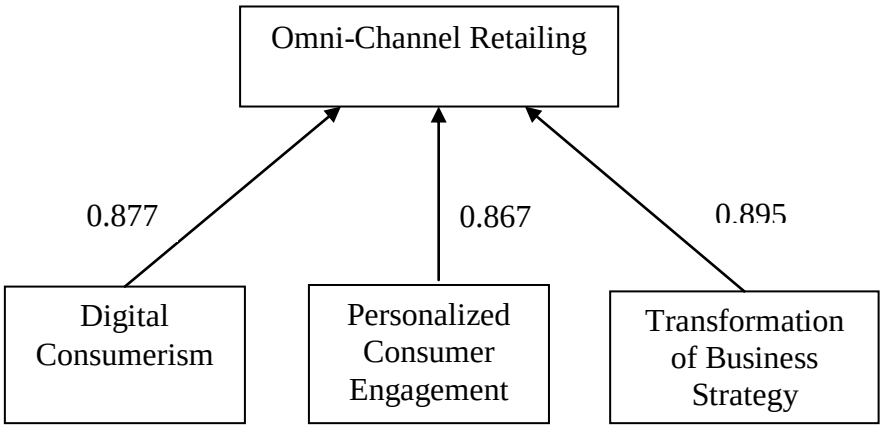


Figure 1: Path coefficients for omni-channel retailing

In the above SEM model the path coefficient for individual constructs, namely digital consumerism (0.877), personalized consumer engagement (0.867), and transformation of business strategy (0.895), are above 0.8, which signifies a strong effect on the independent variable – omni-channel retailing (Bullmore et al., 2000).

2.2 Converging Technologies

Today, technology has become an integral part of our world. Technology has witnessed a paradigm shift to meet today's changed consumer and business needs. Convergent technologies refer to the synergistic combination and use of various technologies, for example big data, cloud, mobile, wireless, wearable, embedded systems, etc. Different technologies would be required to meets today's changed consumer and business needs (Kucuk, S. U. (2016)). The major parameters influencing converging technologies are technology innovation and cost reduction (Maggs, 2012; Elliot, 2015).

H3: Converging technologies has a positive impact on mobility in supply chain management due to technological innovations and cost reduction.

H4: Converging technologies has a positive impact on Real-Time Access due to real-time decision making and cloud solutions.

2.2.1 Technology Innovation

Technology innovations are transforming the world around us. The era of digital consumerism has impacted the business-consumer ecosystem like never before. Both technology and business players are working towards integration of various technologies to create holistic platform to address dynamically changing demands of the new-age consumers/businesses effectively. Different technologies have emerged to meet the different needs of today's consumer and businesses (Priem, R. L et al., 2012). Few of the emerged technologies in the recent times are mobility, social media, embedded systems, cloud, bid data, IoT etc. Mobility as preferred medium of purchase, social media as preferred medium of communication, embedded systems and wearable for convenience and self-help services, cloud as being cost-effective, big data to understand the customer needs better and stay relevant in the market place and augmented reality to enhance customer experience.

2.2.2 Cost Reduction (Labour/Operational)

Automated technologies, for example RFID, AIDC, NFC wearable and voice technology make operations more efficient, increase productivity, reduce labour and maximize space utilization (Frandsen, 2014). New technologies like mobility solutions and automation are increasingly being deployed in various functions of the supply chain, for example materials handling, order picking, stacking, order processing and are proving to be very effective in reducing operational and labour costs (Maggs, 2012).

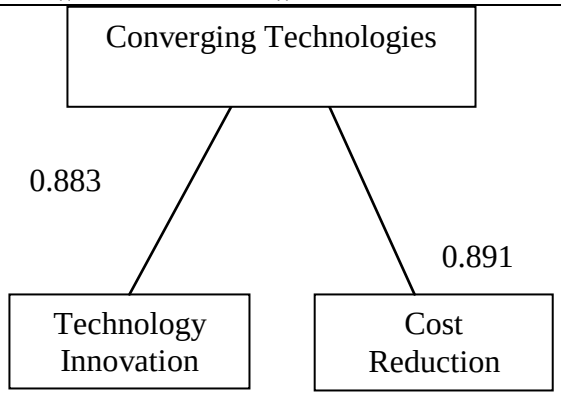


Figure 2: Path coefficients for converging technologies

The individual constructs and their path coefficient for converging technologies: Technology innovation (0.883) and cost reduction (0.891) are above 0.8, which signifies a strong effect on the independent variable – converging technologies (MacCallum, & Austin, 2000).

2.3 Real-time Access

Today, overwhelmingly the majority of business transactions are executed digitally. On-line applications integrate business processes to provide real-time information enabled with business intelligence for better planning, utilization of resources eliminating wastes, supports quick decision making for the growth and problem resolution. The rapid growth of web-based technologies, social networking, and mobile platforms in particular is creating a fundamental shift in the way business is conducted providing business agility (Frandsen, 2014). The major parameters influencing real-time access that impact mobility in supply chain management are real-time decision making (Frandsen, 2014), mobile and wireless communication (Roper, 2015) and cloud solutions (Michel, 2014).

H5: Real-time access has a positive impact on mobility in supply chain management due to mobile and wireless communication

2.3.1 Real-time Decision Making

The ubiquity of mobiles and internet access has made information accessible at all times with the ability to execute transactions wherever people are, making it location agnostic. Real-time access of information and data enables quick decision making for both the customer and business. The faster you get the actionable information, the quicker you are to take action and stay ahead of completion (Napolitano, 2013). Digitization has transformed supply chain execution, making it more agile and efficient with real-time responsiveness on the go (Frandsen, 2014).

2.3.2 Mobile and Wireless Communication (Bridging the Last Mile)

The ubiquity of mobile and wireless communication is helping in bridging the last mile in the supply chain (Roper, 2015). Mobility and GPS (global positioning system) have been a major breakthrough in making connected supply chain until the last mile a reality. This provides the tracking of fulfilment down the last mile and last minute, providing systems involved real-time status providing agility to business and customer.

2.3.3 Cloud Solutions (Low Cost Platforms)

Cloud solutions have enabled a real-time connected supply chain to be affordable to all sizes of business. It provides fast and flexible supply chain execution solutions with low upfront costs. It has taken away the complexity of software management/maintenance and the hardware installation cost, making it affordable and available to all sizes of business (Bond, 2015). Cloud computing provides service oriented architecture to users, which is cost-effective and scalable, making it a suitable platform for all sizes of business. Cloud solutioning facilitates Infrastructure as a service (IaaS) and Software as a Service (SaaS), thus making it affordable. The data/applications on cloud can be accessed from anywhere, with any device (Michel, 2014).

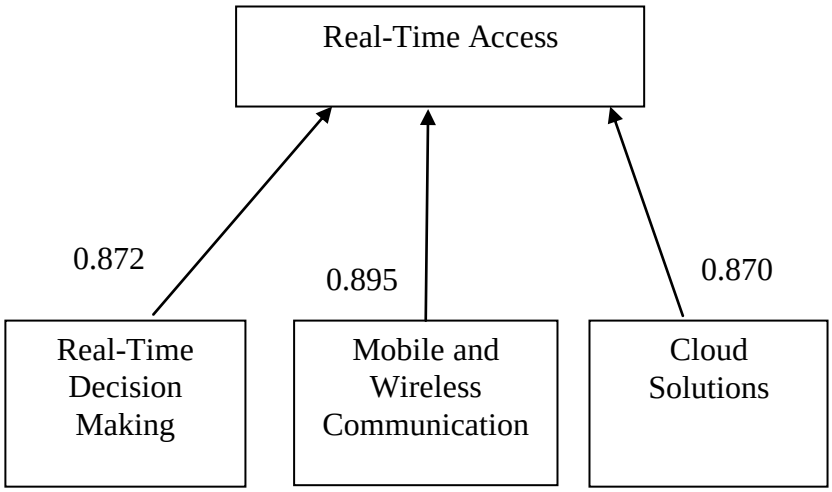


Figure 3: Path coefficients for real-time access

Individual constructs and their path coefficient for real-time access: real-time decision making (0.872), mobile and wireless communication (0.895) and cloud solutions (0.870) are greater than 0.8, which signifies a strong influence on the independent variable – real-time access (Rigdon, 1998).

2.4 Mobility Devices

Mobile devices like smartphones, tablets, wearable printers and other hand-held computers and devices support continuous connectivity in todays digitally connected world of business and consumers. They allow workers to be agile and productive accomplishing various tasks independent of work location (Roach Partridge, 2011). The major influencing factors are accurate data collection (Hammack, 2015), commercial availability, location independent work (Berry, 2014) and multi-purpose devices (Kogoi, 2014).

H6: Mobility devices have a positive impact on mobility in supply chain management due to accurate data collection and multi-purpose device.

H7: Mobility devices have a positive impact on real-time access irrespective of time and location.

2.4.1 Accurate Data Collection

Mobility devices (smartphones, tablets, wearable and handheld devices) and wireless technology enable accurate data collection agnostics of place and the time of the transaction. Accurate data collection is fundamental to business intelligence, which helps in growth opportunities for a business. Mobility devices have eliminated paper-based manual transactions, leading to time saving and cost reduction. Through mobile devices accurate data can be captured and real-time information is available to all the partners in the supply chain to make quick decisions (Hammack, 2015).

2.4.2 Commercial Availability

There is an increasing demand for the commercial availability of ruggedized mobility devices that can work even in the harsh environmental conditions, for example extreme hot and cold weather, water resistance. The demand for robustness and reliability with increased battery life is expected to grow to meet the demand for continuous connect irrespective of external environmental factors (Michel, 2015b).

2.4.3 Location Independent Work

Mobility (mobile and wireless technology) devices have made the demand of continuous connection a reality. Mobility devices enable work from anywhere at any time, making work location and time independent (Berry, 2014). Mobility devices and internet access have been revolutionary in today's connected world.

2.4.4 Multi-purpose Device

Today's mobility devices have multi-purpose capabilities. They have built-in cameras, scanners etc. to facilitate the changed business requirements. Multi-purpose devices eliminate the need for more than one device

by having the capability of executing the multiple functions available in other devices thus making the process and execution lean. A worker's productivity increases as the worker is able to execute more work with the single multi-purpose device and is able to support new business functions of the supply chain, for example reverse logistics on the go (Kogoi, 2014).

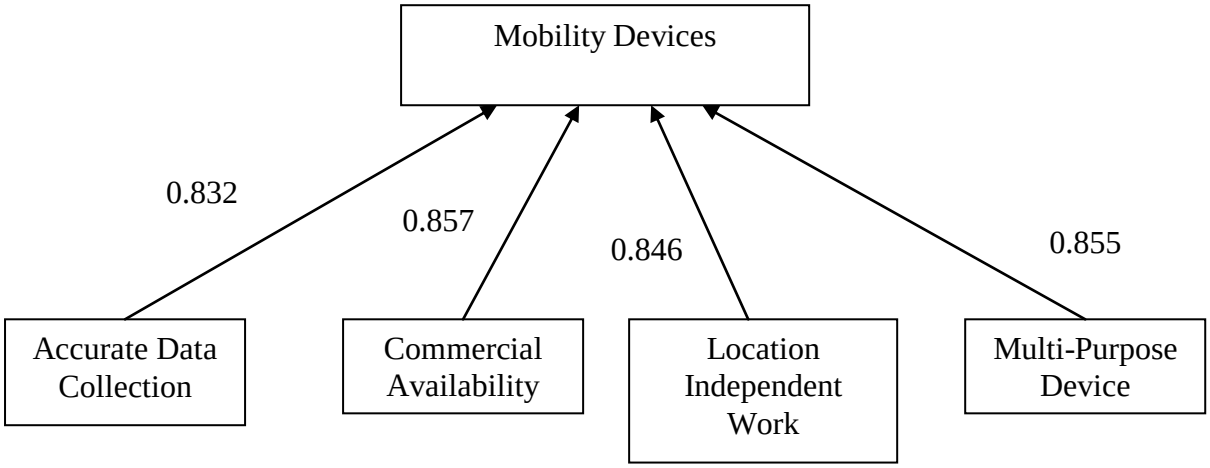


Figure 4: Path coefficient for mobility devices

Individual constructs and their path coefficient for mobility devices: accurate data collection (0.832), commercial availability (0.857), location independent work (0.846), and multi-purpose devices (0.855) are greater than 0.8, which signifies that they have a strong impact on the measured variable – mobility devices.

2.5 Integration of Supply Chain

Global competition, digital consumerism and omni-channel retailing have forced enterprises towards integration of the supply chain to enable seamless information sharing and collaboration among all the supply chain partners. Integration of the supply chain has provided operational agility to facilitate real-time visibility for partners to collaborate in the entire supply chain, minimizing the bullwhip effect of demand fluctuations (Yan et al., 2014). Real-time visibility to all partners (Napolitano, 2013) and bullwhip effect (Elliot, 2015b) are the parameters influencing integration of supply chain.

H8: Integration of the supply chain has a positive impact on mobility in supply chain management due to minimization of bullwhip effect.

2.5.1 Real-time Visibility to All Partners

The integration of the supply chain to give real-time visibility of accurate data and information to all partners has become a competitive necessity (Napolitano, 2013). In today's changing trend of omni-channel retailing customers expect faster and faster delivery of their orders. This has led to an increasing requirement for collaboration, cross-functional data integration and data sharing across all partners of the supply chain. Real-time visibility of data and information anytime and anywhere saves time leading to cost saving through faster execution of processes and meeting today's customers' expectation of faster delivery.

2.5.2 Bullwhip Effect (Demand Fluctuation)

The integration of the supply chain provides real-time visibility of accurate data and information to all partners, helping to minimize the bullwhip effect due to the demand fluctuations. Accurate data and information to all partners through an integrated supply chain helps with the accuracy of demand/supply forecast, minimizing undesirable effects of in-accurate demand/supply forecast (Elliot, 2015b).

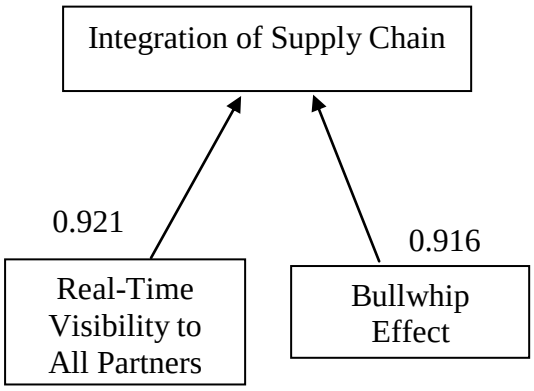


Figure 5: Path coefficient for integration of supply chain

Individual constructs and their path coefficient for integration of supply chain: real-time visibility to all partners (0.921) and bullwhip effect (0.916) are greater than 0.8, which signifies that it has a strong impact on the measured variable – integration of the supply chain (MacCallum, 1995).

2.6 Customer Expectation

In today's new era of digital consumerism and near instant gratification, customer expectation of speed, quality and convenience is increasing day by day. Today's demanding and hyper informed customers are the driving force for advancement in mobility in supply chain management (McCrea, 2012). Mobility (mobile-wireless technology and devices) provides ubiquitous access to information anytime anywhere. This has enabled customers to order merchandise anytime and anywhere. The major parameters influencing customer expectation are service level (Phiri & Mcwabe, 2013), order tracking and tracing (Napolitano, 2013), ease of return (Lang, Gerald, Bressolles & Grégory, 2013), digital consumerism (Udhas, Mittal & Chandrasekaran, 2013) for mobility in supply chain management.

H9: Customer expectation has a positive impact on mobility in supply chain management due to increased service level.

2.6.1 Service Level

Customer expectation of convenience and speed is only increasing. Customer expectations and needs are measured through service quality, customer satisfaction and customer loyalty. Customers demand better service levels, higher availability of products and faster delivery. Customers demand a more personalized shopping experience with ease of payment. It is an era of a customer dominated market and customer demands and needs must be met (Phiri & Mcwabe, 2013).

2.6.2 Order Tracking and Tracing

Smartphones, the internet and access to information 24*7 has empowered customers to track and trace their orders from ordering to delivery due to integration and digitization of supply chain until the last mile. Real-time data is captured and available to business and customer agnostics of when and where the transaction is executed (Napolitano, 2013). Visibility of order status has increased customer satisfaction.

2.6.3 Ease of Return

Ever increasing expectations of customers of convenience has led to a demand for ease of return. Reverse logistics is one the new business functions in the supply chain to cater to customer demands for ease of return. Advancement in technology (wearable printers), mobility (mobile and wireless technology) and access to real-time data in the connected supply chain are supporting the new demand for reverse logistics (Lang, Gerald, Bressolles & Grégory, 2013).

2.6.4 Digital Consumerism (Paradigm Shift)

The advancement in technological innovation and ubiquity of smartphones, tablets, internet and access to information on the go has empowered today's consumer. There is a paradigm shift in consumers' behaviour to purchase due to various factors like rising presence of smartphones, the internet and increasing consumer demand to connect on the go (Udhas, Mittal & Chandrasekaran, 2013).

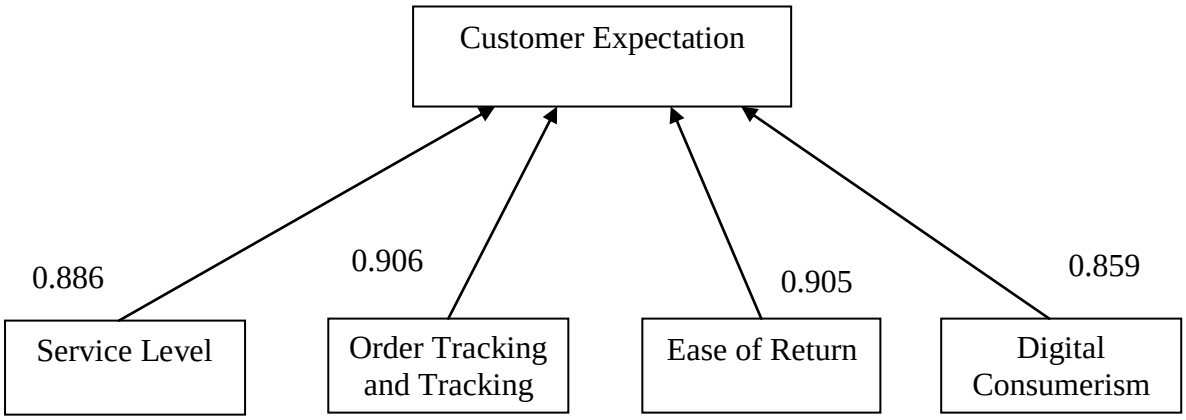
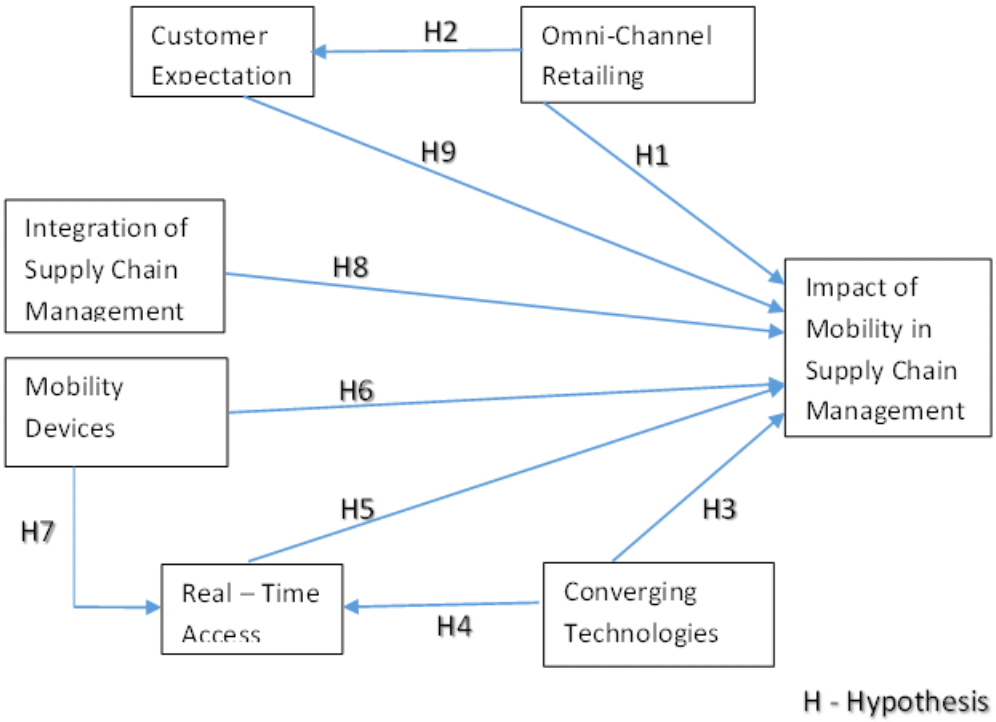


Figure 6: Path coefficient for customer expectation

Individual constructs and their path coefficient for customer expectation: service level (0.886), order tracking and tracking (0.906), ease of return (0.905), and digital consumerism (0.859) are greater than 0.8, which signifies a strong influence on the independent variable – customer expectation.

3. Research Methodology

Both primary data (interviews and on-line questionnaire) and secondary data (literature review of Google Scholar, Google, ProQuest and EBSCO HOST databases) were studied to carry out the research and capture the findings. Sixty-one (61) academic journals were examined to collect the secondary data, helping to establish the scope for future research by identifying the independent variables explaining the impact of mobility on supply chain management. The primary data was collected through an online questionnaire with a sample population consisting of industry experts in supply chains and professionals from different business functions of supply chains i.e. supplier, manufacturer, warehouse, transportation, retailer, e-commerce and end customers. Figure 7, below, depicts the relationship between the identified dependent and independent variables.



The questionnaire was developed based on an extensive literature review, with each question strongly substantiated by the literature. The questionnaire was made available online and circulated globally by email and WhatsApp to collect the responses from various partners in the supply chain.

The online questionnaire was pretested before final circulation to all the respondents. During the pre-test, industry experts and industry practitioners were interviewed and their feedback was recorded to identify new independent variables that could influence mobility on supply chain management. The questionnaire was further refined based on the insights drawn from this exercise. A Likert scale was used to record the responses. The respondents' demographics were chosen to be diverse and spread globally with working for various business functions in the entire supply chain from supplier to end customer across the United States of America, the Middle East and Africa, Europe, Asia Pacific.

To encourage participation and give clarity to the respondents, the statement of objective was also provided in the online questionnaire. A total of 400 supply chain professionals and end customers were invited, of whom 257 responded, representing a response rate of 64%. Table 1, below, provides details of respondents' distribution.

Table 1: Demographic details of respondents

Item	Measure	Frequency	Percentage
Business Function	Supplier	40	16%
	Manufacturer	44	17%
	Warehouse Management	30	12%
	Transport Management	22	9%
	Logistic Management	34	13%
	Retailer	20	8%
	e-Commerce	40	16%
	End Customer	155	60%
Professional Level	Senior Management	41	16%
	Middle Management	68	27%
	Junior Management	16	6%
	End Customer	132	51%
Region	Asia Pacific	217	84%
	Europe	10	4%
	Middle East & Africa	2	1%
	North & South America	28	11%

* Business Function -> one respondent may have multiple business function

Item	Measure	Frequency	Percentage
Organisation Position on Mobility	Fully Integrated mobility across supply chain	134	52%
	Implemented some level of mobility	24	9%
	Traditional independent systems	79	31%
	NA (End Customer)	20	8%
Challenges for Implementing Mobility	Awareness	69	27%
	Investment Cost	75	29%
	Mobility Devices Availability	28	11%
	Wireless Network Availability	33	13%
	Data Security on Cloud Based Solutions	56	22%
	NA (End Customer)	122	48%
Technologies to be Implemented in Organisation	Cloud	68	27%
	Big Data	58	23%
	Wearable (Printers, Glasses)	25	10%
	Wireless	41	16%
	GPS (Global Positioning System)	40	16%
	AIDC (Automatic Identification and Data Capture)	25	10%
	RFID (Radio Frequency Identification)	25	10%
	IoT (Internet of Things)	45	18%
	Mobile	58	23%
	NA (End Customer)	111	43%

* "Challenges…" and "Technology…" -> one respondent may have multiple selections

3.2 Data Analysis

To model the primary data collected, the ADANCO statistical tool was used. ADANCO (a structural equation modelling tool) is capable of modeling variance based structural equations, postulate hypotheses and in-turn construct a research framework. The analysis was carried out in two stages:
Stage 1 – Structural model was estimated through modelling.
Stage 2 – Reliability and validity were measured to determine the best model fit.

3.3 Reliability

Cronbach's alpha is a measure of internal consistency. It is a measure of reliability of the model fit, for which a value greater than 0.6 indicates a good level of reliability. Jöreskog's rho is a measure for composite reliability, which is an indication of the integrity and homogeneity of the model. (Wertz, Linn & Joreskog, 1974). Table 2, below, provides statistical details.

Table 2: Overall reliability

Construct	R^2	Jöreskog's rho (ρ_c)	Cronbach's alpha(α)	Average variance extracted (AVE)
Impact of Mobility in SCM	0.7610	0.9468	0.9297	0.7807
Omni-Channel Retailing		0.9112	0.8539	0.7739
Converging Technologies		0.8804	0.7284	0.7864
Integration of Supply Chain		0.9162	0.8171	0.8454
Real-Time Access	0.7314	0.9106	0.8528	0.7725
Mobility Devices		0.9107	0.8692	0.7183
Customer Expectation	0.6214	0.9380	0.9117	0.7909

3.4 Convergent Validity

Convergent validity measures the construct validity through conformity scores. The average variance extracted should be equal to or above 0.5 to be acceptable (Chin, 1998). As per Table 3, below, the minimum AVE value is 0.7183. This satisfies the measurement requirements of the research model.

Table 3: Convergent validity

Construct	Average variance extracted (AVE)
Impact of Mobility in SCM	0.7807
Omni-Channel Retailing	0.7739
Converging Technologies	0.7864
Integration of Supply Chain	0.8454
Real-Time Access	0.7725
Mobility Devices	0.7183
Customer Expectation	0.7909

3.5 Discriminant Validity

The Discriminant Validity gives detail of the degree of differentiation between the variables and comparison with the other constructs of the research. The Average Variance Extracted (AVE) of the other construct should be less than the square root of the AVE from a particular construct (Fornell & Larcker, 1981). Table 4, below, establishes that the model has discriminant validity.

Table 4: Discriminant validity

Construct	Impact of Mobility in SCM	Omni-Channel Retailing	Converging Technologies	Integration of Supply Chain	Real-Time Access	Mobility Devices	Customer Expectation
Impact of Mobility in SCM	0.7807						
Omni-Channel Retailing	0.7055	0.7739					
Converging Technologies	0.5913	0.6555	0.7864				
Integration of Supply Chain	0.5564	0.5655	0.5909	0.8454			
Real-Time Access	0.6099	0.6447	0.6557	0.6306	0.7725		
Mobility Devices	0.6428	0.6838	0.6447	0.6161	0.6629	0.7183	
Customer Expectation	0.5809	0.6214	0.5893	0.5846	0.6062	0.6304	0.7909

Squared correlations; AVE in the diagonal.

Table 5: Significance level

	Significance level	t-value
Level of Significance	P < 0.1	1.65
	P < 0.05	1.96
	P < 0.01	2.59

In this research nine hypotheses were postulated and their reliability was tested. Table 6, below, shows the recorded t-values of the independent variables on the dependent variables.

Table 6: Outcomes of the hypothesis testing

Hypothesis	Effect	Path Coefficent (Beta)	Mean value	Standard error	t-value	Supported
H1	Omni-Channel Retailing -> Impact of Mobility in SCM	0.4159	0.4128	0.0701	5.9356	Yes
H2	Omni-Channel Retailing -> Customer Expectation	0.7883	0.7805	0.0520	15.1679	Yes
H3	Converging Technologies -> Impact of Mobility in SCM	0.0626	0.0612	0.0639	0.9793	No
H4	Converging Technologies -> Real-Time Access	0.4392	0.4303	0.0611	7.1896	Yes
H5	Real-Time Access -> Impact of Mobility in SCM	0.1131	0.1125	0.0670	1.6872	Yes
H6	Mobility Devices -> Impact of Mobility in SCM	0.1701	0.1707	0.0751	2.2660	Yes
H7	Mobility Devices -> Real-Time Access	0.4615	0.4655	0.0602	7.6721	Yes
H8	Integration of Supply Chain -> Impact of Mobility in SCM	0.0891	0.0905	0.0588	1.5154	No
H9	Customer Expectation -> Impact of Mobility in SCM	0.0950	0.0961	0.0543	1.7496	Yes

4. Research Findings

Based on the literature review nine hypotheses were identified, the path coefficient and t-value for seven out of nine hypotheses have been significantly very strong and therefore seven hypotheses are accepted. Hypothesis H3 – effect of converging technologies and H8 – effect of integration of supply chain do not have an impact on mobility in supply chain management and hence they are rejected. Postulated hypotheses based on the literature research findings majorly confirm the existing body of literature. Seven out of nine hypotheses have confirmed the research fact pointed out by earlier studies. Figure 8, below, is the bootstrapped structural equation model along with its associated path coefficients reflecting a strong correlation between the dependent and independent variables.

Graphical Representation of the Structural Equation Model

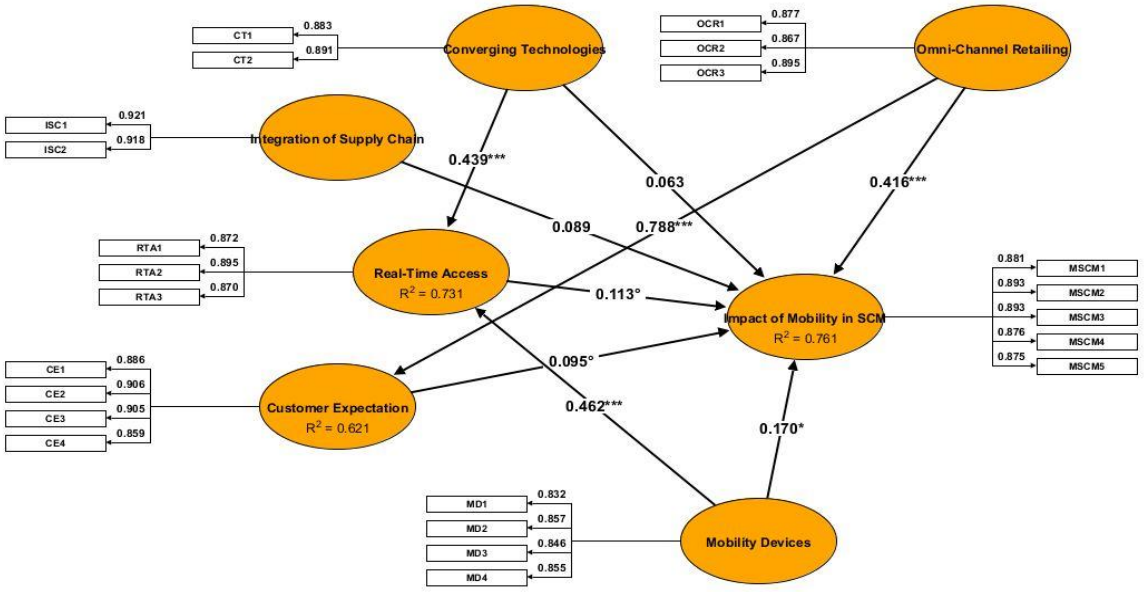


Figure 8: SEM (Structural Equation Modelling) through bootstrapping

5. Theoretical support

This research provides a new description for the SCOR model incorporating mobility and supply chain management. The original SCOR (Supply-chain operations reference model) is given in Figure 9 below:

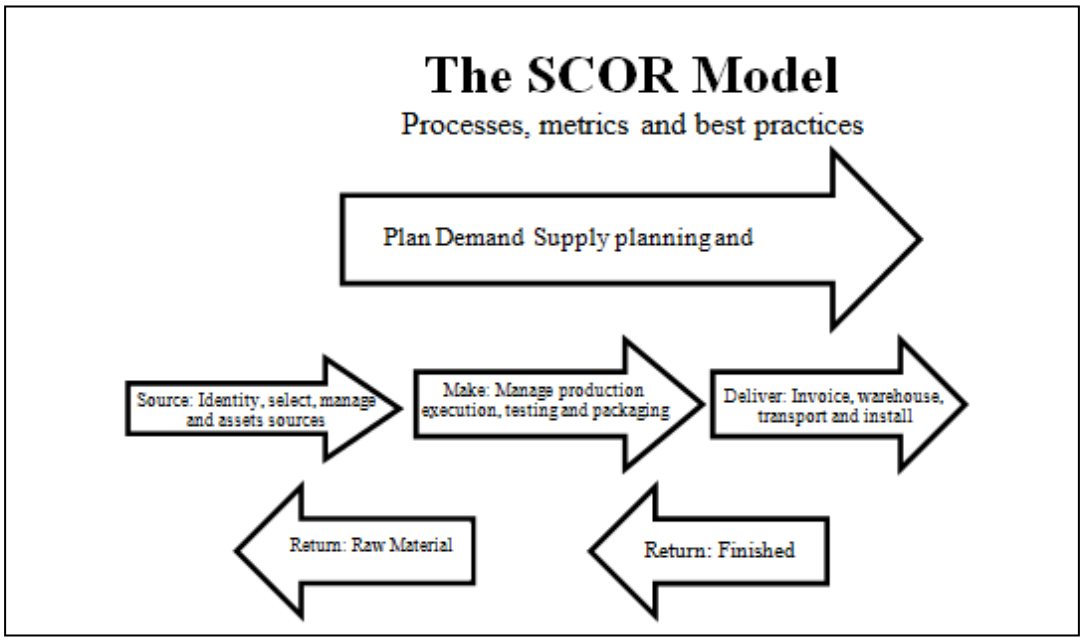


Figure 9: The SCOR Model

This research, by including the mobility into the supply chain management, provides a new description for the SCOR model in Figure 10 as below:

Plan

P1:Use mobility devices to assess customer demand and needs in real time.
P2: Use"4V" framework consisting of high volume, high velocity, high veracity and high variety information, which uses various processing measures to ensure better decision making by real time access.
P3: Use analytics to improve processes and ensure business optimization.

Source

S1: Gather tremendous amounts of data from various processes, i.e., the use of sensors, RFID and tracking devices, which serves as a breeding ground for the generation of big data.
S2: Use social media to rate various vendors.
S3: Use analytic hierarchy processing (AHP) to determine the varying degree of importance of the flow of inputs and provides a strategic perspective in rating suppliers.

Deliver

D1: Use mobility to improve visibility by providing an integrated framework to monitor performance and customer interaction through real time data analysis and critical decision-making scenarios, thus mitigating risk and supply chain disruption and failures

Return

R1: Exploit the huge amount of collected data with the help of information technology (IT), i.e., business intelligence insights, analytics, etc., improve existing supply chain practices, reduce costs and provide better inventory management, in turn increase profits in the supply chain industry.
R2: Use demand management to deal with the obsolescence of goods and wastage, especially for perishable goods, for which both agile and lean methodologies may be used.

Figure 10: SCOR model for the application of Mobility in Supply Chain Management

6. Implications of Impact of Mobility in Supply Chain Management

The objective of this research is to find the impact of mobility in supply chain management. Is mobility positively impacting supply chain management? The results from this research confirms the positive impact of mobility in supply chain management to support the changing business landscape of supply chain as a result of shift from single-channel of purchase to omni-channel retailing, ubiquity of smartphones and the internet along with rising customer expectations in the new era of digital consumerism. The research shows that converging technologies and integration of the supply chain does not have any direct influence on mobility in supply chain, in contrary to previous researches. Omni-channel retailing, real-time access, mobility devices and customer expectation have a positive direct impact on mobility in supply chain management and it confirms the previous researches.

Indicators for impact of mobility in supply chain management are data accuracy, real-time connectivity, worker productivity, competitive business advantage, customer service and satisfaction. These indicators measure the impact of mobility (mobile-wireless technology and devices) in supply chain management. Accurate data collection and availability is the foundation for business intelligence, which helps to take quick decisions for both business and consumer through the real-time connected supply chain giving competitive business advantage and enhancing customer service and satisfaction.

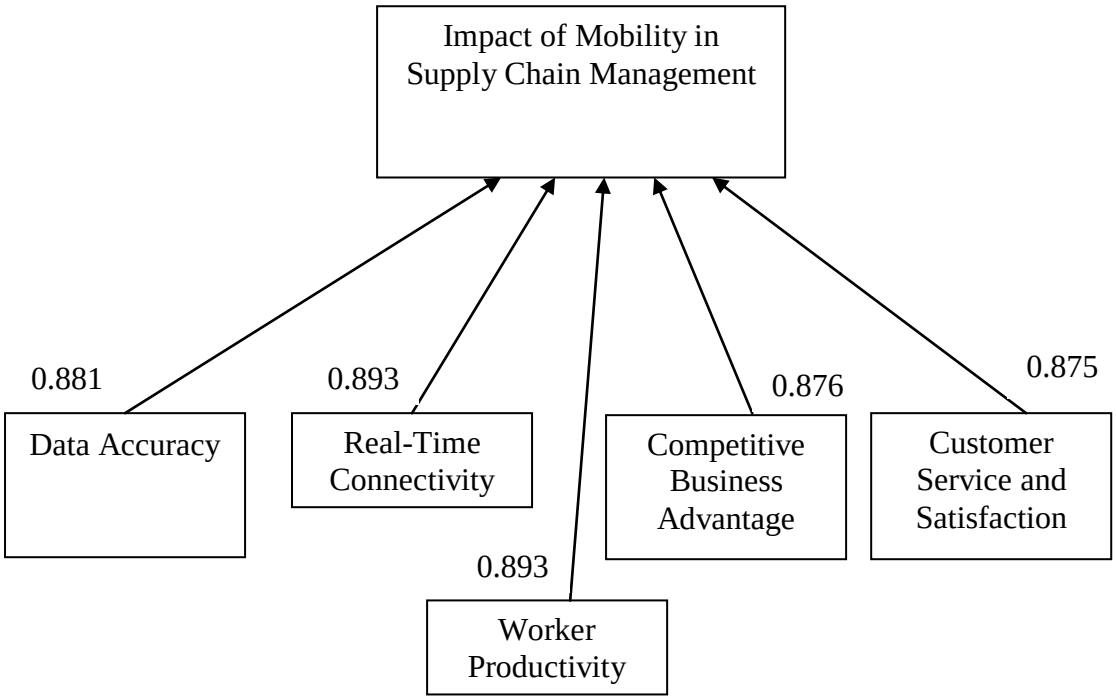


Figure 11: Impact of mobility and its path coefficients

In the above SEM model, the path coefficient of all the constructs represents measures of the impact of mobility in supply chain management. The individual constructs data accuracy (0.881), real-time connectivity (0.893), worker productivity (0.893), competitive business advantage (0.876), customer service and satisfaction (0.875) are greater than 0.8, which signifies that they have a strong impact on the measured variable impact of mobility in supply chain management.

7. Limitations and Future Research

Generalizability of the findings may be limited by the research context. Insignificant quantity of data was obtained from Europe (4%) and the Middle East and Africa (1%). Therefore, analysis is based mainly on the United States of America and Asia Pacific. Even though mobility is experienced by many partners in the supply chain industry in the Middle East and Africa and Europe, the data analysis was majorly focused on American and Asian Population. As the economic and cultural characteristics of Americans and Asians differ from those of the other countries, caution should be taken when generalising the findings to the context of mobility in supply chain management.

Finally, in terms of future research, empirical evidence shows that mobile and cloud technology and big data adaptation and implementation will increase in the future with an increase in awareness and ever changing customer expectation in this era of digital consumerism. Future research may extend this study and examine whether mobile and cloud technology and big data generate new insights for supply chain management.

8. Conclusion

This study draws attention to the most common challenges faced today in the implementation of mobility in a supply chain. Organisations are planning the implementation of cloud solutions, big data and mobile technologies in the near future to facilitate a connected supply chain to gain a competitive business advantage.

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