International Journal of Social, Political and Economic Research

IJOSPER

ISSN: 2667-8810 (Online)

ijosper.uk

OPEN ACCESS

Original Article

Article No: 20_V7_I1_A2

doi.org/10.5281/zenodo.3698218

Industry 4.0 and its Impact on Procurement in Supply Chain

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Key Words:

Industry 4.0, E-Procurement, Digital Procurement, Supply Chain Management, Internet of Things, Performance Management.

Abstract:

The forming of competitive innovation in the developed world that creates a new market and vanishes the obsolete ways of doing work to enhance productivity and ultimately established a market-leading firms, products & alliances that digitization is now known as industry 4.0. Yet this term is still unaware by many of the organizations & its impact on production & performance of the supply chain is still vague. More prominently this research paper addresses more prominently the effect of digitization on procurement and supply chain performance within Pakistan. In order to examine the phenomenon a qualitative research has been conduct. This has been examined that industry 4.0 has put a rigid impact & brought procurement & supply chain to the next level of maturity. This paper gives a brief contribution to understanding the digitization & supply chain.

1. Introduction

In the developed countries no doubt the digital technology impacting the life of individuals & changing the way of doing business within the organizations. But an effect is still unclear (Kane, Palmer, & Philips, 2015). German explored and came forward to define the digitization in technologies & their impact on industrial production known as" industry 4.0" (BMBF, 2015). The fourth industrial revolution, is a newly grown stair of organization and management of whole supply chains over the life cycle of products."

The dynamic customer behavior and needs on one side and on the other side developing global competition are driver of so-called internet of things or fourth revolution. Sometimes it is used interchangeably with key words like bug data, artificial intelligence etc. Lately associations are looked with an extreme change in light of the fact that the worldwide interconnectivity and trade of information and data continuously empower associations to make new plans of action and ideas inside their zone of activity from one viewpoint, and then again, an expanding rivalry, additionally getting from new market sections, power associations to build their capability of advancement to keep up aggressiveness inside the new made plans of action and ideas. This dynamic and vastly changing business discipline which is known as digitization is on the top priority of administration level and motivation of associations, inquire about foundations, legislative issues, just as not-for-profit associations.

In 1970s it was industrial innovation 3.0 which was era of machine and this fourth revolution is era of digitalization. As mentioned, it is baby in the womb of mother and yet to born so it has a lot to talk about and a lot to discuss about. Because of the quick procedure, expected to express modern cycle time short and required associations & partners for development & store network methodologies on another of accomplish upper hands. One authoritative capacity and production network movement which assumes a huge job for "computerized of acquirement it is focal point of this examination. Doorman (1998) has distinguished of affirmative exercises of respect of essential exercises, found to the degree of capacity, control action of acquisition can change an increasingly basic and key inside the zone production network the executives and to help hierarchical productivity, adequacy, and benefit inside a long-haul viewpoint.

2. Literature Review

2.1 Supply Chain Management and Industry 4.0

Raz (2008) drew attention to organizational exercises inside the previous years to beat the forthcoming difficulties by outwitting inner systems and methodology. Regardless,

associations must execute and live inventory network the board to grow their elements on one hand just as to build their production network surplus then again. In this setting Sengupta (2013) and (Deloitte, 2014) ensnare “Man-made reasoning", "Large Information", furthermore, "Digitization" definitive action of field. (Cook, Heiser, & Sengupta, 2011)2

Moreover, Wu et al. (2015) covering the investigation for keen coordination’s organize and the odds of innovative advancements to cut the large expenses and boost effectiveness. In addition to it, Wu et al. (2015) control their assessment topic towards of sharp generation of SCM by featuring by real perspective by looking at a few assets and viewpoints secured inside the perplexing field of research. According to (Ross, 2010) the upcoming years will be governed by technology-based drivers.

In the first place, the robotization of strategies will be driven by "Electronic thinking" and "Huge Data" as included by (Bienhaus & Haddud, 2018) Instrumented is alluded to exchange forms that is destined to be completely mechanized & overseen , worldwide situating frameworks, and so forth., to expand comprehensibility, lessen dangers and costs, and defeat multifaceted outcomes. (IBM, 2009) generally supporting the need for sensor developments of hardware just like programming then again to assemble, control, or go for masses of accessible information.

Second, interconnected is bridged to web advances and past the immediate joint effort of inventory network by including constant market improvement, e.g., to incorporate client input from internet-based life exercises and offer, screen, and oversee follow-up exercises and choices progressively. Idea of interlinking assist by Kumar (2016) which plot adjustment Supply of structure plan considering the effect for headways. "Huge Data", "Thing of Web", and so on open doors for associations for making collaborations due to the blend of "typical" creation and "client explicit" generation.

Third, Ingenious identified with recreations of inventory network occasions and upheld by technologies it is conceivable to make different situations ahead of time. Hence, in future progressive and successful Supply chain network will alternatively assess take out dangers prior to they happen (IBM, 2009).

Okada et al. (2015) bolster the technique of diversion and model of supply chain with the upside likelihood for format distinctive possible imminent circumstances impact operational towards level (for example generation, distribution center, and so on.) just as towards the vital level (for example store network arrange, venture the executives, and so on.).

These three advancement-based drivers of things to come store network are legitimately connected to or rather support by the point of Industry 4.0 to change supply chains to totally coordinated environments with full straightforward interfaces.

2.2 Procurement in Industry 4.0

Philippart et al. (2005) assert that major significant of e- source is that it initiates the conventional process of communication; for instance, it has a system that collects all information and function as mean of communication between customer and seller. In addition, Schmock et al. (2007) emphasizes that digital solution gathers data on advanced Platform the data can be seen, mutual and prepared by massive number of people. Thus, the information cannot be monopolized, as customers have equal share in the procedure.

Giunipero and Brand (1996) highlighted the evolving role of procurement in domain of supply chain and procurement. Plainly, supply chain suffice management by serving organizational broader need. In other words, it connects buyers and retailers from central organization. On the other hand, procurement fills the bigger space of organizations by giving direct access to customers and retailers.

2.3 Procurement as Critical Factor in Industry 4.0

Geissbauer et al. (2016) feature the real best craft of the fellowship obtainment and securing just as sorting out the future structure involve on troubles and necessities. Categories the ongoing technologies and condense them under the well-known term of Industry 4.0. The writer focused on the advanced impact and potential outcomes of acquirement in the field of Supply and odds development in up and coming years.

3. Research Methodology

(Saunders, Lewis, & Thornhill, 2012) have defined research as a process from which individuals try to learn things in a systemic way in order to increase their knowledge. They further elaborated that it is a systematic investigation that gathers and analyses of information and contributes to generalized knowledge. However, in literature, research is a different form than other forms of discovering knowledge because, it uses a systematic process called the scientific method. Moreover, the object of research is answering the research questions and connecting the research objectives with using scientific methods.

3.1 Research objective

The objective of this research is to compare the production methods in revolution of mass production and revolution of digital technology most commonly renowned as industry 4.0.

3.2 Research questions

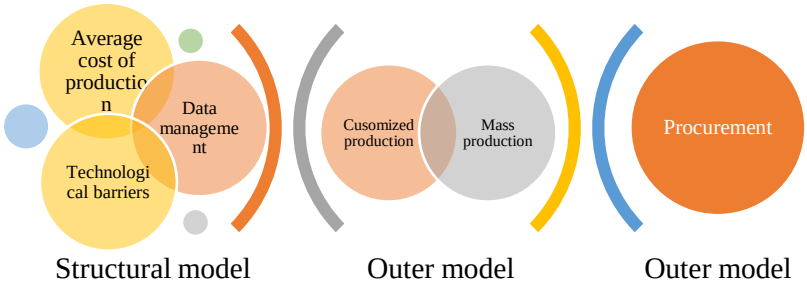
1. How procurement has or will be changed over the phase of revolution in industry?
2. What will procurement look like in the era of industrial revolution 4.0?
3. What are the hindrances in realization of digitalization in procurement?

3.3 Research Model

Two models will be used outer model and structural model.

1. Outer model
2. Structural model

Outer model will be concerned with direct variables and structural model will be concerned with latent variables. Latent variables are those variables which causes changes in dependent variable by the influence of independent variable.



Source: Self-created model for research

3.4 Direct variables

Direct variable in this model is the variable which have direct impact of change there are two type of direct variables

- Independent variable
- Dependent variable

Industry 4.0 is independent variable in this study whereas procurement is dependent variable.

3.5 Latent Variables

These are the variables which are hidden. In other words, these variables are the conjunction between independent and dependent variable. In this study following are the latent variables

- Average cost of production
- Technological barriers
- Data management

3.6 Quantitative and Qualitative Research

The literature divides research choice into quantitative, qualitative or mixed methods (Saunders, Lewis, & Thornhill, Research methods for business students, 2012).

In addition, business and management research methods utilizes both quantitative and qualitative research to investigate social phenomenon. Using method is situational in nature that is whichever suits the situation. Data collection techniques also varies depending on number of techniques utilized by a researcher. A mono method is utilization of one method, di is for two and multi for more than two. Quantitative methods are used as an alternative for any data collection technique such as questionnaire or data analysis procedures like graphs or statistics. In addition, quantitative method is predominantly used to describe factors as sample size, types of data to be collected and sampling (Saunders et al., 2009). On the other hand, qualitative methods are used predominantly for any data collection technique such as interview or data analysis procedure such as categorizing data that generates non-numerical data like pictures or video clips (Saunders et. al. 2009). Furthermore, (Bryman, 2008) points out that a qualitative study follows a predetermined set of steps in which a researcher creates general questions, selects relevant locations and people, and collects and interprets the data for the study. I have utilized the qualitative approach of research in this study and tool of data collection is focus interview. Three interviewees are selected on base of criteria of industry related experience and academic related.

3.7 Data Collection

On the base of sources data can be divided into two types, primary and secondary. These are primary data and secondary data. According to (Saunders, Lewis, & Thornhill, Research methods for business students, 2009) primary data means original data that has been collected for the specific purpose, firsthand and from the original source. Surveys, experimentation, observations and type of data that are not subjected to any manipulation is also called primary data. On the contrary, secondary data is the data that has collected with another objective and

analyzed by someone else with another objective. Secondary data includes, published or unpublished data, books, newspaper etc. When the research projects require international comparison, Saunders et al. (2009) suggests using secondary data since they provide a main source to answer the research question(s) and to address the research objectives. Interviewing is the most common form of data collection in qualitative research.

4. Results and Discussion

This chapter determines the findings of the research by analyzing the interviews in association with the industry 4.0 and procurement: A comparative study of traditional procurement and procurement in industry 4.0. These interviews were conducted with reference to achieve the objectives of the research. Preceding section aims at answering research questions of this research which are as under:

1. How procurement has or will be changed over the phase of revolution in industry?
2. What will procurement look like in the era of industrial revolution 4.0?
3. What are the hindrances in realization of digitalization in procurement?

4.1 Demographics of Respondents

The first interviewee is a Professor in German university. Professor requested to keep his name and name of institute confidential due to German data privacy law knowns as (DATUMSCHUTZ). But he did not deny the right to mention his expertise. He is a PHD doctor with over 20 years of teaching experience. In addition to this, he is rector of the university and consultant for many firms in Germany. He is among the pioneer of industry 4.0 piolet in various automobile companies. His interview was conducted with the help of a friend studying in Germany.

The second interviewee is a manager of research in private hospital named Agha khan hospital. Mr. Umer is 30 years old young professional with vast experience in field of supply chain research. He is young and talented with high ambition toward future trends in supply chain research. These factors made him an ideal candidate for me to pursue my research and get benefited from his talent and ambitions.

Third and last interviewee is Mr. Zohaib Farooqi. He is 32 years old manager SAP and ERP in renowned company with experience of over seven years. Mr. Farooqi keeps a close eye on supply chain research, and he was a good addition to this research.

4.2 Results and Analysis

Three interviewees were selected, and seven questions were asked from those interviewees in anticipation of exploring research questions. The results are drawn by analyzing all statement and opinions of these interviewees.

Suppliers and business relationships are important because of following reason

- Process optimization
- Process improvement
- Continuous flow of key parts
- Continuation of flow chain

However, failing to maintain relationship with supplier may result into,

- Process failure
- Increased costs
- Discontinuous supplies
- Losing credibility in market and eventually extinction of business

Supplier involvement can be a tricky decision on one hand it can be helpful because information sharing can lead toward better coordination and processes as a whole improvement on the other hand it can come with downside of supplier stealing confidential information and becoming a competitor. They (Principals) are integral part as we represent them in our country. They are completely engaging in our process from marketing to after sales services.

Industry 4.0 is future of this world. In coming decades every thig would be digitalized. Jobs would be entirely changed, its era of artificial intelligence, its era of smart factories, its era of robotics. Future is all about industry 4.0 everything is going to be revolutionized like with the invention of machine. The Industry 4.0 market is forecasted to reach $1 trillion by 2030, dominated by global technology giants including Alphabet-Google, HP, Samsung, IBM, NEC, Microsoft, and more. According to the new 4-volume report by HSRC: Global Industry 4.0 Market & Technologies 2018-2023, the Industry 4.0 market will reach $214B by 2023." It is common misconseption that industry 4.0 fruits only big technological gaints however, this is not true industry 4.0’s fruits are widelyspread for both big and small companies. Agha khan is currently not working on industry 4.0. Life would be entirely revolutionized by this. All the

big data, internet of things artificial intelligence and these fruits of industry 4.0 is going to make life easy. As far as second part of your question is concerned there would be technical barriers obviously such as;

- Managing big data
- Maintenance in industry 4.0
- Expert systems
- System bugs
- Data privacy and many more

But having said that with industry 4.0 process would be more efficient, set up cost might be high but then it will make production very efficient and cost effective in terms of average cost and profit margins will be increased.

Industry 4.0 is gaining importance because of benefits it is going to give which are under as follow;

- Flexible
- Dynamic in coping up with market challenges
- Customization
- Innovative
- Sustainable

Often called the Fourth Industrial Revolution, technologies Industry 4.0 enable businesses to creation of smart factories that are more efficient, more productive, more flexible and more responsive to the customers. But, many manufacturers balk at the imaginary costs and complexity of introducing them in their factories. Also, the disinformation campaign by people who are afraid that robots will replace humans has made many workers hostile to them. However, set up cost and technical barriers might be high, but the process would be optimized due to,

- Efficient production method
- Resource efficient
- Lean production
- Low waste
- Efficient labor

Traditional factories lose a lot of money on returned substandard products. Using Industry 4.0 can reduce or eliminate those costs. Real-time monitoring and quality control allow data to be collected from every point of production. This helps determine and control the conditions that affect the quality of products while production is in process, for example, determining the optimum temperature and pressure levels ensures the best quality and helps eliminate waste. This can help reduce or eliminate defective or substandard products, which means fewer products are returned for failing to meet specifications. Unique products are not made on large scale else they are going to lose uniqueness.

5. Conclusion

On the base of responses of interviewees, it can be concluded that traditional methods are heading toward saturation and soon a new revolution is going to revise this world. This era would be era f digitalization, this era would lead to unique manufacturing process which will result into unique procurement methods. Companies like Volkswagen have already implemented. Now every car is unique like every person is. Customization is future of this world though technical barriers are huge. Countries like Pakistan which belongs to third world countries are way behind this and Germany and other western world countries are heading toward new world faster than others. However, this is like baby in womb of a mother and it needs a lot of research and work to explore more possibilities which again encourages the researchers to do research in this new world order.

Acknowledgment

I would like to thank my professor Dr. Muhammad Asim for providing me his supervision throughout this research paper. I would also like to thank folks and educator who gave me constant help and supervision. It would be unjust of me if I forget my interviewees who provided me with the time to respond to my inquiries.

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Interview Questions

1. Suppliers are the key part of supply chain of any company, according to you how much a supplier is involved in procurement process?
2. These days there is a lot of hype of digital revolution which in common words is known as industry 4.0, does your company has any process based on industry 4.0?
3. Is your company working on any process based on industry 4.0?
4. What you think is industry 4.0 going to make life easier? By this I mean to ask that will process be efficient or there are too many hindrances?
5. Do you believe that industry 4.0 can produce cost efficient products?
6. Can industry 4.0 which is era of customization can help producing at large scale?
7. Can you please elaborate your current procurement process?