NEAR EAST UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
INTERNATIONAL BUSINESS PROGRAM

The Impact of Information and Communication Technology on The Integration of Supply Chain on Lebanese Corporations in Beirut

MOSTAFA EL-GHAZI

MASTER'S THESIS

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We as the jury members certify the '**The Impact of Information and Communication Technology on The Integration of Supply Chain on Lebanese Corporations in Beirut'** prepared by **MOSTAFA EL-GHAZI** defended on **29/01/2021** has been found satisfactory for the award of degree of Master

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I **MOSTAFA EL-GHAZI**, hereby declare that this dissertation entitled '**The Impact of Information and Communication Technology on The Integration of Supply Chain on Lebanese Corporations in Beirut**' has been prepared myself under the guidance and supervision of '**Assist. prof. Dr. Mohammad Ma'aitah**' in partial fulfilment of the Near East University, Graduate School of Social Sciences regulations and does not to the best of my knowledge breach and Law of Copyrights and has been tested for plagiarism and a copy of the result can be found in the Thesis.

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ABSTRACT

The Impact of Information and Communication Technology on The Integration of Supply Chain on Lebanese Corporations in Beirut

The main aim of this research is to estimate the impact of information and communication technology on integration of supply chain of Lebanese corporations in Beirut. In order to accomplish the aim of this research, the research will be concentrated on to widen the theoretical concepts related to information and communication technology and integration of supply chain on Lebanese corporations. Also, the research will assess the importance of information and communication tools in Lebanese corporations and explore factors that influence integration of supply chain in these corporations. The questionnaire was used to collect the data of this research. The study population consisted of employees working at 30 Lebanese corporations in Beirut. Total of 400 employees were participates in this research. The result of this research indicated that information and communication technology and integration of supply chain were statistically significant. The results show that human resource have the highest impact on integration of supply chain and supplier's integration. Where software has the highest impact on information system integration and customer integration. The research model developed to provide the relationship of information and communication technology through human resource, software and networks which can be used by the Lebanese corporation management as a directory to positive impact on integration of supply chain.

Keywords: Information and Communication Technology, Integration of Supply Chain, Information System Integration, Customer Integration, Suppliers Integration.

ÖZET

The Impact of Information and Communication Technology on The Integration of Supply Chain on Lebanese Corporations in Beirut

Bu araştırmanın temel amacı, bilgi ve iletişim teknolojisinin Lübnan şirketlerinin Beyrut'taki tedarik zincirlerinin entegrasyonuna etkisini tahmin etmektir. Bu araştırmanın amacına ulaşmak için araştırma, bilgi ve iletişim teknolojisi ile ilgili teorik kavramların genişletilmesi ve tedarik zincirinin Lübnan şirketlerine entegrasyonu üzerinde yoğunlaşacaktır. Araştırma ayrıca Lübnan şirketlerinde bilgi ve iletişim araçlarının önemini değerlendirecek ve bu şirketlerdeki tedarik zincirinin entegrasyonunu etkileyen faktörleri araştıracak. Bu araştırmanın verilerini toplamak için anket kullanıldı. Araştırmanın evrenini, Beyrut'ta 30 Lübnan şirketinde çalışan kişiler oluşturdu. Bu araştırmaya toplam 400 çalışan katılmıştır. Bu araştırmanın sonucu, bilgi ve iletişim teknolojisi ile tedarik zinciri entegrasyonunun istatistiksel olarak önemli olduğunu gösterdi. Sonuçlar, insan kaynaklarının tedarik zinciri entegrasyonu ve tedarikçi entegrasyonu üzerinde en yüksek etkiye sahip olduğunu göstermektedir. Yazılımın bilgi sistemi entegrasyonu ve müşteri entegrasyonu üzerinde en yüksek etkiye sahip olduğu yer. Lübnan şirket yönetimi tarafından tedarik zinciri entegrasyonu üzerindeki olumlu etkiye bir rehber olarak kullanılabilecek insan kaynakları, yazılım ve ağlar aracılığıyla bilgi ve iletişim teknolojisi ilişkisini sağlamak için geliştirilen araştırma modeli.

Anahtar Kelimeler: Bilgi ve İletişim Teknolojisi, Tedarik Zinciri Entegrasyonu, Bilgi Sistemi Entegrasyonu, Müşteri Entegrasyonu, Tedarikçi Entegrasyonu.

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ABBREVIATIONS

ITC: Information and Communication Technology.

HR: Human Resource.

SF: Software.

NT: Network.

ISC: Integration of Supply Chain.

ISI: Information System Integration.

SI: Supplier Integration.

CI: Customer Integration.

EDI: Electronic Data Interchange.

XML: Extensible Mark-up Language.

EDA: Electronic Data Access.

SCM: Supply Chain Management.

IT: Information Technology.

SC: Supply Chain.

ERP: Enterprise Resource Planning.

IVR: Interactive Voice Response.

VRS: Voice Recognition Systems.

CHAPTER 1

INTRODUCTION

1 Introduction

There is a speedy improvement in the use of information and communications technology (ICT) in logistics and supply chain management (SCM) (Azevedo et al., 2007). ICT is today being applied in many corporations in a huge variety and operations areas. It has provided new methods to store, process, distribute and exchange information both within corporations and with clients and providers in the supply chain (SC). ICT used to exchange information in the SC is often named interorganizational ICT or interorganizational information systems (Alan et al., 2003).

In SCM, ICT has especially been diagnosed as an enabler for information sharing which corporations in the SC can use for doing away with the bullwhip-effect (Adebanjo et al., 2018). Information-sharing is also a key issue in many of the current automatic replenishment packages (Bowersox & Daugherty, 2003). Tasks consisting of vendor managed stock and collaborative making plans, forecasting and replenishment are based on an increased stage of automation in both the drift of physical materials and the float of records between corporations to improve the performance inside the entire SC (Lee, 2000). In an operations management perspective, corporations seek to further improve the efficiency in the SC by sharing information related to matching

demand and supply such as short- and long-term production planning, demand forecasting and materials and capacity planning. Information that can be relevant to share between customers and suppliers typically includes point-of-sales data, forecasts and inventory levels (Bowersox & Daugherty, 2003).

There is a significant amount of research demonstrating a positive impact of ICT in the ISC. As corporations seek to improve the efficiency in the SC through increased integration, ICT can be considered as a key enabler for SCM through its ability to support information sharing and shortening information processing time. ISC can however be expressed in a wide range of dimensions such as integration of processes, information, organizations and systems (Abbas et al., 2015; Bowersox & Daugherty, 2003). Similarly, the impact of ICT can be demonstrated in terms of for instance changes in relationships, interorganizational changes and performance (Campbell & Wilson, 1996). The many dimensions in which ISC can be expressed and the wide variation of factors in which the impact of ICT can be defined in terms of integration indicates that previous research has been limited to studying a few dimensions and variables relationships at a time. The aspect of how to control and coordinate the activity between the corporations in the SC, and how ICT affects the level of ISC is a poorly developed area (Abbas et al., 2015).

Integration is one of the prominent research streams in operations and SCM literature. Since mid-1990s, several research studies have examined this strategic aspect of SCM and empirically investigated the relationships between different dimensions of ISC and various performance measures (Frohlich & Westbrook, 2001; Lee, 2000). ISC manifest in terms of integration of internal operations within a firm as well as external integration with customers and suppliers. Integration with upstream suppliers and downstream customers has been emphasized to be a key competitive differentiator by several studies (Frohlich & Westbrook, 2001; Lee, 2000). The factors that are required to foster integration among SC partners mainly concentrate on information sharing and collaboration in the design of processes and products, joint decision-making, and coordination. These factors help in aligning the interests of all firms within

the SC and aid in improving overall SC performance as against maximizing only internal efficiencies of individual firms (Lee, 2000).

Notwithstanding the importance of ISC, in previous studies the underlying constructs have been conceptualized and analyzed from different perspectives. Further, internal integration within a firm as well as external integration initiatives among firms along the SC have been shown to exert different and varying levels of impact on various performance dimensions. For instance, Schoenherr & Swink (2012) found distinct associations of ISC with operational and financial performance. Cousins & Menguc (2006) show that integration positively impacts supplier's communication performance; however, it does not influence supplier's operational performance. Devaraj et al. (2007) reported that supplier integration has a positive impact on performance, but customer integration does not have a significant impact on performance. Thus, there are some mixed findings in the literature.

Therefore, this research concentrated on Lebanese corporations in Beirut to serve the study objectives and intends to investigate the elements that have the most fundamentally effect of the ICT on ISC. Also, it planned to compare various ICT and ISC components and how can be explained by ICT in these corporations. The elements identified in this research are human resource (HR), software (SF) and networks (NT) to develop the relationship of ISC (information system integration (ISI), supplier's integration (SI) and customer integration (CI)) among the employees in these corporations.

1.1 Problem Statement and Purpose of the Research

The deployment of ICT tools has been more prominent in management of global SC in large corporations. ICT has been an influencing factor for automation in ISC operations in services corporations and is progressing in large corporations. However, the practical use of ICT in small corporations is at its initial stage (Heeks et al., 2015). The small corporations have been slow in the adoption of ICT tools in leading and managing ISC despite the numerous benefits present in the implementation and use of ICT. Particularly in Lebanon, SCM has much relevance from the arrival of globalization that has opened up the domestic economy to the world. However, the significance and benefits of

SCM in Lebanon is not realized by the corporations which is dominant in the country (Prakash et al., 2013). It can be said that there is an unequal use of ICT in these corporations. Thus, there is a need to investigate the impact of ICT on ISC and opportunity for ICT use in Lebanese corporations to help these corporations in improving the SC performance, operational efficiency and to develop competitive SCs. This can also provide insight for Lebanese corporations to understand how ICT tools can benefit the ISC operations at a different scale. The findings from this research will add some new knowledge in the area of literatures surrounding the impact of ICT on ISC. Hence, this research seeks to investigate ICT's impact on ISC of Lebanese corporations in Beirut.

Therefore, the main objective of this research is to estimate the impact of ICT on ISC of Lebanese corporations in Beirut. In order to accomplish the aim of this research, the research will be concentrated on to widen the theoretical concepts related to ISC, ICT on Lebanese corporations. Also, the research will assess the importance of ICT tools in Lebanese corporations and explore factors that influence ISC in these corporations. Moreover, to find out the role and benefits of ICT in ISC and recommend approaches in managing ICT contribution to improve ISC in Lebanese corporations.

1.2 The Research significance

Using of ICT in SCM provides improved visibility and accountability. In order to bring efficiency to the total production process, it is important that a corporation in different sectors have clear sight into the current stage of in-production products, foresee any potential problems or delays they might face and be able to align production schedules accordingly. Use of ICT can bring the necessary transparency into the whole process. It allows the corporations to have better control over product flow and information flow across the SC. Therefore, this research examines whether the dimensions of ICT (HR, SF and NT) have an important relationship to the ISC (ISI, SI and CI) among employees working at Lebanese corporations.

1.3 Research Model and Hypotheses

Based on a review of literature within ISC and the impact of ICT a research model is developed. The purpose is to provide further insights to the complex relation between ICT and ISC. It can also be used as a starting point for empirical investigations within the field, defining the scope of the study or be used as an analytical framework. Furthermore, it proposes a set of areas that are considered to be relevant to take into consideration when exploring the impact of ICT on ISC. Figure 1 illustrates the conceptual model of this research. Therefore, the following hypotheses and sub hypotheses are proposed:

H_1: Positive relations exist between information and communication technology and integration of supply chain.

> **H_1a:** Positive relations exist between information and communication technology and information system integration.
> **H_1b** Positive relations exist between information and communication technology and supplier integration
> **H_1c:** Positive relations exist between information and communication technology and customer integration.

H_2: Positive relations exist between human resource and integration of supply chain.

> **H_2a:** Positive relations exist between human resource and information system integration.
> **H_2b** Positive relations exist between human resource and supplier integration
> **H_2c:** Positive relations exist between human resource and customer integration.

H_3: Positive relations exist between software and integration of supply chain.

> **H_3a:** Positive relations exist between software and information system integration.
> **H_3b** Positive relations exist between software and supplier integration

H_3c: Positive relations exist between software and customer integration.

H_4: Positive relations exist between networks and integration of supply chain.

H_4a: Positive relations exist between networks and information system integration.

H_4b Positive relations exist between networks and supplier integration

H_4c: Positive relations exist between networks and customer integration.

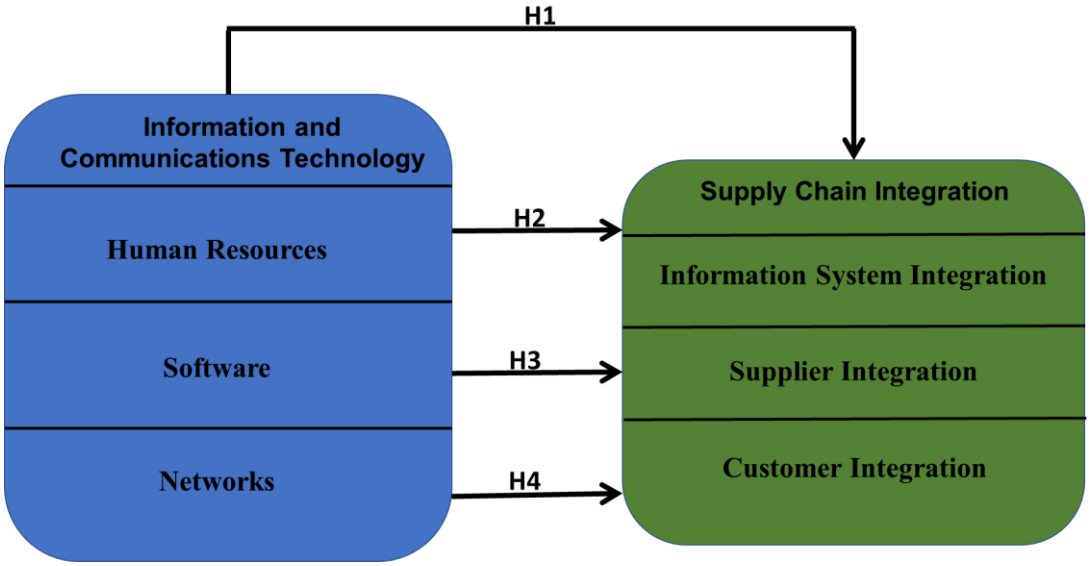

Figure 1 Research Model

CHAPTER 2

LITERATURE REVIEW

2.1 Information and Communication Technology

When studying effects of ICT in a SC perspective, it is important to consider that the ISC often covers a wide range of different types of ICT. In an internal integration perspective, enterprise resource planning (ERP) systems are often recognized as essential ICT for supporting the internal sharing of information integration between functions and departments in an organization. In an external integration perspective ISC constituting automated information systems shared by two or more corporations, can be used to support information-sharing with customers and suppliers (Kaufman, 2001; Lamba & Choudhary, 2013). The ISC concept can be considered an overall term for a group of technologies that support information system integration across organizational boundaries as e-mail, electronic data interchange (EDI), extensible mark-up language (XML), electronic data access (EDA) and the Internet (Akpan & Itighise, 2019).

Overall effects of ICT in the SC are often expressed in terms of company performance such as efficiency and effectiveness (Kent & Mentzer, 2003; Sanders & Premus, 2005; Sriram & Stump, 2004). However, there are also many effects identified from the use of ICT in a ISC perspective that are related to the relationships in the SC. Effects of ICT related to the general quality and climate of the relationship including trust and commitment in the ISC are often identified (Kent & Mentzer, 2003; Sriram & Stump, 2004). In addition, ICT is considered to have a positive impact on both internal and external

collaboration, and external collaboration is a further driver of internal collaboration (Aldosari et al., 2019). ICT is also expected to contribute to improved communications patterns, an increased demand for coordination of joint activities and new organizational and societal structures through its ability to store, transmit and process information and speed up interorganizational activities (Ao & Huang, 2020).

ICT has resulted in many new business models usually entitled as the “new economy”. It boomed some emerging industries and corporations including ICT service providers and ICT equipment manufacturers (Sriram & Stump, 2004). On the other hand, ICT has been widely used in traditional industries and changed the structures and management of firms, and especially the processes within firms. ICT can be an enabler of operation or ISC and improves the performance of firms (Varela-Ordorica & Valenzuela-González, 2020).

However, the experiences from other firms showed that ICT is not a silver bullet for all corporations seeking performance improvements or competitive advantage. Rinatovna et al. (2019)indicated that between 50 and 75 percent of U.S. firms experience some degree of failure when implementing advanced manufacturing or information technology. ICT investment and its output as expressed in the debate are entitled “the ICT productivity paradox” (Bloom et al., 2013). This paradox has placed managers in an awkward situation. On the one hand, firms cannot afford not to invest in ICT and they are always inspired to spend more money on ICT. On the other hand, ICT does not always work as they expected.

With the internationalization and globalization of markets, firms have to improve operational capabilities to cooperate with their suppliers and customers to beat the competition. Therefore, ISC has increasingly gained attention (Chen & Paulraj, 2004). ISC is the process by which suppliers, partners, and customers plan, implement and manage the flow of information, services, and products in a way that improves business operations in terms of speed, agility, real-time control, or customer response (Zhang & Dhaliwal, 2009). The philosophy of ISC is founded on integration among SC partners

(Prahinski & Benton, 2004; Vakharia, 2002). The central issue with integration is the exchange of large amounts of information along the SC, including various kinds of real-time information (Sanders & Premus, 2005). ICT allows for the sharing of large amounts of information and the processing of information necessary for synchronous decision making (Kearns & Lederer, 2003). Therefore, some researchers regard ICT as the backbone of ISC (Sanders & Premus, 2005). As a result, scholars have begun to pay attention to the relationship between ICT and ISC.

There is a significant amount of research dealing with the impact of ICT in the supply chain that contributes to important insights to the different types of effects of ICT and the interdependencies of ISC. However, as there seems to be limited knowledge of the details in different settings involving different types of relationships that surround the actual contribution of ICT to ISC.

2.1.1 Human Resources

An effective HR system must address a range of administrative, statutory, functional and technological requirements in order to enable the HR to support the partnership between HR professionals, program managers, finance staff, employees, suppliers and customers (Tashtoush & Eyupoglu, 2020). Also, providing accurate, reliable information for organization-wide planning and decision-making. Corporations are also advised to establish long-term relationships with technology vendors (Prakash et al., 2013).

In the mid-1990s, due to business process reengineering and information system integration from diverse applications, Enterprise Resource Planning (ERP) became popular among organizations. Hornstein et al. (2002) discovered in a survey of 649 firms that nearly every organization had made significant investments in some combination of enterprise resource planning (ERP), HR service centers, interactive voice response (IVR), voice recognition systems (VRS), Web applications and employee portals. The value of ERP is its ability to integrate other functions with HR under a single vendor and common technology standards. In the leading ERP systems, some of the HR permit the use of the internet to reduce transaction costs (Sari et al., 2012). For example, the HR capability of the PeopleSoft package (one type of ERP

software) was used to track the movements of 5,000 employees across 70 locations and calculate their salaries accurately. Consequently, when operational benefit in payroll processing was considered, cycle time was reduced from four days to four hours. Thus, accurate, time-effective information delivered to managers improved the speed and quality of decision making and assisted cost control (Davenport, 2000). Moreover, in keeping with changing demand patterns, most ERP vendors have introduced second-generation Web-based HR that are easier to integrate with other applications.

Koulikoff-Souviron & Harrison (2007) were among the first to link HRM to SCM. Via case studies, these scholars suggested that the development of SCM posed great challenges for HRM and that HRM practices contributed to building and facilitating supply chain relationships and collaboration. Their studies influenced scholars to consider supply chain issues from an HRM perspective. Following this trend, Cohen et al. (2007) found that the right incentives could lead to desired supply chain behavior. Wang et al. (2010) suggested that human capital could be leveraged to improve manufacturers 'flexibility in supply chains. Derwik & Hellström (2017) and Lorentz et al. (2013) considered competency and skill as enablers of SCM. Lorentz et al. (2013) identified five types of employee work behavior that impeded the success of supply chain relationships. Fu (2013) empirical study found that HRM could improve supply chain performance through team formation and implementation. These studies provided valid evidence that HRM played a significant role in SCM. Another theme related to the HRM/SCM interface has highlighted the importance of managers in logistics and SCM context (Ellinger et al., 2002; Giunipero et al., 2006; Murphy & Poist, 2007; Van Hoek et al., 2002). In recent years, as the complexity and significance of SCM has grown, competition for talent has become more intense and managers have assumed more responsibilities (Musgrove et al., 2014), which has led to more research on development of capable supply chain professionals. For example, Musgrove et al. (2014) and Prajogo & Sohal (2013) discussed ways to improve supply chain manager skills. Harvey & Richey (2001) illustrated the necessity for managers to develop a global mindset in global SCM. Although these

studies directly addressed the role people played in SCM, they still neglected the importance of employees (Ellinger et al., 2002).

The extant literature has mainly focused on the link between HRM and SCM. Because SCI lies in the heart of SCM (Sweeney et al., 2015), such studies have shed light on how HRM may function in SCI, especially those investigating supply chain relationships, which are the central concepts of SCI. Several recent studies have also directly discussed the relationship between ICT and ISC. For example, Shub & Stonebraker (2009) conceptually demonstrated the relationship between a set of ICT and SCI and suggested that a fit should be established between them.

2.1.2 Software

Many vendors have positioned themselves to integrate ISC components to their software packages so that they may offer fully integrated enterprise application architecture to business community (Yen et al., 2002). ISC software is often viewed as a series of individual software applications by vendors. Most of the major ISC functions such as planning, sourcing, manufacturing, delivering and returning have their own specific software integrated into the vendor package (Prajogo & Sohal, 2013). Some large vendors have attempted to assemble many of these different software applications together under a single roof, or at least connect them together with some interfaces, but no one has yet a complete package of their own. Integrating the different pieces of the applications together could be an ongoing process (Swafford et al., 2008). Currently, perhaps the best way to think about ISC software is to separate it into software that helps to plan the SC and software that helps to execute the SC steps themselves (Lu et al., 2018).

Software uses mathematical algorithms to help improve the flow and efficiency of the ISC and reduce inventory (Bayraktar et al., 2009). This type of software is entirely dependent upon information for its accuracy. Planning applications are available for all five of the major ISC steps, while the most valuable one is demand planning, which determines how much product will satisfy different customers' demands. SC execution software is intended to automate the

different steps of the SC (Dehning et al., 2013) . This could be as simple as electronically routing orders from manufacturing plants to suppliers for the manufacturing processes needed to make products.

Given the complexity of maintenance, enhancement, and upgrade of ISC solutions, their integration and upgrades become challenging for managers (Kaliani Sundram et al., 2016). In order for business to streamline operations as well as better coordinate with their SI and CI, it is necessary for them to integrate their ISC solution or upgrade periodically to improve business efficiency and productivity (Vakharia, 2002). In addition, as ISC providers try to streamline their solutions to connect different software pieces together under a single solution suite, the managers face the question of whether to keep up with the SCM vendors with upgrading and obtain additional services (Zhang & Dhaliwal, 2009).

Many ISC vendors are busy checking off the industry-specific requirements with new releases in order to stay competitive. SAP's ISC software is designed first to meet the needs of a horizontal universe; then specialized vertical units within the company add specific process enhancements (Ball, 2013). The need for improved visibility across the entire ISC is also driving the new releases among software vendors (Jamshi & Ganeshkumar, 2017). In addition to the market requirements, most ISC software vendor corporations would consider the criteria such as fixing customer identified issues. Moreover, for successful software process improvement a software process must be constantly monitored and evaluated in order to determine its stability (Nozari & Maryam Mjjdehi, 2016). Lucas & Smith (1981) recommends that performance improvement is of utmost importance to customers in their decision to obtain systems from vendors. Evolutionary software maintenance has blossomed because of the ease of adding new functionalities into a system through software improvements but at the same has placed an additional risk (Stadtler & Kilger, 2008).

2.1.3 Networks

In the ISC, the information exchange with suppliers facilitates the flow of materials and economic resources (Eskandarpoura et al., 2015), where

networks of corporations, services, and production processes are formed that execute operations where the application of ICT is required, which is defined as a set of elements and techniques that allow users to manipulate information, convert it, store it, manage it, transmit it, and find it through the use of computers, software, and computer networks (Rodrigues et al., 2004), which allow users to process and disseminate it simultaneously and in real time with partners.

Using ICT tools to manage distribution and ISC increases efficiency and certainty and waste reduction in the value chain and have a great impact on all market players (Lin & Shaw, 1998). Large buyers in the supplier networks often use ICT tools to manage their producer networks. The ICT tools address record keeping, monitoring of field agents' activities, operations of procurement, tasks of credit and payment, distribution of inputs, forecasting and determining productivity of the organization (Leenders, 2006). Most distribution networks such as input supply corporations selling frequently use ICT tools to help manage their inventory in remote distribution networks. This application includes systems that process see orders and in voice products electronically, control inventory and costs, communication with clients and identification with new markets (Xie et al., 2019). ICT offer several contributions to ISC through their advanced properties such as unique identification of products, easiness of communication and real time information (Tan & Le, 2019). Thus, ICT can improve the traceability of products and the visibility throughout the entire supply chain and also can make reliable and speed up tracking, shipping, checkout and counting processes, which lead to improved inventory flows and more accurate information (Helo et al., 2008). ICT leads to incremental revenue due to reduction in stock-out rates, incremental revenue due to improved visibility of stocks. In terms of cost of goods sold, ICT leads to reduced expired product write-offs, reduced product shrinkage, reduced labor costs in shipping, receiving, managing returns, reduced inventory carrying cost, reduced safety stock due to improved inventory accuracy and reduced lead time it also leads to reduced cycle stock due to improved visibility.

Krmac (2007) suggested that ICT includes the application of HR, software and networks to enhance information flow and facilitate the decisions-making. It is one of the few aspects of SC that simultaneously offers both improved performance and lower cost. It enables corporations to maintain key information in an accessible format, process requirements, and make operational and planning decisions (Yazici, 2002). The adoption and successful implementation of important hardware, software and network technology is a prerequisite for SC success. The SC information capability that facilitates a seamless flow of information is a very important element in further enhancing the efficiency of ISC activities (Prajogo & Sohal, 2013).

Key activities in the ISC are the logistics activities. They include planning, designing, implementing and managing the flow and storage of materials and information exchange in order to support basic logistics functions such as procurement, distribution, transportation, inventory management, packaging, and manufacturing (Swafford et al., 2008). One of the strategic features of logistics service providers is the employment of customer service. In order to optimally achieve this goal, they must use modern logistics tools and processes. ICT is the most important technology for improving logistics systems, because with its proper use the productivity of constituent activities of logistics systems could be significantly enhanced (Bals & Tate, 2018). Information technologies are seen as a resource of a company, as a source of its competitive advantage, and serve as a catalyst of change in a company (Christiaanse & Kumar, 2000). They are tools for control and management of all resources, internal and external. Adoption and successful implementation of ICT (HR, software and network technology) are certainly prerequisites to logistics success.

With the growing trend toward the use of international ISC and e-commerce, logistics service providers for product warehousing, transportation and delivery are placing greater emphasis on ICT in order to remain competitive globally (Heeks et al., 2015). In the last decades, innovative ICT have deeply affected the way business is performed and the way that corporations compete. Innovations in electronic commerce play a key role in managing inter-

organizational networks of ISC members (Alan et al., 2003). The internet represents a powerful technology for commerce and communication between SC participants as well as a technique for the improvement of ISC (Devaraj et al., 2007).

2.2 Integration of Supply Chain

ISC is one of the core areas of SCM that influence SC efficiency and effectiveness. ISC involves the practice of planning and handling the movement of products (raw materials and services) to the customer at the right time, right quantity, right quality, and the right place and right price. Due to the significant role performed by logistics in firms' ability to create competitive advantage and improve performance, technological systems have been designed to enhance the effectiveness and efficiency of implementing policies and using logistics facilities (Nozari & Maryam Mjjdehi, 2016).

According to Franklin (2008), the capacity of ICT to change and interrupt the activities of firms, coupled with the support to international firms in controlling the activities in their SC has gotten to the level where we can say that the technological age has arrived. ICT is a technological tool used to influence and improve logistics activities and processes to enhance customer satisfaction and increase firms' performance. Again, ICT is a system that is adopted and used by firms to manage the embodiment of their SC activities through sharing of information leading to the creation of value and competitive capabilities and achievement of organizational goals through customer satisfaction. ICT is employed in areas of document handling, transportation, strategic planning, warehousing, inventory, supplier and customer management (Gunasekaran & Ngai, 2004).

Franklin (2008) established that ICT settles issues relating to identifying and locating suppliers who are dependable, (strategic sourcing), forecasting demand and converting demand into requirements of SC, management of distribution, fulfilling customer order, management of warehouse, inventory control, management of transportation, generation of import-export documents and monitoring, tracking and tracing of goods in transit, and management of risks. These ICT comprise electronic data interchange (EDI), radio frequency

identification (RFID), distribution management systems, enterprise resource planning, (ERP), customer relationship management systems and transport management systems (Lyytinen & Damsgaard, 2011). ICT is an essential capability that firms use for controlling firm-to-firm partnerships (Azevedo et al., 2007). According to Moshtari (2016) utilizing suitable ICT enhances effectiveness and generates flexibility through collaboration, which creates value.

Azevedo et al. (2007) posit that right ICT tends to strengthen the efficiency of distribution, ease the integration of logistics and advance the improvement of the supply chain, which is recognized as a panacea to supply chain management failure. ICT enhances sharing of information among partners of ISC and improves flexibility and responsiveness of firms, which result in reduction of inventory cost and effective management of risk (Hartono et al., 2010). Al-Mamary et al. (2014) found that information science and technology have provided tools for the enterprises and strategic partners to interact and communicate with each other. The use of ICT influences the interaction of firms with their ISC members. These systems also ensure effective coordination among departments in a firm.

ISC practices have received massive attention in recent years. This is a result of firms' desire to remain relevant in the contemporary market, which is characterized with instability and uncertainty. Every firm in our current globalized market faces the challenge of stern competition where competitive capabilities created in-house are not enough to keep them floating. Firms' quest to develop new capabilities and tap into existing ones in their SC to acquire competitive positions in the market has resulted in ISC. ISC is the level at which firms share information and resources with their supply chain partners to develop competitive advantage and improve performance. Many ISC concepts acknowledge the movement of goods and the sharing of information (Prajogo & Olhager, 2012a). Some scholars have also considered ISC from only the information-sharing perspective (Cai et al., 2010; Kulp et al., 2004). Again, ISC has been investigated from the process integration point of view (Agyabeng-Mensah et al., 2019; Rajaguru & Matanda, 2019, 2008). Further,

internal, customer and supplier integrations have been the study directions of some SC scholars. However, many scholars argue that the findings of studies into ISC become more reliable when the study combines both internal and external perspectives. According to Stratopoulos & Dehning (2000), firms that have achieved a high degree of integration with their SC partners develop the capability to coordinate their logistics processes, activities and facilities effectively. Many pieces of literature have established that ISC is a critical driver of inter-firm relationships (Barki & Pinsonneault, 2005; Nazir & Pinsonneault, 2012; Qu et al., 2010; Tallon & Pinsonneault, 2011). This research focuses on complete integration. Internal integration is when an organization connects all its departments to share resources, information, skills and expertise to improve firm performance. Customer integration is when a company shares resources with its customers to improve efficiency and satisfies the demands of the customer. However, SI occurs when a firm integrates, configures and merges its processes and systems with suppliers to enhance interactions and communication to develop a strategic relationship and share information and resources to the benefits of both parties. ISC influences organizational performance.

According to Hu (2012), firms that have built in-house distinctive competence can have a little competitive impact in today's market. Many research works have discovered that ISC has a remarkable effect on the performance of organizations (Olhager & Prajogo, 2012). Integrative efforts among partners help to improve overall SC efficiency (Nazir & Pinsonneault, 2012), which is reflected in organizational performance. External and internal integrations have positive links with the performance of organizations (Barki & Pinsonneault, 2005). Firms use the sharing of information and collaborative planning as approaches to improving performance (Kulp et al., 2004).

ICT such as enterprise resource planning, transport management systems and electronic data interface ensures effective sharing of information and resources among SC partners to improve performance. ICT has become an essential means for SC members to share information and resources to enhance their competitive positions to improve performance (Moshtari, 2016).

Sanders & Premus (2005) confirmed that internal and external integration mediates the connection between information technology and firm performance. Shang & Marlow (2005) found that the utilization of ICT enhances integration and financial performances.

2.2.1 Information System Integration

In the IT field, ISI has been viewed from two perspectives in IT. A technical standpoint in the first perspective suggests that ISI is a mechanism to depict the interconnectedness of ICT within an organization and the extent to which a common conceptual representation of data elements is shared (Hai & Hung, 2020; Muller-Torok et al., 2019). In other words, ISI is defined as the degree to which different systems of an organization are interconnected and are capable of communicating to each other. In the second perspective, ISI is the degree to which two or more independent organizations have standardized business processes and those processes are firmly linked through telecommunications technologies and computers (Dan et al., 2001; Sikora & Shaw, 1998). ISI aims at facilitating exchange and information sharing within an organization (van Hoek et al., 2005; Van Hoek et al., 2002), and achieving inter-firm coordination (between buyers and sellers) for better monitoring capability as in the case of SC (Goodhue et al., 1992). In regard to ISC, it has been repeatedly stressed that ISI needs all application systems, data, and communication to be integrated (Chiang et al., 2000) in order to provide a real-time and consistent connectivity within function component across SC (Stank et al., 2001).

Lyytinen & Damsgaard (2011) classified ISI into three main dimensions encompassing: domain, reach, and direction. Accordingly, direction is either horizontal or vertical, reach is either intra-organization or interorganizational, and domain is either data-wise, function-wise and, program-wise. It should be added that (Goodhue et al., 1992) considers object-wise as another sub-dimension for domain. Dan et al. (2001) categorized it as ex-ante and ex-post integrations, in addition Gunasekaran & Ngai (2004) grouped ex-ante integration into re-engineering and integrated components, and on the other

hand classified ex-post integration into sub-dimensions as data, function, and presentation.

Regardless, it has been equally emphasized in many IT literature that IT is not a source of sustainable performance and value creation (Powell & Dent-Micallef, 1997). Consequently, integrating resources and aligning them in organization's cultural and social context is crucial (Qu et al., 2010), in particular, in developing workflow and operations coordination (Rai et al., 2006). In sum, ISI has been found to be a sociotechnical phenomenon beyond a mere technological aspect such that it includes an assortment of economical, organizational, and even social facets of the phenomenon (Chiang et al., 2000).

From organizational integration perspective, vertical ISI is concerned with a firm covering two single output production processes in which all or part of the upstream output processes are employed as either entire or part of intermediate input into the downstream processes (Yusuf et al., 2004). It also involves internal integration (units linked within firm) and external integration (links among firm with customers, suppliers and retailers) (Prajogo & Olhager, 2012b). For instance, e-procurement which reflects the transactional nature of using IT in SC context, is one aspect of electronic integration that represents the operational aspect of sourcing over ICT enabled platforms (Rajaguru & Matanda, 2019).

2.2.2 Supplier Integration

SI occurs when a firm partner with its suppliers to structure inter-organizational strategies, develop synchronized processes and share information and knowledge (Flynn et al., 2010). It has been considered to be a critical source of competitive advantage as it improves inter-enterprise operations (Ellinger et al., 2002; E. T. G. Wang et al., 2007). SI provides a unity of effort in meeting customer requirements for products (Narasimhan & Kim, 2002) and in responding to changes in markets (Zhao et al. 2013). Firms can acquire insights into suppliers' processes, capabilities and constraints (Yeung et al. 2009; Huo 2012), ultimately enabling more effective planning and forecasting, better product and process designs and reduced transaction costs (Zhang &

Huo 2013). A firm may collaborate with suppliers through enterprise integration and/or interoperability (Panetto & Moline 2008). Enterprise integration focuses on interenterprise long-term collaboration and on the homogenization, coherence, interdependency and standardization of models, methods, terms, tools and applications among enterprises, and hence a firm and suppliers are tightly coupled (Chen et al., 2008). Enterprise interoperability emphasizes that each enterprise retains its independence and gains in its capability to collaborate and to synchronize strategies, resources, skills and processes with other enterprises, with the support of the new ICT, without changing their models, methods, languages and tools, and hence a firm and suppliers are loosely coupled (Chen et al.,2008; Panetto & Moline 2008). A firm can integrate with suppliers through information sharing, process synchronization and strategic alignment (Alfalla-Luque et al., 2013; Zhang & Huo 2013).

ISI occurs when a firm works together with suppliers to exchange information and develop a coordinated information flow and system (Panetto & Moline 2008; Yeung et al. 2009). It requires a firm and suppliers to develop interoperable systems by connecting and integrating core elements from ERP systems, data warehouses and other enterprise applications into a common platform via computer networks (Chen et al., 2008). Through the standardization of data models and query languages, joint development of applications and direct communications with suppliers via computer networks, a firm can build performance metrics associated with task execution and outcomes and learn about critical changes in environments (Frohlich & Westbrook 2001), which allow the firm and its suppliers to coordinate production and delivery, improve forecasting and planning (Alfalla-Luque et al., 2013) and develop an accurate assessment of performance bottlenecks across supply chains (Paulraj & Chen 2007; Cai et al., 2010). Providing information (e.g. scheduling, planning, shipment notices and sales forecasting) to suppliers enables a firm to improve inventory management and replenishment planning (Lai et al. 2012), which, in turn, helps the firm reduce operating costs, transaction risks and coordination costs and improve productivity.

Integration between production and purchasing departments forms a basis for ISI with suppliers (Lai et al. 2012), as it is difficult for a firm to communicate and exchange information with suppliers if its internal units are acting within functional silos (Paulraj & Chen 2007; Moyano-Fuentes et al., 2016). Internal integration increases the accuracy and timeliness of the information flow and the visibility of the firm, which enhance suppliers' understandings of the needs of the firm, especially regarding the specifications and standards of raw 7 materials and components (Williams et al. 2013). Joint planning and decision making also assist employees to identify critical issues, events or changes that may affect suppliers, improving the quality and quantity of information sharing (Swink et al., 2007; Zhao et al. 2011).

2.2.3 Customer Integration

The main focus of the ICT is value and value creation and thus value for the stakeholder as well as the way the value is created. ICT is the main basis for value exchange and will be created in cooperation of different actors (Vargo & Lusch, 2011). The first core premise underlines the importance of IT in economics and claims that IT is exchanged for service. Even more, IT is treated as a singular term. The next core premise highlights a broad involvement of the CI in the value creation process (Prahalad & Ramaswamy, 2004) and thus the understanding of the CI as part of the entire service (Edvardsson et al., 2011), which results in an enhanced value for all actors. An important message of this premise is that resources and activities of a service do not create value by themselves. Rather, the value is created by co-creation between the provider and the customer.

Simultaneous, co-creation illustrates an important change in the logic of value provision. It describes a shift from value-in-exchange (transactional) to value-in-use (relational) or value-in-context (Edvardsson et al., 2011). Co-creation can be seen in strong relationship to the next premise. In the third core premise, Vargo & Lusch (2004) argue that all actors, e.g. firms and customers, are resource integrators. Resources, like knowledge and skills, have to be integrated in the service process by any actors. The integration of these resources facilitates the co-creation of value and helps to fulfill the needs and

demands of the customer. The last core premise defines the nature of value. The description of value as uniquely and phenomenological Vargo & Lusch (2004) means that value is idiosyncratic, experiential, contextual and meaning laden (Edvardsson et al., 2011). Thus, value is subjective and has a unique character that is shaped by the individual context of every actor. Summarized, ICT highlights the importance of co-creation and CI in many different ways. This is necessary, because the nature of value is uniquely and phenomenologically determined by the beneficiary (Prahalad & Ramaswamy, 2004).

Furthermore, analogous to core premise, the integration of resources as well as operation on available resources is necessary to receive the desired value from a service (Vargo & Lusch, 2011). Both premises highlight the importance of the customer in the service provision process. This is reflected by the manifold influence of the customer on a service. As Gummesson (1998) states, a provider needs the participation of the customer to create value. A good example for this is the value-in-use concept of ICT. It describes the importance of the customer in the value creation process and the need of its skills and knowledge (Prahalad & Ramaswamy, 2004). The integration of the customer's resources can have different goals. A SI resources to serve the customer better or to co-create greater value. Analogous to this, a CI resources to enable the provider to serve him better or to create greater value co-creation (Moeller, 2008). Value-in-use is only one example for co-creation. ICT emphasizes the integration of HR, like skills and knowledge (Vargo & Lusch, 2011) and operand resources in the value creation. Furthermore, beside of the provision of these resources, CI has influence on decision-making concerning service provision activities (Moeller, 2008). But co-creation is more than this simple and ongoing resource integration and decision-making in a service process. During the whole lifecycle of a service, different possibilities for CI occur. This issue will be displayed by the three stages of the FTU Framework of Moeller (2008). the stages, facilities, transformation and usage, divide the service lifecycle in three different segments. Analogous to these three stages, Prahalad & Ramaswamy (2004) differentiate between value facilitation, value co-creation and sole value creation.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Research Design

A quantitative method will used in this research as a descriptive and analytical research to check the impact of ICT on ISC by developing a questionnaire to test four hypotheses for this research, where the employees of the Lebanese corporations in Beirut formed as an analysis unit of this research. Data collection used to answer research questions and hypotheses that related to the status of the research and to assess the position of ICT in the corporations under research.

In conclusion, based on a deductive approach the quantitative research relates to layout, measurement, and sampling issues that focusing on detailed planning to data collection and data analysis. The author applied quantitative research methods and the procedures are created systematically before unifying data collection. Besides, data analysis relies on the use of statistical methods, Tables, or figures and discusses how to link the result to hypotheses. Therefore, the nature of this research is completely quantitative.

3.2 Sampling & Sample

This research included 30 of Lebanese corporations in Beirut and selected based on the Industry Classification Benchmark taxonomy. The reason for selecting these corporations as a population is: (1) abundant of the ICT information, (2) clarity of the structure of the corporations, (3) the importance of applying the ICT to these corporations. The research population consisted

of employees working at Lebanese corporations in Beirut. According to the statistical report of the Ministry of Industry for the period, 2018-2019 the total population of employees working at the 30 Lebanese corporations in Beirut was 6951. Due to reasons of the large size of the population used in conducting this research and the potential challenges in time, cost and non-response Yamane (1985) formula were used to determine the ideal sample size for this research. Therefore, in this research, the size of the population is 6951. Regarding Yamane (1985) formula if the size of the population between 6000-7000 for a 5% precision level, where the confidence level is 95%, the sample size will be 378. The research sample will be the employees working at Lebanese corporations in Beirut and used as a primary data collection to addressing a specific issue to the ICT on ISC. The questionnaire was applied between October 2020 and November 2020. A questionnaire was distributed by hand within the Lebanese corporations. Once all responses had been received, they were recorded in the database using SPSS v 25 for further analysis. Also, this research utilized a convenience-sampling method based on the data collection from the population who are available to participate in this research. According to that, out of total 450 distributed questionnaires, 400 usable responses were received making 89% as a response rate.

3.3 Data Collection Procedures

After collecting the data, SPSS 25 software will be used to analyze the data with the following steps: First, testing the reliability of the scale and validity of questionnaire through Cronbach's alpha coefficient. According to (Sekaran & Bougie, 2016) Cronbach's alpha with larger alpha values (greater than 0.70) indicating higher internal consistency in the measured dimension and hence greater reliability. Second, analyzing correlation to show how the variables are positively related to each other.

Third, regression analysis will be applied to test the hypotheses that developed to know the effect of independent variable on dependent variable, and to test the significance of the model or goodness of fit of the models used for the analysis of the data, F test will be used. Finally, factor analysis will be used to find out the principal components to identify whether the factors used

in the research are able to measure the variables and whether the factors used in the questionnaire are related to the variables or not. This research will use the descriptive statistical tools to assess the status of ICT and ISC in the different sectors where the mean and standard deviations were used to see the level of use of ICT in these corporation and standard deviation is used to see the scatteredness of the data.

The four hypotheses that used in this research will be tested at 95% confidence level (or 5% level of significance) and the probability value (PV). The decision rule is that, if the PV is less than 0.05, we reject the null hypothesis. However, if the PV was found to be greater than 0.05, we accept the null hypothesis. A number of summary tables will be prepared to demonstrate the similarities and differences of ICT and ISC among employees working at Lebanese corporations in Beirut.

3.4 Study Variables and Instrument

The model of the research is quantitative and cross-sectional. The questionnaire developed in three parts with 53 items in total: demographic information, the information and communication technology Scale (ICTS), the integration of supply chain Scale (ISCS). Table 3 summaries the Cronbach's alpha for these scales.

3.4.1 Demographic Information

The research also assesses some demographic variables that are presented in Part 1 of the questionnaire (see Appendix). The respondents were asked about gender, age, educational level, year of experience and position. The demographic questions consist of 5 items.

3.4.2 Information and Communication Technology Scale

The ICTS used in this study was developed by (Kaliani Sundram et al., 2016; Tashtoush, 2008). This scale consists of (26 items) with the format of a typical Five-Point Likert Scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree) which divided into three sub-dimensions: human resource, software and networks with a Cronbach's alpha score of 0.815. According to (Hair et al., 2014) the level of Cronbach's alpha that needs to achieve the reliability and to

be an acceptable study is 0.7. Therefore, the Cronbach's alpha scores for the ICT variables for this study are reliable.

3.4.2.1 Human Recourse

HR scale has (14) items developed by (Kaliani Sundram et al., 2016; Tashtoush, 2008). The data were collected from customers and measured based on five-point Likert scale ranging from 5 = Strongly Agree to 1= Strongly Disagree. This scale was measured through 14 items with Cronbach's alpha score of 0.923.

3.4.2.2 Software

SF scale has (6) items developed by (Kaliani Sundram et al., 2016; Tashtoush, 2008). The data were collected from customers and measured based on five-point Likert scale ranging from 5 = Strongly Agree to 1= Strongly Disagree. This scale was measured through 6 items with a Cronbach's alpha score of 0.917.

3.4.2.3 Networks

NT scale has (6) items developed by (Kaliani Sundram et al., 2016; Tashtoush, 2008). The data were collected from customers and measured by the subject's responses based on five-point Likert scale ranging from 5 = Strongly Agree to 1= Strongly Disagree. This scale was measured through 6 items with a Cronbach's alpha score of 0.756.

3.4.3 Integration of Supply Chain

The ISCS used in this study was developed by (Kaliani Sundram et al., 2016; Tashtoush, 2008). This scale consists of 22 items with the format of a typical Five-Point Likert Scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The Cronbach's alpha value for the ISCS was calculated as 0.816. As with the ICTS, this value is also considered to be reliable.

3.4.3.1 Information System Integration

DM scale has (7) items developed by (Kaliani Sundram et al., 2016; Tashtoush, 2008). The data were collected from customers and measured

based on five-point Likert scale ranging from 5 = Strongly Agree to 1= Strongly Disagree. This scale was measured through 7 items with a Cronbach's alpha score of 0.783.

3.4.3.2 Supplier Integration

SI scale has (8) items developed by (Kaliani Sundram et al., 2016; Tashtoush, 2008). The data were collected from customers and measured based on five-point Likert scale ranging from 5 = Strongly Agree to 1= Strongly Disagree. This scale was measured through 8 items with a Cronbach's alpha score of 0.800.

3.4.3.3 Customer Integration

CI scale has (7) items developed by (Kaliani Sundram et al., 2016; Tashtoush, 2008). The data were collected from customers and measured based on five-point Likert scale ranging from 5 = Strongly Agree to 1= Strongly Disagree. This scale was measured through 7 items with a Cronbach's alpha score of 0.777. The Cronbach's alpha value for the present study of 48 items was calculated as 0.806 which this value considered to be reliable.

Table 1 The Cronbach's Alpha for Research Variables

Variable Name	Number of Items	Cronbach's alpha
ICT	**26**	0.815
HR	14	0.923
SF	6	0.917
NT	6	0.756
ISC	**22**	0.816
ISI	7	0.783
SI	8	0.800
CI	7	0.777
Total	**48**	**0.806**

3.5 Data Analysis Procedures

After collecting data, SPSS v.25 software was used to analyze the data with the following steps: First, test the reliability of the scale and validity of the

questionnaire through Cronbach's alpha coefficient. According to (Sekaran & Bougie, 2016), Cronbach's alpha indicates that values which greater than 0.70 has high internal consistency in measured the variables and increases reliability. Second, correlation analysis shows how variables are positively related to each other. Table 2 summarizes the correlation coefficient scale. Third, factor analysis was used to find out the principal components to identify whether the factors used in the research can measure the variables and whether the factors used in the questionnaire are related to the variables or not. (Hair et al., 2014) reported that exploratory factor analysis (EFA) is used to explore data and provides information on the number of factors needed to represent data better. Also, all measured or observed variables are related to each factor according to the value of the load estimation factor. The main feature of EFA is that all factors are obtained only from statistical results, not from any theory, and after the factor analysis is performed the factors can be named. In other words, EFA can be analyzed without knowing the number of factors that already present in the research or which variables that belong to which constructs. Finally, regression analysis was applied to test the hypotheses that developed to determine the effect of ICT on ISC.

Table 2 Correlation Coefficient Scale

Correlation Scale	Description
±0.90 - ± 1.00	Very high positive or negative correlation
±0.70 – ±0.89	High positive or negative correlation
±0.69 - ±0.50	Moderate positive or negative correlation
±0.49 - ±0.30	Low positive or negative correlation
±0.29 - ±0.00	Negligible correlation

The hypotheses and sub-hypotheses that used in this research will be tested at 95% confidence level (or 5% margin of error). The rule of decision is that if the PV less than 0.05, the null hypothesis will be rejected and if it is greater than 0.05 it will be accepted. Several summary tables will be prepared to demonstrate the similarities and differences of ICT and ISC among Lebanese corporations in Beirut.

3.6 Ethical Considerations

This research was designed to match the ethical principles of voluntary participation and ensure that the participants were not harmed and that their right to privacy, anonymity, and self-determination was respected. This research was conducted keeping in mind the ethical implications at every stage of the research process. The approval was obtained from the Ethics Committee at Near East University for the research questionnaire before collecting data. During this research, participants were introduced to the importance of the research and its purpose, and the participation in this research is voluntary and the data collected during this research will be used for academic research purposes only and may be presented at national/international academic meetings and/or publications and will be treated with strict confidentiality. In addition, the information of participants in this research will be assured to be confidential and anonymous.

CHAPTER 4

RESEARCH RESULT

4.1 Descriptive Statistics

The purpose of this research is to examine the impact of ICT on ISC in Lebanese corporations in Beirut. To achieve this goal, the researcher distributes (450) questionnaire were subjected to (400) valid questionnaire for statistical analysis. Table 3 summarizes the distribution of the questionnaire on the research sample.

Table 3 The Distribution of The Questionnaire on The Research Sample

	Number	**Ratio**
Distributed questionnaires	450	100%
Questionnaires recovered	436	97%
Non-refunded questionnaires	21	5%
Non-analytical questionnaires	15	3%
Questionnaires under analysis	400	89%

After collecting the questionnaire from the sample, the questionnaire response scale which contains 48 items was translated to a quantitative scale by giving the answer category 5 = Strongly Agree, 4 = Agree, 3 = Neither Agree nor Disagree, 2 = Disagree, 1 = Strongly Disagree. The total scores of the sample respondents for each paragraph were classified as shown in Table 4.

Table 4 The Degree of Approval of the Questionnaire Paragraphs

Likert-Scale	Classification	Description
1	1 – 1.79	Strongly Disagree
2	1.8 – 2.59	Disagree
3	2.6 – 3.39	Neither Agree nor Disagree
4	3.4 – 4.19	Agree
5	4.2 – 5	Strongly Agree

The researcher relied on the degree of approval of the questionnaire paragraphs according to (Idek et al., 2014) the rule specified in Table 7 that the approval for the paragraph is strongly disagreed if the average mean of the paragraph between 1 – 1.79, disagree if the average mean of the paragraph falls between 1.8 – 2.59, neither agree nor disagree if the average mean of the paragraph is between 2.6 – 3.39, agree if the average mean of the paragraph between 3.4 – 4.19, and strongly agree if the average mean of the paragraph between 4.2 – 5.

4.1.1 Information and Communication Technology

Table 5 shows the mean scores for the ICT and its sub-dimensions items. The respondents' mean scores for the sub-dimensions of ICT items range from 2.28 to 4.67. At the same time, their standard deviation demonstrated that the items do not present a high deviation from the average mean among items. Where The respondents' mean scores for HR was 3.41, SF was 3.77 and NT was 3.34. Therefore, the respondents' mean scores for ICT (overall), as well as each of its dimensions, were all above the 3.00 mid-point score. These scores indicate that the customers perceptions of the ICT are satisfactory.

Table 5 The Mean Scores for the ICT and It Sub-Dimensions Items

Items	Mean	Std. Deviation	Degree of Approval
HR1	3.74	1.170	Agree
HR2	3.91	1.161	Agree
HR3	3.07	1.259	Natural
HR4	3.74	1.282	Agree
HR5	2.28	1.036	Disagree
HR6	4.25	1.042	Agree
HR7	3.22	1.043	Natural
HR8	2.44	1.037	Disagree
HR9	4.67	1.165	Strongly Agree
HR10	3.73	1.206	Agree
HR11	2.96	1.115	Natural
HR12	2.67	1.185	Natural
HR13	4.27	1.032	Strongly Agree
HR14	2.80	1.310	Natural
HR Means Score	**3.41**	**1.146**	**Agree**
SF1	3.34	1.035	Agree
SF2	4.07	1.111	Agree
SF3	3.75	1.062	Agree
SF4	4.01	1.062	Agree
SF5	3.36	1.040	Agree
SF6	4.09	1.110	Agree
SF Means Score	**3.77**	**0.86**	**Agree**
NT1	3.67	0.903	Agree
NT2	3.11	0.907	Natural
NT3	2.91	0.752	Natural
NT4	3.71	1.046	Agree
NT5	3.31	1.019	Natural
NT6	3.31	0.909	Natural
NT Means Score	**3.34**	**0.923**	**Natural**
ICT Means Score	**3.48**	**1.090**	**Agree**

4.1.2 Integration of Supply Chain

Table 6 shows the mean scores for the ISC and its sub-dimensions items. The respondents' mean scores for ISC items range from 2.87 to 4.65. At the same

time, their standard deviation demonstrated that the items do not present a high deviation from the average mean among items. Where The respondents' mean scores for ISI was 4.34, SI was 3.69 and CI was 3.65. Therefore, the respondents' mean scores for ISC (overall) was 3.99 this indicate that the customers perceptions of the ISC are agree.

Table 6 The Mean Scores for the ISC and It Sub-Dimensions Items

Items	Mean	Std. Deviation	Degree of Approval
ISI1	4.33	0.779	Strongly Agree
ISI2	4.39	0.751	Strongly Agree
ISI3	4.04	0.684	Agree
ISI4	4.17	0.770	Agree
ISI5	4.48	0.656	Strongly Agree
ISI6	4.48	0.742	Strongly Agree
ISI7	4.52	0.708	Strongly Agree
ISI Means Score	**4.34**	**0.727**	**Strongly Agree**
SI1	4.09	0.742	Agree
SI2	3.68	0.849	Agree
SI3	4.65	0.670	Strongly Agree
SI4	4.19	0.819	Agree
SI5	4.04	0.914	Agree
SI6	3.78	0.845	Agree
SI7	3.83	0.878	Agree
SI8	3.67	0.842	Agree
SI Means Score	**3.69**	**1.05**	**Agree**
CI1	2.87	1.582	Natural
CI2	4.65	1.485	Strongly Agree
CI3	3.66	1.062	Agree
CI4	2.97	1.620	Natural
CI5	3.35	0.897	Agree
CI6	3.85	0.918	Agree
CI7	4.20	1.044	Strongly Agree
CI Means Score	**3.65**	**1.230**	**Agree**
ISC Means Score	**3.99**	**0.921**	**Agree**

4.2 Demographic Characteristics of Respondents

Demographic characteristics of respondents that have been captured in this research include 5 different aspects; gender, age, educational level, monthly income and occupation. First, gender was measured into two categories of male and female. Second, the age which was measured in seven categories having options of less than 25 years, from 25 – 29 years, from 30 – 34 years, from 40 – 44 years, from 45 – 49 years, and more than 50s years. Third, educational level was measured in three categories diploma or below, undergraduate, postgraduate or above. Fourth, the monthly income was measured in four categories having options of below than 250, From 250 – 450, From 451 – 650 and More than 650. Fifth, occupation was measured in three categories of unemployed, professional/ employed and business/self-employed.

4.2.1 Gender

Gender respondents were selected in two categories: male and female. In data from customers, the majority of male and female respondents were 74% and 26% respectively. This is consistent with the fact that females are in Lebanon usually took the role of the family only and the males were responsible to do business and make money for the family. But this has begun to change in the recent past, and now more female workers continue to work even after marriage because of the constantly rising cost of living and low wages for their partners. Table 7 summarize the sample distribution by gender.

Table 7 Sample Distribution by Gender

Variables	Frequency	Percent
Gender		
Male	297	74%
Female	103	26%
Total	400	100%

4.2.2 Age

In customers data, respondents were of different age groups in a relative distribution as shown in Table 8. The highest representation is respondents

who belong to the 30 – 34 years by 42%. The rate of ageing between 35 – 39 years was 22%, respondents from 25 – 29 years were 17%, from 40 – 44 years 9%, from 45 – 49 years 6%, and 5% were more than 50s years.

Table 8 Sample Distribution by Age

Variables	Frequency	Percent
Age		
25-29	69	17%
30-34	168	42%
35-39	87	21%
40-44	36	9%
45-49	21	6%
50 years and more	19	5%
Total	400	100%

4.2.3 Educational Level

The educational level of respondents was measured in three categories as shown below in Table 9. The highest percentage of respondents who obtained an undergraduate degree is 94%, and postgraduate or above is 6%.

Table 9 Sample Distribution by Educational Level

Variables	Frequency	Percent
Educational Level		
Undergraduate	377	94%
Postgraduate	23	6%
Total	400	100%

4.2.4 Year of Experience

Year of experience of respondents was measured in four categories as shown below in Table 10. The highest percentage of respondents who has experience from 5 – 9 years by 46%. From 1 – 4 years was 30%, more than 10 years was 20%, and 3% who has less than 1 year.

Table 10 Sample Distribution by Year of Experience

Variables	Frequency	Percent
Year of Experience		
Less than 1 year	15	4%
From 1 – 4 years	118	30%
From 5 – 9 years	187	46%
More than 10 years	80	20%
Total	400	100%

4.2.5 Position

Position of respondents was selected in four categories. The highest representation is respondents who belong to head of department by 75%, head of division 22% and general manager 3%. Table 11 summarize the sample distribution by position.

Table 11 Sample Distribution by Position

Variables	Frequency	Percent
Position		
General Manager	15	3%
Head of Department	298	75%
Head of Division	87	22%
Total	400	100%

4.3 Correlation Analysis

The results of the correlation analysis which indicates that all the six constructs were positively correlated with each other with 0.01 significance value are shown in Table 12. The relationship between ICT and ISC (R= 0.533, p = 0.01) is considered as a significant and moderate correlation. The relationship between ICT and ISI (R = 0.379, p = 0.01) is considered as a significant and low positive correlation. The correlation coefficient between ICT and SI (R = 0.521, p = 0.01) is considered as moderate positive correlation. The relation between ICT and CI (R = 0.429, p = 0.01) is considered as low positive correlation. The relationship between HR and ISC (R= 0.822, p = 0.01) is considered as high positive correlation. The relationship between HR and ISI (R = 0.600, p = 0.428) is considered as a significant and moderate positive

correlation. The correlation coefficient between HR and SI (R = 0.805, p = 0.01) is considered as high positive correlation. The relation between HR and CI (R = 0.649, p = 0.01) is considered as moderate positive correlation.

The relationship between SF and ISC (R= 0.765, p = 0.01) is considered as a significant and high positive correlation. The relationship between SF and ISI (R = 0.763, p = 0.01) is considered as a significant and high positive correlation. The correlation coefficient between SF and SI (R = 0.782, p = 0.01) is considered as high positive correlation. The relation between SF and CI (R = 0.792, p = 0.01) is considered as high positive correlation. The relationship between NT and ISC (R= 0.743, p = 0.01) is considered as a significant and high positive correlation. The relationship between NT and ISI (R = 0.751, p = 0.01) is considered as a significant and high positive correlation. The correlation coefficient between NT and SI (R = 0.759, p = 0.01) is considered as high positive correlation. The relation between NT and CI (R = 0.779, p = 0.01) is considered as high positive correlation.

Table 12 Correlation between Research Variables

	ICT	HR	SF	NT	ISC	ISI	SI	CI
ICT	1							
HR	.668**	1						
SF	.572**	.779**	1					
NT	.539**	.742**	.964**	1				
ISC	.533**	.822**	.765**	.743**	1			
ISI	.379**	.600**	.763**	.751**	.654**	1		
SI	.521**	.805**	.782**	.759**	.962**	.677**	1	
CI	.429**	.649**	.792**	.779**	.693**	.799**	.714**	1

N=230

**Correlation is significant at the 0.01 level (2-tailed).

ICT: information and communication technology, HR: human resources, SF: software, NT: networks, ISC: integration of supply chain, ISI: information system integration, SI: suppliers integration, CI: customer integration.

4.4 Exploratory Factor Analysis

Exploratory factor analysis (EFA) enables the author to reduce the observed variables to smaller numbers and identify the relationship between them

(Hinkin, 1998). Principal components analysis (PCA) technique following by the Promax with Kaiser Normalization rotation method was used to extract the factors. As proposed by (Hair et al., 2014) the author kept only those items which loaded 0.4 or above on single item. Table 13 showed KMO and Bartlett's Test and the resulting value for Lebanese corporations in Beirut was 0.786 which effectively comply with (Kaiser & Rice, 1974) of the required sample value.

Table 13 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.786
Bartlett's Test of Sphericity	Approx. Chi-Square	13110.049
	Df	630
	Sig.	0.000

The author examined the correlation between the variables and the visual examination showed a significant correlation at p = 0.01. The EFA analysis extracted six distinct factors explaining 62.67% of the total variance. The construct HR possessed fourteen items and two of the were deleted which remaining twelve items loaded between 0.510 to 0.870, and the construct explained 21.3% of the total variance. The construct SF possessed six items loaded between 0.656 to 0.958 and explained 11.95% of the total variance. The original construct of the ISI had seven items and two of them were deleted which the remaining five items loaded between 0.620 to 0.817 and explained 10.65% of the total variance. The CI had seven and three of them were deleted which the remaining four items loaded from 0.785 to 0.868 and explained 7.56% of the total variance. The SI construct had eight items and three items were deleted, the remaining five items loaded between 0.636 to 0.892, and the construct explained 5.77 % of the total variance. The construct of NT had six items and one item was deleted which the remaining five items loaded between 0.634 to 0.739 and explained 5.45% of the total variance. Table 14 summarizes exploratory factor analysis result.

Table 14 Exploratory Factor Analysis Results

Factor	Factor loading	% of Variance Explained	Cronbach's alpha	Initial Eigenvalues
Factor 1: Hardware				
HR1	**.717**	21.3%	0.919	7.667
HR2	**.680**			
HR3	**.664**			
HR4	**.510**			
HR5	**.761**			
HR6	**.766**			
HR7	**.727**			
HR8	**.775**			
HR10	**.870**			
HR11	**.700**			
HR13	**.752**			
HR14	**.853**			
Factor 2: Software				
SF1	**.967**	11.95%	0.917	4.303
SF2	**.737**			
SF3	**.854**			
SF4	**.656**			
SF5	**.958**			
SF6	**.751**			

Factor	Factor loading	% of Variance Explained	Cronbach's alpha	Initial Eigenvalues
Factor 3: Information System Integration				
ISI1	**.620**	10.65%	0.825	3.833
ISI4	**.806**			
ISI5	**.767**			
ISI6	**.800**			
ISI7	**.817**			
Factor 4: Customer Integration				
CI1	**.868**	7.56%	0.869	2.720
CI2	**.838**			
CI4	**.849**			
CI5	**.785**			
Factor 5: Suppliers Integration				
SI5	**.636**	5.77%	0.824	2.08
SI6	**.892**			
SI7	**.884**			
SI8	**.786**			
Factor 6: Networks				
NT1	**.635**	5.45%	0.789	1.96
NT2	**.739**			
NT3	**.678**			
NT5	**.721**			
NT6	**.634**			

4.5 Hypotheses Testing

The researchers used linear regression for SPSS v25 to test the research hypotheses. This research consists of four main hypotheses and twelve sub-hypotheses. The relationship for these hypotheses and sub-hypotheses divided into four sections.

4.5.1 The relationship between information and communication technology and integration of supply chain

Hypothesis H_1 posits that ICT positively influence ISC. As shown in Table 15 the linear regression demonstrated that the path estimates between ICT and ISC was significant ($F_{(1,398)} = 158.212$, $p < 0.05$, $R^2 = 0.284$). Also, the model coefficient shows that ICT were positive and statistically significant to ISC ($T_{(398)} = 12.578$, $\beta = 0.211$, $p < 0.05$). Therefore, hypothesis H_1 was accepted.

Table 15 Regression analysis of ICT on ISC

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.533[a]	.284	.283	8.350
a. Predictors: (Constant), ICT				

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11032.191	1	11032.191	158.212	.000[b]
	Residual	27752.746	398	69.731		
	Total	38784.938	399			
a. Dependent Variable: ISC						
b. Predictors: (Constant), ICT						

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	60.118	1.136		52.902	.000
	ICT	.211	.017	.533	12.578	.000
a. Dependent Variable: ISC						

4.5.1.1 The relationship between information and communication technology and information system integration

Hypothesis H1a posits that ICT positively influence ISI. As shown in Table 16 the linear regression demonstrated that the path estimates between ICT and ISI was significant ($F_{(1,398)} = 66.837$, $p < 0.05$, $R2 = 0.144$). Also, the model coefficient shows that ICT were positive and statistically significant to ISI ($T_{(398)} = 8.175$, $\beta = 0.076$, $p < 0.05$). Therefore, hypothesis H1a was accepted.

Table 16 Regression analysis of ICT on ISI

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.379[a]	.144	.142	4.629

a. Predictors: (Constant), ICT

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1432.456	1	1432.456	66.837	.000[b]
	Residual	8529.904	398	21.432		
	Total	9962.360	399			

a. Dependent Variable: ISI

b. Predictors: (Constant), ICT

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	26.000	.630		41.268	.000
	ICT	.076	.009	.379	8.175	.000

a. Dependent Variable: ISI

4.5.1.2 The relationship between information and communication technology and suppliers integration

Hypothesis H1b posits that ICT positively influence SI. As shown in Table 17 the linear regression demonstrated that the path estimates between ICT and SI was significant ($F_{(1,398)} = 148.007$, $p < 0.05$, $R2 = 0.271$). Also, the model coefficient shows that ICT were positive and statistically significant to SI ($T_{(398)} = 12.166$, $\beta = 0.108$, $p < 0.05$). Therefore, hypothesis H1b was accepted.

Table 17 Regression analysis of ICT on SI

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.521[a]	.271	.269	4.416
a. Predictors: (Constant), ICT				

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2885.936	1	2885.936	148.007	.000[b]
	Residual	7760.442	398	19.499		
	Total	10646.377	399			
a. Dependent Variable: SI						
b. Predictors: (Constant), ICT						

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	30.308	.601		50.435	.000
	ICT	.108	.009	.521	12.166	.000
a. Dependent Variable: SI						

4.5.1.3 The relationship between information and communication technology and customer integration

Hypothesis H1c posits that ICT positively influence CI. As shown in Table 18 the linear regression demonstrated that the path estimates between ICT and CI was significant ($F_{(1,398)} = 89.903$, $p < 0.05$, $R2 = 0.184$). Also, the model coefficient shows that ICT were positive and statistically significant to CI ($T_{(398)} = 9.482$, $\beta = 0.082$, $p < 0.05$). Therefore, hypothesis H1c was accepted.

Table 18 Regression analysis of ICT on CI

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.429[a]	.184	.182	4.334

a. Predictors: (Constant), ICT

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1688.376	1	1688.376	89.903	.000[b]
	Residual	7474.421	398	18.780		
	Total	9162.797	399			

a. Dependent Variable: CI

b. Predictors: (Constant), ICT

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	25.777	.590		43.707	.000
	ICT	.082	.009	.429	9.482	.000

a. Dependent Variable: CI

4.5.2 The relationship between human resource and integration of supply chain

Hypothesis H2 posits that HR positively influence ISC. As shown in Table 19 the linear regression demonstrated that the path estimates between HR and ISC was significant ($F_{(1,398)} = 827.994$, $p < 0.05$, $R^2 = 0.675$). Also, the model coefficient shows that HR were positive and statistically significant to ISC ($T_{(398)} = 28.775$, $\beta = 0.974$, $p < 0.05$). Therefore, hypothesis H2 was accepted.

Table 19 Regression analysis of HR on ISC

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.822[a]	.675	.675	5.625
a. Predictors: (Constant), HR				

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	26194.004	1	26194.004	827.994	.000[b]
	Residual	12590.934	398	31.636		
	Total	38784.938	399			
a. Dependent Variable: ISC						
b. Predictors: (Constant), HR						

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	34.925	1.367		25.553	.000
	HR	.974	.034	.822	28.775	.000
a. Dependent Variable: ISC						

4.1.1.1 The relationship between human resource and information system integration

Hypothesis H2a posits that HR positively influence ISI. As shown in Table 20 the linear regression demonstrated that the path estimates between HR and ISI was significant ($F_{(1,398)} = 224.167$, $p < 0.05$, $R^2 = 0.360$). Also, the model coefficient shows that HR were positive and statistically significant to ISI ($T_{(398)} = 14.974$, $\beta = 0.360$, $p > 0.05$). Therefore, hypothesis H2a was rejected.

Table 20 Regression analysis of HR on ISI

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.600[a]	.360	.359	4.002
a. Predictors: (Constant), HR				

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3589.439	1	3589.439	224.167	.000[b]
	Residual	6372.921	398	16.012		
	Total	9962.360	399			
a. Dependent Variable: ISI						
b. Predictors: (Constant), HR						

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	16.543	.972		17.012	.000
	HR	.360	.024	.600	14.972	.000
a. Dependent Variable: ISI						

4.5.2.1 The relationship between human resource and suppliers integration

Hypothesis H2b posits that HR positively influence SI. As shown in Table 21 the linear regression demonstrated that the path estimates between HR and SI was significant ($F_{(1,398)} = 734.603$, $p < 0.05$, $R^2 = 0.649$). Also, the model coefficient shows that HR were positive and statistically significant to SI ($T_{(398)} = 27.104$, $\beta = 0.500$, $p < 0.05$). Therefore, hypothesis H2b was accepted.

Table 21 Regression analysis of HR on SI

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.805[a]	.649	.648	3.066
a. Predictors: (Constant), HR				

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6905.209	1	6905.209	734.603	.000[b]
	Residual	3741.169	398	9.400		
	Total	10646.377	399			
a. Dependent Variable: SI						
b. Predictors: (Constant), HR						

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	17.347	.745		23.283	.000
	HR	.500	.018	.805	27.104	.000
a. Dependent Variable: SI						

4.5.2.2 The relationship between human resource and customer integration

Hypothesis H2c posits that HR positively influence CI. As shown in Table 22 the linear regression demonstrated that the path estimates between HR and CI was significant ($F_{(1,398)} = 290.246$, $p < 0.05$, $R^2 = 0.422$). Also, the model coefficient shows that HR were positive and statistically significant to CI ($T_{(398)} = 17.037$, $\beta = 0.374$, $p < 0.05$). Therefore, hypothesis H2c was accepted.

Table 22 Regression analysis of HR on CI

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.649[a]	.422	.420	3.649

a. Predictors: (Constant), HR

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3864.123	1	3864.123	290.246	.000[b]
	Residual	5298.675	398	13.313		
	Total	9162.797	399			

a. Dependent Variable: CI

b. Predictors: (Constant), HR

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	16.195	.887		18.265	.000
	HR	.374	.022	.649	17.037	.000

a. Dependent Variable: CI

4.5.3 The relationship between software and integration of supply chain

Hypothesis H3 posits that SF positively influence ISC. As shown in Table 23 the linear regression demonstrated that the path estimates between SF and ISC was significant ($F_{(1,398)} = 561.737$, $p < 0.05$, $R^2 = 0.585$). Also, the model coefficient shows that SF were positive and statistically significant to ISC ($T_{(398)} = 23.701$, $\beta = 1.235$, $p < 0.05$). Therefore, hypothesis H3 was accepted.

Table 23 Regression analysis of SF on ISC

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.765[a]	.585	.584	6.357

a. Predictors: (Constant), SF

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	22700.941	1	22700.941	561.737	.000[b]
	Residual	16083.996	398	40.412		
	Total	38784.938	399			

a. Dependent Variable: ISC

b. Predictors: (Constant), SF

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	29.912	1.863		16.059	.000
	SF	1.235	.052	.765	23.701	.000

a. Dependent Variable: ISC

4.5.3.1 The relationship between software and information system integration.

Hypothesis H3a posits that SF positively influence ISI. As shown in Table 24 the linear regression demonstrated that the path estimates between SF and ISI was significant ($F_{(1,398)} = 555.572$, $p < 0.05$, $R^2 = 0.583$). Also, the model coefficient shows that SF were positive and statistically significant to ISI ($T_{(398)} = 22.571$, $\beta = 0.625$, $p < 0.05$). Therefore, hypothesis H3a was accepted.

Table 24 Regression analysis of SF on ISI

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.763[a]	.583	.582	3.232
a. Predictors: (Constant), SF				

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5804.292	1	5804.292	555.572	.000[b]
	Residual	4158.068	398	10.447		
	Total	9962.360	399			
a. Dependent Variable: ISI						
b. Predictors: (Constant), SF						

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8.794	.947		9.285	.000
	SF	.625	.027	.763	23.571	.000
a. Dependent Variable: ISI						

4.5.3.2 The relationship between software and suppliers integration

Hypothesis H3b posits that SF positively influence SI. As shown in Table 25 the linear regression demonstrated that the path estimates between SF and SI was significant ($F_{(1,398)} = 625.519$, $p < 0.05$, $R^2 = 0.611$). Also, the model coefficient shows that SF were positive and statistically significant to SI ($T_{(398)} = 25.010$, $\beta = 0.661$, $p < 0.05$). Therefore, hypothesis H3b was accepted.

Table 25 Regression analysis of SF on SI

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.782[a]	.611	.610	3.225
a. Predictors: (Constant), SF				

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6506.484	1	6506.484	625.519	.000[b]
	Residual	4139.894	398	10.402		
	Total	10646.377	399			
a. Dependent Variable: SI						
b. Predictors: (Constant), SF						

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	13.819	.945		14.623	.000
	SF	.661	.026	.782	25.010	.000
a. Dependent Variable: SI						

4.5.3.3 The relationship between software and customer integration

Hypothesis H3c posits that SF positively influence CI. As shown in Table 26 the linear regression demonstrated that the path estimates between SF and CI was significant ($F_{(1,398)} = 671.196$, $p < 0.05$, $R^2 = 0.628$). Also, the model coefficient shows that SF were positive and statistically significant to CI ($T_{(398)} = 25.907$, $\beta = 0.622$, $p < 0.05$). Therefore, hypothesis H3c was accepted.

Table 26 Regression analysis of SF on CI

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.792[a]	.628	.627	2.927
a. Predictors: (Constant), SF				

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5752.016	1	5752.016	671.196	.000[b]
	Residual	3410.781	398	8.570		
	Total	9162.797	399			
a. Dependent Variable: CI						
b. Predictors: (Constant), SF						

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	9.081	.858		10.586	.000
	SF	.622	.024	.792	25.907	.000
a. Dependent Variable: CI						

4.5.4 The relationship between networks and integration of supply chain

Hypothesis H4 posits that NT positively influence ISC. As shown in Table 27 the linear regression demonstrated that the path estimates between NT and ISC was significant ($F_{(1,398)} = 489.203$, $p < 0.05$, $R^2 = 0.551$). Also, the model coefficient shows that NT were positive and statistically significant to ISC ($T_{(398)} = 22.118$, $\beta = 1.193$, $p < 0.05$). Therefore, hypothesis H4 was accepted.

Table 27 Regression analysis of NT on ISC

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.743[a]	.551	.550	6.612
a. Predictors: (Constant), NT				

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	21385.977	1	21385.977	489.203	.000[b]
	Residual	17398.961	398	43.716		
	Total	38784.938	399			
a. Dependent Variable: ISC						
b. Predictors: (Constant), NT						

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	31.226	1.936		16.131	.000
	NT	1.193	.054	.743	22.118	.000
a. Dependent Variable: ISC						

4.5.4.1 The relationship between networks and information system integration

Hypothesis H4a posits that NT positively influence ISI. As shown in Table 28 the linear regression demonstrated that the path estimates between NT and ISI was significant ($F_{(1,398)} = 514.961$, $p < 0.05$, $R^2 = 0.564$). Also, the model coefficient shows that NT were positive and statistically significant to ISI ($T_{(398)} = 22.693$, $\beta = 0.611$, $p < 0.05$). Therefore, hypothesis H4a was accepted.

Table 28 Regression analysis of NT on ISI

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.751[a]	.564	.563	3.303

a. Predictors: (Constant), NT

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5619.328	1	5619.328	514.961	.000[b]
	Residual	4343.032	398	10.912		
	Total	9962.360	399			

a. Dependent Variable: ISI

b. Predictors: (Constant), NT

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	9.165	.967		9.477	.000
	NT	.611	.027	.751	22.693	.000

a. Dependent Variable: ISI

4.5.4.2 The relationship between networks and suppliers integration

Hypothesis H4b posits that NT positively influence SI. As shown in Table 29 the linear regression demonstrated that the path estimates between NT and SI was significant ($F_{(1,398)} = 539.605$, $p < 0.05$, $R^2 = 0.576$). Also, the model coefficient shows that NT were positive and statistically significant to SI ($T_{(398)} = 23.229$, $\beta = 0.638$, $p < 0.05$). Therefore, hypothesis H4b was accepted.

Table 29 Regression analysis of NT on SI

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.759[a]	.576	.574	3.370

a. Predictors: (Constant), NT

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6127.140	1	6127.140	539.605	.000[b]
	Residual	4519.237	398	11.355		
	Total	10646.377	399			

a. Dependent Variable: SI

b. Predictors: (Constant), NT

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	14.527	.987		14.725	.000
	NT	.638	.027	.759	23.229	.000

a. Dependent Variable: SI

4.5.4.3 The relationship between networks and customer integration

Hypothesis H4c posits that NT positively influence CI. As shown in Table 30 the linear regression demonstrated that the path estimates between NT and CI was significant ($F_{(1,398)} = 612.347$, $p < 0.05$, $R^2 = 0.606$). Also, the model coefficient shows that NT were positive and statistically significant to CI ($T_{(398)} = 24.746$, $\beta = 0.608$, $p < 0.05$). Therefore, hypothesis H4b was accepted.

Table 30 Regression analysis of NT on CI

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.779[a]	.606	.605	3.011

a. Predictors: (Constant), NT

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5553.351	1	5553.351	612.347	.000[b]
	Residual	3609.447	398	9.069		
	Total	9162.797	399			

a. Dependent Variable: CI

b. Predictors: (Constant), NT

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	9.480	.882		10.752	.000
	NT	.608	.025	.779	24.746	.000

a. Dependent Variable: CI

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 Discussion

The amount of research about the ICT and its impact on ISC on Lebanese corporations in Beirut is limited. Accordingly, the current study aimed at classifying this issue in the literature by empirically examining the relationship between ICT and ISC among the employees of Lebanese corporations in Beirut.

The results showed that the relationship between ICT and ISC, ISI, SI and CI are at 28.4%, 14.4%, 27.1% and 18.4% respectively. This indicated that ICT have a very weak relationship but positively significant to ISC, ISI, SI and CI. The reason for the weakness of this relationship may be due to the ICT practices used by Lebanese corporations that do not help to spread information quickly and accurately due to the old ineffective IT system. The Lebanese corporations under study lack the ISC and coverage of the overall process of information sharing. There have been various types of software currently in use that may affect information quality and pose an integration challenge. Therefore, it is suggested to design a single integrated unit instead of multiple platforms in such a way that it effectively meets its ISC operations. This will ensure a single source of validated information for warehouse level data and coordination between stakeholders will become easy. Lebanese corporations that adopt ICT as a relationship management mechanism can achieve higher internal and supplier integration. However, suppliers' use of coercive force can only contribute to supplier integration. This result shows that if Lebanese corporations want to improve SI, they can use ICT with high

reliability. However, if the focus is on internal integration, then they must build an atmosphere of mutual trust between the two parties. Moreover, internal integration mainly relates to the integration of employees and the flow of information and processes from different functions within the Lebanese corporations. Suppliers have limited influence on internal integration because their resources are not scarce and valuable to internal operations. As such, a higher level of trust is sufficient to motivate buyers to stick with the relationship. Not only does it need to share operational information with suppliers, but it also needs to coordinate operations, such as involving suppliers in the production and design stages. These investments are by nature extremely stuck in and cannot be shared by other supply chain partners. As such, the confidence in ICT is extremely important in motivating CI to join this partnership. On the other hand, SI cannot succeed without suppliers' contribution capacity and knowledge. From this perspective, supplier resources are vital to effective and efficient SI. These arguments may explain why a supplier's use of authority, which depends on their resources, is an important factor in SI (Alan et al., 2003; Aldosari et al., 2019; Christiaanse & Kumar, 2000; Escribá-Carda et al., 2017).

The relationship between HR and ISC and SI are at 67.5% and 64.9%. This result indicated that HR has a moderate relationship and positively significant to ISC and SI. This implies that Lebanese corporations with current competition and extended SC have increased the complexity of ISC. Significant barriers such as ICT also exist in ISC processes and pose great challenges for HR to keep their skills updated continuously. This implies that improving HR skills allows Lebanese corporations to better deal with ISC problems in a dynamic environment. Selective hiring enables Lebanese corporations to select HR based on their attitudes and desires to work in teams. As a result, the HR hired through this selection process are more likely to cooperate with others. This is in line with internal integration, which emphasizes cooperation across different functions. In addition, training programs aimed at improving the depth and breadth of HR skills empower HR with a wide range of knowledge to better understand the nature of ISC. In other words, HR from every department is trained to understand the importance of

cooperation and collaboration and start this initiative with fundamental ISC. Moreover, HR skills enabled them to assume their daily responsibilities and interact with cooperative groups. HR skills increased their decision making and adaptive capabilities. These capabilities are essential for ISC. In this way, traditional function boundaries may be broken and frequent communication and cooperation may occur, thereby improving ISC. According to the RBV, HR skills reflect their embedded Lebanese corporation's specific knowledge and competences. HR skills help Lebanese corporations maintain competitive advantage by facilitating ISC. Also, HR participation, including problem-solving groups and feedback systems affect ISC which demonstrated that groups served as a means of absorbing CI and SI variability. The effect of feedback systems on HR could execute changes to facilitate SC activities based on feedback systems. This requires Lebanese corporations in the transportation industry to increasingly cultivate human capital and rely heavily on their HR to understand and implement these practices that makes Lebanese corporations in the industry face fewer changes and require fewer HR (Christiaanse & Kumar, 2000; Nozari & Maryam Mjjdehi, 2016; Rodrigues et al., 2004; Swafford et al., 2008).

The results showed that the relationship between HR and ISI and CI is at 36% and 42.2%, thus rendering it weak. This implies that Lebanese corporation's data integrity in terms accuracy, timeliness delivery and completeness in ISI has often been cited as demanding utmost attention. The lack of a repository of historical information is a cited challenge in reporting of trends and making predictive analysis. Further, another key challenge facing the Lebanese corporations is constant ICT threats where the challenges exist in aligning operational activities to strategic directions in particular, assuring that ISI efforts of the Lebanese corporations are not treated in piece-meal approach, rather, receiving adequate budgetary support and skillful HR to implement identified key projects. ISI could be achieved by satisfying the level of compatibility between different system components where HR plays an integral role in compatibility integration. Lebanese corporations need of ICT for all elements of the corporations which constitute the internal logistical chain as well as SI and CI. ICT is necessary not only for inventory management, but

also for the development of SI and CI in order to facilitated the establishment of strategic targets in delivery performance. Moreover, HR related to the competitive priority of quality. CI should provide customers with high quality after sales services by providing replacement parts quickly and giving fast after sales services. In addition, quality warrant is achieved through the appropriate choice of transport and materials storage (Baron & Armstrong, 2007; Grönroos & Gummerus, 2014; Harland, 1997).

The results showed that the relationship between SF and ISC, ISI, SI and CI are at 58.5%, 58.3%, 61.1% and 62.8% respectively. This result indicated that SF has a moderate relationship and positively significant to ISC, ISI, SI and CI. This implies that Lebanese corporations have the ability to build and develop a new software that go beyond the ICT which help them to make there system more sufficient. This research recommends the Lebanese corporations that the development of complex SF is a challenging design activity not because of the complexity of technical problems, but because of social interaction when users and system developers learn to create, develop and express their ideas and visions. However, they need to take in their consideration that the design of complex SF is an intrinsic collaborative process in which the main source of complexity arises from the need to pool different perspectives on the problems to be solved. These perspectives arise from the many stakeholders involved in developing the system. The primary challenge for SF of the future is to provide support for mutual understanding between groups of people who see the world in radically different ways (Al-Mudimigh et al., 2001; Brehm & Markus, 2000; Green, 2001; Shub & Stonebraker, 2009; Stadtler & Kilger, 2008).

The relationship between NT and ISC, ISI, SI and CI are at 55.1%, 56.4%, 57.6% and 60.6% respectively. The results indicated that NT has a moderate relationship and positively significant to ISC, ISI, SI and CI. This implies that Lebanese corporations must continuously monitoring of NT for safeguard against attacks test ICT infrastructure and will affect the process of ISC. The log files of the users accessing the host containing information about their IP addresses, duration and time stamp must be recorded. The weak areas must

be identified through intrusion detection systems and the network security holes must be fixed before hackers find them. Also, Lebanese corporations need considered at the ISI services that have been used by NT because some of these services must be implemented such as password authentication, authorization and accounting. In the days of localized, centrally managed systems, passwords were considered sufficient to validate and authenticate users and this enhance the process of ISC (Campbell & Wilson, 1996; Delporte-Vermeiren et al., 2004; Guan & Wu, 2019; Tan & Le, 2019; Xie et al., 2019).

5.2 Conclusion

The presence of an corporations depends on the contribution of significant elements of ICT. ISC in a corporation have more importance than any other division because the corporations have direct and constant contact with the customers and suppliers they serve. Human resource behavior can ultimately improve or reduce the performance of the corporation. To meet or exceed what is required from them, service-oriented staff must adjust their work behaviors to address the unique nature of the needs they fulfil and must identify the vital role of ISC. Lebanese corporations must develop a suitable environment to lead ICT procedures to prompt ISC and enhance their performance. The results of this research indicate that the HR derived from ICT is a critical and fundamental variable that can be used by Lebanese corporations to facilitate and enhance the ISC and SI towards their corporation, which in turn will have a positive impact of ICT on ISC. Also, SF has important and significant impact on ISI and CI Regarding practical and managerial implications, the main findings suggest that Lebanese corporations will benefit if ICT are strengthened and become more reliable, as this may increase performance in the Lebanese corporations and consequently lead to a higher level of ISC.

5.3 Research Implication

5.3.1 Managerial and Practical Implications

The findings of this research also have significant managerial implications and insights that may allow Lebanese corporation to better manage and coordinate

ICT and ISC. First, scholars have acknowledged that it is critical for ISC practitioners to separate truth from hype and understand the importance of ISC and the elements required for its success. The research results contribute to the knowledge of HR, SF and NT by showing that ISC can be improved by leveraging ICT that is designed for an entire corporation. This means that ISC issues can be viewed from an ICT perspective and that HR should assume more responsibilities for the success of operational practices such as ISC. More importantly, the current fierce competitive marketplace determines that treating employees as commodities and managing supply chain relationships on a transactional basis cannot be sustained. A relational approach to ICT and ISC should be adopted both within and across corporation. The research finds that both ICT practices and ISC are designed based on relationships and identify an important strategic fit. This indicates that HR, SF and NT should develop strategies and actions together, as doing so offers a promising way to introduce unique competitive advantage to corporation. Second, the improvement of HR cannot be overemphasized in complex ISC. Barriers to and new technologies for ISC appear constantly in a changing environment. Extensive training programs should be arranged for employees to obtain new skills and remove the barriers to facilitate ISC. More importantly, a continuous-learning atmosphere should be established within a corporation during this process, as it would nurture the more flexible and quickly responsive employees who are necessary for complex ISC. Although motivation is also necessary, goal-based incentives cannot improve ISC. The main reason is that the implementation of ISC has not yet reached its highest stage, at which corporation align their own objectives with ISC. At the current stage, corporation are competing for “pies.” This also reflects the fact that there are significant gaps in the ISC implementation theories and practices. Although it is important for ISC practitioners to advance their understanding of ISC and implement ISC toward its highest stage, other incentive strategies should be enacted until they reach that stage. More importantly, for any incentive strategy to be effective, HR, SF and NT must work together and find the appropriate SC metrics to evaluate employee performance. Employee participation reflects that corporation place great emphasis on the value and development of employees. This is the essence of the relational approach, and it has been

proved to be a better way of extolling employee intelligence and enthusiasm. Third, the emergence of global marketplaces has posed great challenges for corporation to successfully manage globe-spanning SC. From this perspective, our study, which examines national differences, not only provides guidelines for companies in specific countries to manage their SC by leveraging specific ICT, but also offers suggestions for multinational corporation to manage their global SC by leveraging ICT in local countries. This should help them identify more effective ICT when promoting ISC in their industries.

5.3.2 Theocratical Implications

In response to a number of calls for more research on the ICT and ISC interface this research advances the literature in two ways. First, few studies have investigated the effect of a bundle of ICT on ISC. This research fills this gap by providing empirical evidence of the link between a set of ICTs that aim at improving ISC. Also, the results find that the ICT that are designed for Lebanese corporations could facilitate ISC. These ICT deliver information about the culture and atmosphere that ICT strategies intend to nurture and, more importantly, they represent the overall attributes that all HR share within a Lebanese corporation that can be leveraged to improve ISC. In this way, the results show that HR may play as important roles in enhancing the ISC, which deserve more attention in future research. In addition, the author claimed that both ICT and ISC are relationship-based strategies. From this perspective, this research explores the strategic fit between ICT and ISC, advancing the knowledge about the ICT and ISC interface. Second, this research finds that the improvement of different dimensions of ISC requires different forms of ICT support from HR, SF and NT. HR participation is most effective and improves one dimension of ISC which is SI. HR are less effective and enhance two dimensions of ISC (ISI and CI). SF and NT are having the most effective and improves of all dimensions of ISC which are ISI, SI and CI. In this way, the research results open the “black box” of the link between ICT and ISC. this research suggests that ICT may serve as an effective enabler for ISC, and that different ICT practices have different effects on the dimensions of ISC. This research adds to the ISC antecedents already identified by the literature and

offers novel perspectives from which to consider ISC issues. Third, this research tests the conceptual model in different corporations. This provides empirical evidence that there are national and industrial differences in the effects of ICT on ISC. This evidence enriches the literature and suggests new directions for future research.

5.4 Research Limitation and Future Study

Similar to any research, consideration should be given to certain limitations when interpreting the results. The findings of this research cannot be generalized because it was conducted in the distribution industry in Lebanon. Also, more research papers and journal articles could be researched or reviewed. The sample size is also a limitation. Though common method bias was tested, the study may still be vulnerable to bias since it's a survey research. Further researches can be done to replicate the conceptual model in other industries and locations. Larger sample size could be picked to test the variables used in this work. Scholars may undertake a study to discover other mediating factors between ICT and ISC. The findings of this research paper could encourage researchers and managers to conduct more research for addressing impact of ICT on ISC and its challenges. While some researchers have extolled the viability of the ISC concept as an effective competitive tool in the current global marketplace, others have offered words of caution. These researchers warn of practical limitations of the reality of SC and lament that the process of making complex SC networks work is not yet well understood. In terms of limitations, it is feasible that an extended literature review could have provided additional information. Similarly, additional interviews would have been preferable, yet given the level of expertise; and the access granted, we believe the current number of respondents is sufficient. There is a possibility of bias in the conventional method of answering all questions. Although we did not statistically find the problems of the method prevalent in this research, they cannot be excluded entirely. Also, this research is conducted using cross-sectional data. This data can only at a specific time, reveal the total impact that predictor variable has towards a particular criterion variable. Thus, a longitudinal study should be carried out instead, to provide more data which are useful from respondents.

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APPENDIX

QUESTIONNAIRE

Near East University

Faculty of Economics and Administrative Science

Department of International Business

Dear Responder,

This questionnaire aims to complete a study conducted by the researcher under the title, **The Impact of Information and Communication Technology on the Integration of Supply Chain on Lebanese Corporations in Beirut.** Please fill this questionnaire that designed to conduct the study. All data will be used for scientific research purposes and will be treated with strict confidentiality.

Thank you for your cooperation

Researcher

Please answer the questions by placing a (X) next to the answer that suits you.

1. Gender

Male ☐ Female ☐

2. Age

Less Than 25 ☐ From 25 - 29 ☐ From 30 - 34 ☐ From 35 - 39 ☐

From 40 - 44 ☐ From 45 - 49 ☐ More than 50s ☐

3. Educational level

Diploma and below ☐ Undergraduate ☐ Postgraduate or above ☐

4. Years of Experience

Less than 1 year ☐ From 1 - 4 years ☐ From 5 – 9 years ☐ From 10 - 14 years ☐

From 15 – 19 years ☐ From 20 – 24 years ☐ 25 or More years ☐

5. Position

General Manager ☐ Head of Department ☐

Head of Division ☐ Head of Unit ☐

Please answer the questions by placing an (X) next to the answer you think is appropriate for you.

#	Items	Strongly disagree 1	Disagree 2	Neither agree/ nor disagree 3	Agree 4	Strongly agree 5
	Information and Communications Technology					
	Human Resource					
6.	Corporations cooperate with training centers for the training of human resource					
7.	Information and communications technology have human capabilities with high intellectual resources and skills					
8.	Information and communications technology are working on the organizing their human resources					
9.	Information and communications technology cooperate with other department managers to choose the right strategy					
10.	Information and communications technology are working to raise the efficiency of human resource					
11.	Information and communications technology are interested to increase the effectiveness of human resource in the work					
12.	Human resource has the knowledge and means of data processing systems that used in information and communication technology					
13.	Human resource of information and communications technology work in a team spirit with programmers, operators and users					
14.	Human resource of information and communications technology has capacity for creativity and innovation improvements in existing systems					
15.	Human resource of information and communications technology has the knowledge of the nature of the relationship between the programs and equipment specifications					
16.	Human resource of information and communications technology has the capacity to reduce redundancy user sub-routines within the program					
17.	Human resource of information and communications technology has a thorough knowledge of programming languages					
18.	Human resource of information and communications technology has the ability to make good use of the means of programming					

19.	Human resource of information and communications technology has the ability to receive information and configured users appropriately					
	Software					
20.	Information technology and communications is working to develop its programs that used to keep pace with technological developments					
21.	Information technology and communications possess adequate investment for the software used					
22.	Information technology and communications has programs that are compatible with the equipment that used					
23.	Information technology and communications has programs that enable human resource to handle it easily					
24.	Information technology and communications has possessed software that capable of providing sufficient amount of information					
25.	Information technology and communications has software with the ability to adapt to the work of the corporation's performance					
	Networks					
26.	Corporation recognize that network determines its supply chain efficiency					
27.	Corporation design an optimal supply chain network to meet the long-term strategic objectives					
28.	There are integrated communication channels between the corporation, suppliers and customers					
29.	Corporation network provide the services in a timely manner and at the right place in the market					
30.	The cost of the goods provided by the corporation is less expensive than the competitors					
31.	The corporation has the ability to deliver orders to customers sooner than competitors					

#	Items	Strongly disagree 1	Disagree 2	Neither agree/ nor disagree 3	Agree 4	Strongly agree 5
	Integration of Supply Chain					
	Information System Integration					
32.	Our organization shares its business units' proprietary information with its trading partners					
33.	Our organization informs its trading partners in advance of changing needs					
34.	Our organization's trading partners share proprietary information with your organization					
35.	Our organization's trading partners keep your organization fully informed about issues that affect its business					
36.	Our organization's trading partners share business knowledge of core business processes with your organization					
37.	Our organization and its trading partners exchange information that helps establishment of business planning					
38.	Our organization and its trading partners keep each other informed about events or changes that may affect the other partners					
	Suppliers Integration					
39.	Our organization rely on few dependable suppliers					
40.	Our organization consider quality as number one criterion in selecting suppliers					
41.	Our organization strive to establish long term relationship with its suppliers					
42.	Our organization helps its suppliers to improve their product quality					
43.	Our organization has continuous improvement programs that include its key suppliers					
44.	Your organization include its key suppliers in its planning and goal setting activities					
45.	Your organization actively involves its key suppliers in new product development processes					
46.	Our organization regularly solve problems jointly with its suppliers					

#	Items	Strongly disagree 1	Disagree 2	Neither agree/ nor disagree 3	Agree 4	Strongly agree 5
	Customer Integration					
47.	Your organization shares a sense of fair play with its customers					
48.	Your organization frequently interacts with customers to set its reliability, responsiveness, and other standards					
49.	Your organization has frequent follow-up with its customers for quality/service feedback					
50.	Your organization frequently measures and evaluates customer satisfaction					
51.	Your organization frequently determine future customer expectations					
52.	Your organization periodically evaluates the importance of its relationship with its customers					
53.	Your organization frequently evaluates the formal and informal complaints of its customers					

PLAGIARISM REPORT

The Impact of Information and Communication Technology on The Integration of Supply Chain on Lebanese Corporations in Beirut

by Mostafa El-ghazi

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ETHICS COMMITTEE

YAKIN DOĞU ÜNİVERSİTESİ

BİLİMSEL ARAŞTIRMALAR ETİK KURULU

30.11.2020

Dear Mostafa El-Ghazi

Your application titled **"The Impact of Information and Communication Technology on the Integration of Supply Chain on Lebanese Corporations in Beirut"** with the application number YDÜ/SB/2020/836 has been evaluated by the Scientific Research Ethics Committee and granted approval. You can start your research on the condition that you will abide by the information provided in your application form.

Assoc. Prof. Dr. Direnç Kanol

Rapporteur of the Scientific Research Ethics Committee

Direnc Kanol

Note: If you need to provide an official letter to an institution with the signature of the Head of NEU Scientific Research Ethics Committee, please apply to the secretariat of the ethics committee by showing this document.