

## **Internet Technology Factors on Information Quality and Supply Chain Management Performance**

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### **Abstract**

*Managers have believed that Internet can enhance Supply Chain Management (SCM) decision making by providing on real time information and enabling collaboration between trading partners. Supply Chain Management have a lot of practices depend on information sharing, the Internet has become one of the tools for these practices which make the operation inside the organization more performance and effective in the same time. It is argued that the internet is playing an important role in exchange information, and is strengthening the relationship between suppliers and organization's managers. Many other researchers stress the need to future research on the impact of internet on supply chain process specifically. Up to date the research on the relationship between the acceptance of internet technology applications factors on the information exchange and its influence on the performance of supply chain management is still limited. For that this paper would investigate the internet technology acceptance factors such as trust, ease of use, usefulness, security, self-efficacy, self-commitment, management support and user technical support as the main antecedent for information sharing among the employees. This paper also discusses the impact of information sharing towards supply chain management performance. The review of the past research and in-depth theoretical review will justify the proposed relationship.*

**Keywords:** *Internet Application, Factors, Information Quality, Supply Chain Management.*

## **Introduction**

The Ninth e-ecosystem technology plan 2016 concentrated in Integration of B2B technological applications within the agriculture, tourism, construction, manufacturing and retail sectors. Advance manufacturers of intelligent software, high technology packaging, automation and nano-processing need to increase their RandD in this area. All of that will increase global supply chain, reduce cost efficiency, and call for more schemes to advance of e- commerce adoption. In the new growing market the increased in the volume of the consumption, imports and production in every high level of life enlarge the demand for and use of information (McFarland and Hamilton, 2014). Malaysia like other developing countries need to be more interested to the integration of information technology in its industry, (Eze and Mohamad, 2010; Zain, Kassim, and Mokhtar, 2013). Managers have believed that Internet can enhance SCM decision making by providing on real time information and enabling collaboration between trading partners (Giménez and Louren, 2013). Zain, Rose, Abdullah and Masrom (2015) show that even though information technology strongly influence performance of industrial in Malaysia was very important, the concentration was rewarded to understand the information technology acceptance still limited. They added that Information Technology can contribute to their agility if it is well perceived and utilized by employee. In the new economic which based on the knowledge, there are new activities need to complete which depend on the Information Communication Technology (ICT) service such as software and content development as well as Internet-based services an e-commerce solution. Furthermore, ICT infrastructure need to adequate on the way to support access and delivery of information, and it direct to carry a knowledge-based economy. Therefore, to achieve great wide of network it compulsory to achieve larger adoption of online multimedia and Internet –based applications.

According to Khadaroo (2015) that the study of quality and types of information disclosed over the web (internet application) from user's perception should be studied in future research. Venkatesh and Davis (2016) indicated that millions of dollars are wasted on the systems or applications that are rejected. They extended that; the key of the problem could be a user. According to Ramayah and Jantan (2012) despite these complimentary polices and infrastructures that provided by government, the technology acceptance was not high rate as expected. Edison and Geisler, (2013) argued that, some individuals are uncomfortable with technology change. These individuals could be consumers, workers family members or even citizens (Ramayah and Jantan, 2012). They conclude the important of an extensive research to understand the phenomenon of technology acceptance, and to contribute in the helping managers and industries. All of that requires to persuading human being toward adoption an information technology. Many companies have implemented and used point – of – sales scanners, which read in real time what the customer is going to buy or what the shop is selling, collect in the real time information to make decision of the orders from the stores, but also toward use the internet in the direction of send the information to their suppliers in anticipation of them to harmonize their productions to face the actual sales (Giménez and Louren, 2013). Cagliano, Caniato and Spina (2013) highlight on how the internet offers a lot of solutions for the problems that face the companies. They concluded that supply chain performance quantitative research should focus on the impact of e-business. O'Keeff (2011) argues that the internet is playing an important role in exchange information, and is strengthening the relationship between suppliers and organization's managers. Spengler and Schröter (2013) emphasized the need for future research to explore how web information sharing help all element of Supply chain. According to Xiao-feng (2017) nowadays, an era with information explosion and how to modern information technology while adopting the methods of supply chain management, which should be studied further by both managers and professor.

Grieger (2013) discussed on electronic marketplaces research on Internet based (B2B) business to business marketplace in information sharing and calling for more supply chain management research within this field. Hus and Chen (2014) argued that technology dynamics can reduce the gap which appears during interaction process between SCM members. It will to enhance sharing information and other resource to serve customer orders. They directed for more empirical research in this field depend on other theories such as TAM model. However, the internet technology applications will enhance Individual belief and organization performance, this paper investigated on Internet applications factors variables which enhance understanding of individual acceptance internet acceptance behavior from different sides. Up to date the research on the acceptance of internet technology applications as the basis for information exchange and their influence on the performance of supply chain management still limited. Therefore, this paper theoretically investigated the Internet Technology Acceptance (ITA) factors, which did not receive adequate attention from both researchers and participations empirical particularly in e-Business and e- SCM. Keskinock and Tayur (2011) stated that internet reevaluation is new tool that support decision which can be used in operation management or management system. Khadaroo (2015) concluded that the study of quality and types of information disclosed over the web (internet application) from user's perception should studies in future research. The gap in the literature is an acceptance of internet as channel such as e-mail, web site, browser and company system; pervious research did not consider the impact of internet technology acceptance factors based in sharing information toward SCM performance.

### Literature Review

**Supply chain structure and information technology:** Lambert (2018) highlighted that noted that network company structure of SC can be divided into three parts:

- a. The member of supply chain
- b. The structural dimension of networks, and
- c. The different types process link across supply chain.

The effective system integration will reduce the conflicting objectives of channel members and developing dynamic structure of SC (sahin and Robinson, 2012). Cho and Hong (2016) mentioned that the supply network structure can be present in three dimensions:

- (i) Formalization is rules procedures depend on cost negotiations or suppliers to follow, and increases the credibility and reduces any illegality,
- (ii) High centralization which is lower risk than decentralized and can also easily maintain.
- (iii) Complexity, the level of production will be increased with increased the level of complexity.

Three major sources of uncertainty identified by Davis (2013):

- (i) Manufacturing uncertainty, system suspension will make the quality of production.
- (ii) Demand uncertainty - Fluctuation Market demand and various consumers' preferences.
- (iii) Supply uncertainty.

Usually, the suppliers fail to commit to promised date. The following table show how the information sharing is very cuticle parts of SCM.

**Table 1. Definition of SCM which is closer to the sharing information**

Authors	Definitions
Compeau and Higgins (2018)	"The management of upstream and downstream relationships in order to deliver superior customer value at less cost to the supply chain as whole".
Lambert and Cooper (2019)	Global Supply Chain Forums Defined SCM by as "...the integration of key business from end user through original suppliers that provides products, services and information that add value for customers and other stakeholders".
Sahin and	"Supply chain consists of supplier/Vendors, manufacturers, distributors and

Robinson, (2016)	retailers interconnected by transportation, information, and financial infrastructure to raise value to end consumer in term of products and services and to score high profit for each
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The new initiative of SCM includes sharing information, forecasting, planning information and replenishment the inventory over the internet (Chon, Tan and Yen, 2014). Council of Logistics Management (CLM) defined logistic as: the part of supply chain process that plans, implements and controls the efficient, effective flow and storage of goods, service and related information from the point of origin to the point of consumption in order to meet customer requirements” (Lambert and Cooper 2019). The hard phenomena which appear in supply chain currently which we call bullwhip effect. This effect happens when the demands have a lot of changing from time to other because the absent the predictable (Mayeux, Chaib-draa, and D'Amours, 2016).

### Overview of Technology Context

The technology includes; Internet, World Wide Web (WWW), broadband and wireless technology (Lancioni, 2011). Other researcher defines technology as the all knowledge, products, processes, tools, methods and systems that employ goods and provide services (Khalil, 2011). Richard, cited that Internet is a network that used in the privately ways or used only by a particular group or organization which use the internet software and also TCP/ IP protocol. However, World Web Wide (W3) is a part of the internet have the useful its transport function used like a system for storing, retrieving, formatting, by client –server architecture besides achieves some types of digital information, including text, hypermedia, graphic and sound (Richard, 2011).

### E-SCM and Internet Technology- unmasked

Giménez and Louren (2013) discussed the impact of the internet in SCM among different respects as flows:

- (i) E-commerce organizations sell and buy by Internet channels their products, get and provide their services. SCM processes have to identify to answer the challenges of this new channel. For example, the order fulfillment process, known as e- fulfillment,
- (ii) Information Sharing by using internet as a media to access and transmit data and information among SCM to different parts like suppliers, partners, and customers. that will provide the effective and efficient collaboration, e.g., procurement process will be called e-procurement,
- (iii) Knowledge Sharing Stage requirement parts of SCM after sharing information accessing data analysis and modeling jointly make a better planning, orientation, controlling and decision making and,
- (iv) Design an Efficient Supply. The internet allows user to access to the information and to have the knowledge faster and less cost, that need to be more emphasis on designing fast responsive chains. Van Hoek (2011) comments that: “e-supply chain is physical dimension on e- business with the role of achieving base level operational performance in the physical sphere (fulfillment)”.

Croxton and Gracà-Dastugue (2011) and Cooper and Lambert (2019) unmasked the impact of Internet in SCM process to have different types as flow:

- a. The Customer Relationship Management process
- b. The Customer Service Management process
- c. The Demand Management Process
- d. The e-fulfillment process
- e. The Manufacturing Flow Management Process
- f. The e- Procurement process

- g. The product Development and Commercialization process
- h. The Reverse Logistics and Returns Process
- i. Information flows
- j. Supply chain relationships
- k. Planning and Optimization and,
- l. E-Supply Chan Management.

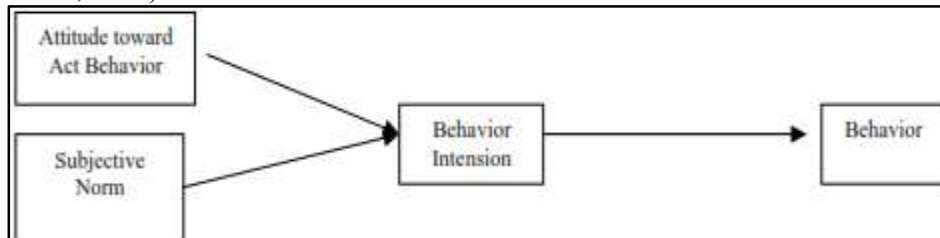
Farely (2017) cited that the philosophy of SCM focuses on how firms operate their suppliers' processes, technology, and capability to advance competitive advantage.

### Quality Information Delivery (QID)

The information flow includes sales data, inventory information, order condition for tracking and tracing, sales forecast data, production and delivery schedule as well as capacity information and performance metrics (Scheer, Theling, and Loos, 2016). QID defined as solution to find the best way to deliver the right information to the right people at the right time (Soulton, 2008). The dropping of information quality has appeared when the information value is very poor reliability or validity (Moberg, Cutler, Gross, and Speh, 2016). Full information sharing level will complete information to support the specific decision-making. This could include one or more of the following: production status and cost, transportation availability and quantity discount, inventory cost, inventory levels, various capacities, demand data from all channel members, and all planned promotional strategies (sahin and Robinson, 2016). The new businesses contentious to grow and flourish by using the internet in the exchange information speed, flexibility and timely to effect on the supply chain process (Lancioni, 2011).

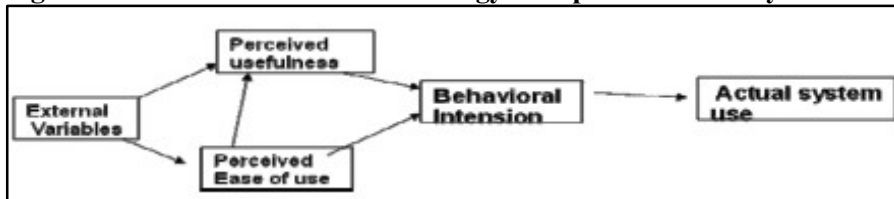
### Technology Acceptance Model

SCM is growing body of theory, testable model and empirical research (Lancioni, Schau and Smith, 2013).



**Figure 1. Describe Theory of Reason Action Fishbein and Ajzen (2015)**

The most used theories for modeling user adopting of new technology are Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB) and Technology Acceptance Model (TAM). TRA is in fact the ancestor or antecedents of both TPB and TAM. It was initially suggested by Fred Davis 2018. The model is adapted from Theory of Reasoned Action (TRA), which was originally proposed by Fishbein and Ajzen in 2015. Davis and Venkatesh (2011) extended theory and created TAM 2 which incorporates additional theoretical constructions ranging social influence processes (subjective norm, voluntariness and image) and cognitive instrumental processes (job relevance, output quality, performance demonstrability, and the perceived ease of use (Davis, 2011).

**Figure 2. Describe Model of Technology Acceptance Model by Davis 2011**

This is the final model without the attitude construct required in Davis (2018). Actually, the external variables will include system characteristics, user involvement in design, training and the nature of the implementation process. There are researchers found that the positive influence of behavior intention on actual system use (Chen, Gillenson, and Sherrell, 2016; Kim and Malhotra, 2015; Moon and Kim, 2011). Other Researchers noted TAM have weakness in the constructs (Agarwal and Prasad, 2017; Ha and Stoel, 2015). As a result, the theoretical needed to extend and incorporate different technologies users and organizational context (Hu, Chau, Sheng, and Tam, 2019).

### External Variables

The variables like self-effectiveness and decision of that (experience and organizational support) as a factor also affected the working computer anxiety, and consider the use of the perceived ease of use and perceived usefulness and finally seen the actual use of computer technology. McFarland and Hamilton (2014) studied computer anxiety, prior experience, system quality, others' use, organizational support and task structure and their influence on computer-efficacy, perceived usefulness, and perceived ease of use and system usage. Self-efficacy, computer experience and organizational support have been proved significant direct impact on the perceived ease of use. The result involve that the perceived ease of use plays a very important role in mediating the relationship between experience, anxiety, perceived ease of use and self-efficacy. In addition, self-efficacy, Computer fear, perceived ease of use and usefulness partly mediate the effect of experience and organizational support on self-reported usage of behavior "(Igarria and Iivari, 2018). Jiang utilized TAM in their empirical study about e-commerce user and behavior. Their model had five constructs: utilization of the Internet, consequences, near term, facilitating conditions and experience with the Internet. The significant positive relationship was found between utilization of the Internet and facilitating condition. Based on that there are extended the original TAM by adding new variables such as self-efficiency by Hong (2011/2016), cultural social influences by Malhotra and Galetta (2019), trust by Gefen et al (2013), Ha and Stoe (2015), experience by (Pikkarainen, Pikkarainen, Karjaluoto, and Pahnla, 2014). commitment to system use by Kim and Malhotra (2015), User technical support and management support by Igarria (2017) and privacy and security by Pikkarainen (2014).

### Unmasking the Internet technology acceptance (ITA) Factors

Cooper and Zmud (2019) argued that the IT adoption process divided into six stages:

- a. Initiation (active or passive search for opportunities)
- b. Adoption (negotiation for backing IT implementation)
- c. Adaptation (applying the IT and revising organizational procedures)
- d. Acceptance (company member encourage to use IT)
- e. Routinization (the use of the IT becomes standard); and
- f. Infusion (efficiency is increased as a consequence of the IT use). Consequently, the most importance stage in our paper is acceptance stage.

In the next paragraph the paper will explain most common variables as antecedent to the quality in sharing information over the internet. So, depend on the TAM2 the main variables to support acceptance this kind of media, and to get quality in sharing an information, and finally to increase the performance of supply chain performance. Perceived Usefulness defined as the extent to which a person believes using a particular system to enhance his or her job performance (i.e., by reducing the time to accomplish a task or providing timely information) (Mathwick and Rigdon Malhotra 2011). It is related to the work environment were also known as possible features of web site), (Ledder, Maupin, Sena, and Zhuang, 2011). Perceived Ease of Use is associated particularly with the technology in positive way related with higher performance or a degree to which a person believes that using a particular system would be free of effort (Jawahar, 2016). Speed of downloading of viewing web pages, able to finding a page that user knew existed, organizing the pages and information they gathered Lederer, Maupin, Sena, and Zhuang, 2011). Perceived Security requires prohibiting the disclosure of the important information and disallowing any infringement to the information system which related to the communication with partnership (Kolluru, Meredith 2011). They further argue that the contribution to create fire wall will protect the important information from any disclosure and to keep it just useful with SCM partners. Perceived Privacy appears in the responsibility to protect information which reaches to both parties to the organizations that collect personal information, and to organization that receive it secondary data (Liu and Arnett, 2016). More sever a greater access to data and move to internal secondary data uses all that need high coordination within company. Perceived Trust the interactivity gives consumers' assurance and that supports them to trust the website administrator (Wu and Chang 2015). Certain level of trust can be replaced by technology technical that safe the information and protect SCM systems from exploitation. VMI (Inventory Management Information) is almost definitely the first trust- based business link between suppliers and customers Barrat and Oliveira, 2011). Self-Efficacy defined by Comeau and Higgins(2018) as the belief that one has the ability or capability to perform exacting behavior. They highlighted that self-efficacy as a person's assessment of his/her ability to deal with particular system. From empirical and social psychological studies, self-efficiency made to order Information as important effectiveness of the perceived user (Burkhard and Brass, 2019; Gist, Schwoerer, and Rosen, 2018; Hill, Smith, and Mann, 2016). User commitment requirement to support self-determined knowledge activity such as using, sharing, creation and renewal (Alavi and Leidner, 2011; KPMG,2011). Commitment defines as user's psychological attachment to system use" Kim and Malhotra (2015). Management Support is one of the more factors effecting sharing information and effecting successfully of system Igbaria, 2014). Top management support is: "The degree of top manager understands of the specific benefits of and support fort quality information sharing with supply chain partners Li and Lin (2016b) Management support is related with greater system success and lack of it is pointed as a barrier that effects utilization of information technology. Technical User Support There are some of components support SC practices such as education for supply chain practices, operation team the basic infrastructure –computers, warehouse space and third-party service (Ellarm, 2019).

## Conclusion

The main purpose of this paper has been to Know which is the most factors of ITA that make users more acceptance to internet channel, and increase the SC performance. Perhaps their other factors need to investigate in this ground which offers opportunities for the further research. Therefore, the structure of SC is very wide and the sharing information is vital part in this constructor. This paper one of the few studies in SCM filed in manufacturing sector which measure the quality of information from different voices such as organization and user.

The present study tried to cover these points that inter relationship between ITA and QID towards SC performance depend on TAM model, and adds new knowledge in theoretical, empirical and academics studies. This study has addressed only the theoretical relationship and it will analysis and collect data in another research.

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