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Understanding the Impact of Digitalization on Buyer Supplier Relationship: A Qualitative Approach

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ABSTRACT

This study analyses the impact of digitalization on the Buyer Supplier relationship (BSR) in the context of Industry 4.0. An empirical qualitative research methodology was employed, with semi-structured interviews conducted with 23 procurement specialists from service sector organizations in India to obtain empirical data. A qualitative content analysis was then conducted to arrive at common patterns and ideas. The study found that procurement specialists perceive that digitalization has an overall positive impact on buyer supplier relationship. However, it is important to exercise diligence during the implementation of any digital tools to restrict dissatisfaction, and human touch is essential in certain areas like negotiation and conflict management. Additionally, data analysis can provide strategic advantages, but the quality of input data must be considered. The study highlights the positive and negative impacts of digitalization on BSR and provides implications for research and corporate practice. It is recommended that future studies should qualify the results by analyzing the BSR in relation to supplier type, as well as by considering other digital technologies such as Machine learning and Artificial intelligence.

Keywords: big data analytics, buyer-supplier relationship (BSR), cloud technologies, industry 4.0, robotic process automation, supply chain management (SCM)

1. INTRODUCTION

Industry 4.0 has started to show its impact on every company that are interconnected in the value chains networks, making it imperative for companies to adopt and prioritize adoption of the digital technologies (Bienhaus and Haddud, 2018). The study of impact of digital tools and technologies on business processes is a growing field of interest among academics and business. The current research focuses on business processes in SCM in the context of buyer supplier relationship (BSR) and the impact of digitalization on BSR.

Inter-firm relationships are paramount in the present interconnected business environment. Relationship between two business firms is vital for the success of entire value creation network of the supply chain (Walter *et al.*, 2001). Every company enters a relationship with other companies as far as supply chain is concerned. There are essentially two different types of relationship. Some companies enter relationships that are transactional in nature meant for short-term arrangements. These are often termed as 'Arms-length' relationship (Henderson, 1990). On the other hand,

strategic relationships are long-term relationships between the involved parties, who share the risks and benefits and are dependent on each other to attain common goal (Whipple *et al.*, 2010).

Digital technologies have connected companies like never before, in terms of data flow and its processing and analysis, thus blurring the corporate boundaries (Veile *et al.*, 2020). The integrated networks created by digital technologies have changed the buyer supplier relationship and have created new avenues for collaboration (Ghadge *et al.*, 2020). Therefore, it is imperative to analyze the BSR in the context of Industry 4.0 and to understand how digital technologies are influencing the dynamics of BSRs. One of the important focus areas of Industry 4.0 is the closely interconnected value-chain network between companies (Buyukozkan and Goçer, 2018). Thus, to achieve the possibilities of Industry 4.0 and digital technologies in its entirety, collaboration and cooperation between companies is paramount. Moreover, it is a known fact that how suppliers impact the buyer's production costs, product quality and eventually to carry out the business profitably (Gottge *et al.*, 2020).

1.1 Need for Study of BSR in Industry 4.0

Many studies have highlighted that the research interest in SCM in the context of Industry 4.0 is very recent and there is dearth of empirical studies done in the area (Legenvre *et al.*, 2020, AbdelBasset *et al.*, 2018). Owing to this recent interest in SCM, studies regarding Buyer Supplier Relationship in Industry 4.0 are equally scarce (Ben-Daya *et al.*, 2019). The current trend of research is either to study Digital technologies or to analyse digital technologies such as big data analytics, cloud computing, and Internet of Things in SCM, disregarding the comprehensive nature of Industry 4.0 and its impact on inter-firm relationships (Veile *et al.*, 2020). Moreover, much research done to study the BSR in industry context lack the dyadic perspective of both the supplier and the buyer (Salo *et al.*, 2020; Agarwal & Narayana, 2020; Milosević *et al.*, 2018; Lee & Ha, 2018).

1.2 Elements of BSR

BSR studies are often multi-dimensional, focusing on the different elements of BSRs. Some studies have focused on the behavioral aspects of BSRs like trust and satisfaction (Milosević *et al.*, 2018), whereas some research were dedicated to study the governance elements such as contract

governance (Ki-Hyun Um *et al.*, 2020). Yet some other studies focused on the structural aspects (such as relationship complexity and power balance) and process related aspects (such as processes, conflict management and interaction) of BSRs (Salo *et al.*, 2020). The current study aims to focus on the above BSR elements and provide a holistic view of how digital technologies are influencing the BSR in the context of Industry 4.0. Consequently, the current research put forwards the following research questions:

- **RQ1**: *How digitalization is affecting the different elements of BSR in the context of Industry 4.0?*
- **RQ2**: *What are the negative impacts of digitalization on BSRs in the context of Industry 4.0?*
- **RQ3**: *What is the impact of a digitized buyer supplier relationship on Supply Chain performance?*

The current study will contribute to the extant literature in the below mentioned ways:
- By exploring how the dynamics of BSRs are changing with the advent of digital technologies and their adoption by companies.
- By analysing the data and presenting the findings of the study.
- By discussing the business and theoretical implications of the results.

The paper is structured as follows: First, a literature review is conducted to present an overview of extant research on the impact of digitalization and digital technologies on BSR, culminating into the research framework for this qualitative study. Next, the research methodology is discussed to elucidate the primary data collection and analysis of the data. Finally, the findings of the data analysis are discussed, concluding with the limitations and suggestions for future study alongside the implications of the study.

Buyer supplier relationship is a multi-dimensional subject area. There are many perspectives from which the BSRs can be studied. The scope of the current study is to analyse BSR in terms of behavioural elements, processual elements, structural elements, and governance elements. Additionally, Industry 4.0 comprises of 9 core technologies i.e.. Big Data Analytics, Additive Manufacturing, Autonomous Robots, Business reality, Cloud Technologies, Simulation, Industrial IOT, Augmented reality and Cybersecurity (Ghadge *et al.*, 2020). For the current study, digitalization is used in the context of implementation of Industry 4.0 technologies and tools such as Automation, Big data analytics and cloud technologies.

2. LITERATURE REVIEW

A systematic literature review was carried out to present a synopsis of the previous studies in the field of buyer supplier relationship and the impact of digitalization on BSR. Scientific databases such as EBSCO, PROQUEST and Google Scholar were used to identify salient articles (more details in **Table 1** in Appendices).

2.1 Social Exchange Theory (SET)

Organizational relationships in a Supply chain network constitutes both the elements of social exchange and economic elements as mentioned in a contract (Johnston *et al.*, 2004). The exchange of tangible or intangible activities between two parties is termed as Social Exchange (Homans, 1961). Primarily, the SET is used to study the relationships between organizations-employees. However, in the context of SCM research, it has been used to study relationships between organizations (Agarwal & Narayana, 2020). The SET postulates that benefits can be obtained in a BSR through enhancing social relational capital such as trust, satisfaction, commitment etc (Carey *et al.*, 2011). Therefore, SET can help explain the building of relationships between organizations. SET suggests that organizations enter relationships with other related organizations to increase their benefits (Homans, 1961).

The norm of reciprocity is a central theme in social exchange theory, which regulates the exchanges between organizations (Goulder, 1960). Therefore, when applied to supply chain management, Social Exchange theory addresses the reciprocal relationship between organizations in the supply chain network (Halldorsson *et al.*, 2007). Griffith *et al.*, 2006 observed that when an organization receives value from its partner firm, they develop a sense of obligation to reciprocate with suitable responses. However, according to the theory, until the organizations perceive diminishing value and benefits, the inter-organization relationship will keep flourishing (Agarwal & Narayana, 2020).

2.2 Digitalization in Supply Chain

The digitalization in Supply chain is the process in which organizations seek to implement Industry 4.0 digital technologies and tools in the entire supply chain network (Premkumar *et al.*, 2018). The importance of digital tools and technologies in managing supply chain activities to help in performance gains has been highlighted by several studies (Gurria, 2017, Laaper, 2017, and Dall'Omo, 2016). At the core of any digital transformation is the mandatory holistic understanding of the internal and external capabilities of the organization (Uhl, *et al.*, 2014). Digitalization helps to improve internal and external capabilities by allowing organizations to reduce cost, increase revenue and create strategic advantage (Gurria, 2017). Ghadge *et al.*, 2020 listed 9 core technologies used in Industry 4.0 which have seen widespread usage in Supply Chain Management.

1. Big Data Analytics
2. Additive Manufacturing
3. Autonomous Robots
4. Cloud Technologies
5. Simulation
6. Augmented reality
7. Business reality
8. Cybersecurity
9. Industrial IOT

Haddud and Bienhaus (2018) cited that the future supply chain will consist of the three technology-based drivers instrumented, interconnected, and intelligent. The current study plans to examine the three drivers alongside

three core dimensions of digitalization in the context of BSR, as presented in **Figure 1**.
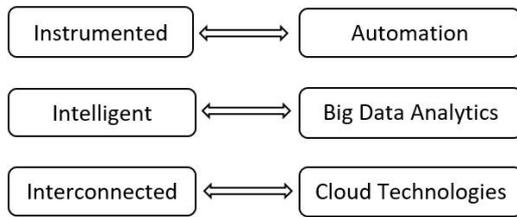

Figure 1 Mapping technology-based drivers with digital technologies (Source: Author)

2.2.1 Automation

For the purpose of this study, automation is used in the context of software systems, wherein the implementation of automation results in the reduction of manual intervention in business processes. This can be achieved by exploring the inherent capabilities of a software tool (such as automatic Purchase Order Creation in ERP) or using separate tools under Robotic Process Automation (RPA). RPA is defined as the process of using a preconfigured software to autonomously execute business activities, transactions and tasks based on business rules (Viale & Zouari, 2020). Many organizations are adopting RPA to streamline their repetitive, manual, time-consuming and less value adding tasks. This enables the buyers to be more focused and efficient (Viale & Zouari, 2020).

2.2.2 Big Data Analytics

Organizations have started using data insights in decision-making extensively. Big data analytics enables organizations to use huge volumes of data, analyse the same, extract relevant information and insight, and thereby improve efficiency and productivity in the organization (Wamba *et al.*, 2017). McKendrick, 2015 highlighted that to enable real time and fast data driven decision-making; adoption of tools to collect and evaluate large data sets from multiple systems will become a necessity.

2.2.3 Cloud Technology

Cloud computing technologies are rapidly adapting to the modern business scenarios and helping organizations to carry out more fact based and efficient Supply Chain activities (Oztemel and Gursev, 2018). Cloud systems help firms to store huge volumes of data, which are collected from multiple business systems, devices, and sensors. Major benefits lie in the ability of the cloud systems to provide real-time retrieval and remote access to large data sets, simultaneously keeping the cost of maintenance low (Ghadge *et al.*, 2020). Adoption of Industry 4.0 has ushered in a more connected network of the involved parties in the supply chain; hence, improved data sharing across organizations is indispensable for the success of the organizations.

2.3 Automation and Buyer Supplier Relationship

Organizations have started to adopt digital tools to automate processes to reduce cost and increase efficacy of the supply chain activities (Neil, 2018). Bienhaus and Haddud, 2018 has supported the idea that for organizations to gain efficiency, effectiveness and profitability, procurement function will become a strategic interface. In procurement function, automation has attracted the attention of plenty of organization. To deal with high-volume repetitive tasks, IBM has implemented robotic process automation (Krenkova *et al.*, 2021). Robotic process automation is suggested for highly repetitive, error prone, rule-based, time-critical, and standard processes (Deloitte, 2019). In future, it is speculated that robotic process automation will be integrated with machine learning and cognitive skills (Schatsky *et al.*, 2017).

Buyers are invariably involved in dispute resolution process with suppliers because they are the first point of contact for them. Most of their time is spent in solving invoice and payment related issues. RPA has made it possible to formalize the processes such as contract creation, supplier invoice and payment or updating supplier master data (Viale & Zouari, 2020). RPA helps buyers to skip low value-adding activities and help them to be more productive and efficient in strategically important activities. However, Křenková *et al.*, 2021 observed that although robots and RPA save time, robots could not substitute certain activities such as negotiations and nurturing relationships with companies. On the other hand, Viale & Zouari, 2020 has found in their study that RPA contributes to satisfaction among involved parties and enhances the quality of BSR. Additionally, they observed that many respondents in their study mentioned the positive effects of RPA on supplier relationship management due to enhanced efficiency in the operational tasks.

2.4 Big Data Analytics and Buyer Supplier Relationship

Information is a key enabler of organizational decision making on strategic, tactical, and operational levels (Rai *et al.*, 2006, as cited in Kache and Seuring, 2017). Recently, there is a tremendous increase in the volume of data generated and collected by organizations (McAfee and Brynjolfsson, 2012). This has started becoming a great challenge for organizations because the sheer volume of data makes it challenging to extract relevant information required to make strategic decisions. Big Data Analytics has provided new opportunities to explore and utilize huge data sets to extract meaningful insights. Big Data Analytics employ advanced statistics to stored data sets to extract information and aid in decision-making (Kache and Seuring, 2017). However, inability to use the available data and thus inability to access accurate and meaningful insights can be considered as a risk for organization and the entire supply chain (Ross *et al.*, 2013).

Big Data analytics can analyse large data sets in real time and highlight the most meaningful insights to support complex fact driven decision-making processes. The availability of appropriate information at the right time will aid buyers to be more focused while decision making in strategic activities (Chick and Handfield, 2014). The insights provided by Big Data Analysis can increase productivity, collaboration and improve relationships among the involved parties in the supply chain network (SC Digital 2014, as cited in Mishra *et al.*, 2018). Moreover, Ittmann, 2015 observed that collecting and analysing data

obtained from across the supply chain network, can help to increase satisfaction of the stakeholders.

2.5 Cloud Technology and Buyer Supplier Relationship

Cloud technologies are used by organizations to optimize business process, build digital infrastructure for the whole supply chain using the Internet. Some of the supply chain activities where cloud technology has been implemented are logistics and inventory management, demand planning and forecasting, procurement, maintaining product catalogues (Vincek *et al.*, 2017). Cloud computing is often referred to as the combination of services delivered over the Internet, usually in form of Infrastructure as a Service – IaaS, Platform as a service – PaaS and Software as a service – SaaS (Lamza-Maronić *et al.*, 2012). Cloud platforms help users to lease and use computing resources in an on demand manner over the internet (Williams *et al.*, 2015). Cloud technologies help organization to serve geographically dispersed users base, reduce ownership cost and increase scalability and fast deployment at global level, while minimizing system outage (Giannakis *et al.*, 2019).

Both suppliers and buyers can benefit from the Cloud computing's on-demand access to information, which can provide real-time meaningful insights (Cao *et al.*, 2017). Additionally, Cloud solutions help increase transparency in relationships (Frohlich and Steinb, 2020). Despite the appealing benefits of cloud technologies, it is not immune to issues. One of the major issues is about data security. When security concerns arise, there is a palpable weakening of the relationship between stakeholders and subsequently there is lack of exchange of information regarding complex issues and evolving ideas (Cao *et al.*, 2017).
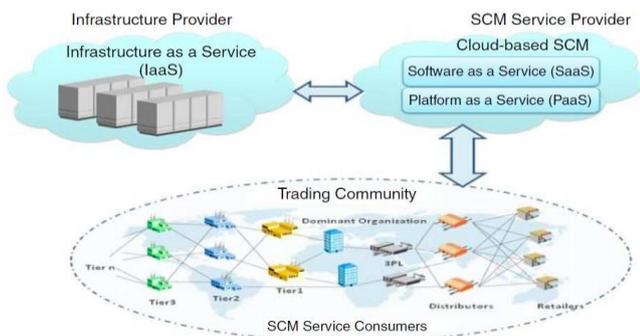

Figure 2 Overview of cloud based supply chain (Source: Adopted from Giannakis *et al.*, 2019)

2.6 Digitalization and Supply Chain Performance

Supply Chain performance entails both tangible (e.g., cost, quality) and intangible (e.g., resource utilization) outcomes obtained by efficient use of the supply chain management activities (Presutti, 2003). Studies have identified responsiveness, process improvements, reduced lead time and on time delivery as some of the constituents of Supply chain performance (Panayides and Lun, 2009). Rai *et al.*, 2006 observed that digital tools and technologies are critical in the management of procurement business processes and building new relationships or strengthening the existing ones. This results in overall gain in the

performance of the organizations. The business processes (e.g., supply chain processes) which are digitalized consists of a platform which have a) integrated devices to collect data, (b) network to enable data transfer, (c) cloud platform for storage of data, and developing application, and (d) a user interface (Birkel and Hartmann, 2020).

It is worth mentioning that business processes are becoming increasingly data driven, and strategic insights obtained from data are considered as critical for supply chain performance improvement (McAfee and Brynjolfsson, 2012). The benefits of big data analytics can be observed in processes improvements, logistics efficiency, improved inventory management, and reduction in cost in procurement (Gawankar *et al.*, 2020).

Procurement can help organizations to create master supply chain ecosystem (Bienhaus and Haddud, 2018). Digital platforms like E-procurement and E-sourcing integrates procurement business processes and systems, which helps to improve an organization's competitiveness (Chang *et al.* 2013). Studies have found that adoption of E-procurement systems can increase transparency and subsequently improve supply chain performance (Puschmann and Alt, 2005). The benefits of adopting procurement specific digital tools and technologies are obtained in the form of reduced procurement costs, more connected procurement function, better monitoring and reporting of performance indicators, and increased process efficiency (Lenka *et al.*, 2016).
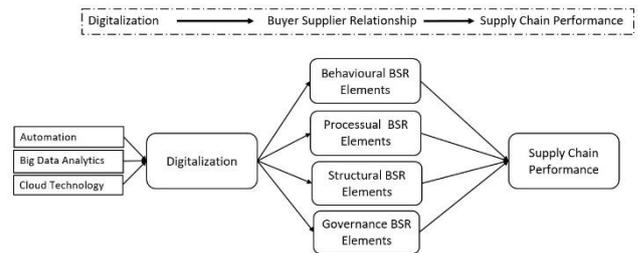

Figure 3 Research framework

3. METHODOLOGY

There is a paucity of extant literature which studies the impact of individual digital technologies on buyer supplier relationship. Keeping into consideration the shortage of relevant literature, an exploratory qualitative approach was taken. Multiple case studies were conducted to elicit initial insights and help in the development of suitable propositions. A case study method was selected because it will help to examine a contemporary phenomenon within a real-life context (Yin, 2018). Besides this approach was also applied within related studies (Viale and Zouari, 2020). In this paper involving a case study method, organizations are considered as single cases. The research process model as proposed by Stuart *et al.* (2002), was followed wherein at first the research questions were developed, followed by the development of study design and selection of cases. Subsequently, the data was collected and analysed.

3.1 Case Selection, Sampling, and Data Collection Method

The case selection is based on theoretical sampling which helps to ensure external validity (Stuart *et al.*, 2002).

Organization which has a matured digital landscape were considered to understand how the buyer supplier relationship has been impacted with the adoption of digital technologies. The current study involves procurement department of 15 organizations. As per Yin, 2018, the sample size is sufficient to collect rich empirical data from a small number of cases. All the organizations included in the current study operate internationally, however their operation in India were the primary focus of the study.

In this study, the objective was to understand the impact of digitalization on BSRs; hence, procurement managers who are engaged in procurement activities were considered. 23 procurement managers from the selected organizations were approached to be part of the study and were interviewed to obtain their insight. Majority of the respondents have more than decade long experience in procurement activities. The sampling method used was purposive sampling together with convenience sampling.

Data collection for the study was done through in-depth semi-structured expert interviews. This method enables collecting data in a structured way and helps to discover new themes as the process maintains a certain level of freedom (Gioia *et al.*, 2013; Yin, 2018). The respondents were selected based on their knowledge and experience in procurement, and their role and designation in the organization (e.g., buyer). The details of the respondent profile and interview duration can be found in the appendices (**Table 2**).

An interview protocol was developed based on the current literature and the research questions and is provided in the appendices (**Table 3**). The interview questions were standard in nature and organized in relation to the main topic. The questions were open ended and intended to find out perception of the buyers on the impact of digitalization on BSR. At the commencement of every interview, the research objective was clearly explained, and consent was taken to participate in the study. All interviews were conducted in English and lasted for an average 30-35 minutes. During the interview, field notes were taken which helped during analysis. The interviews were organized in the month of Nov 2021. McCracken, 1988 suggests that interviewing eight informants can provide enough information to reach saturation. Theoretical saturation was attained after interviewing 23 respondents as no new information was obtained in the subsequent interviews.

4. DISCUSSION, ANALYSIS, AND FINDINGS

In this section, discussion on the responses given by the study respondents is presented alongside the analysis and findings.

4.1 Impact of Digitalization on Behavioral Elements of BSR

The behavioural elements of buyer supplier relationship studied in this research were trust and satisfaction. Ocicka and Wieteska, 2019 noted that trust is determined through both qualitative and quantitative factors. Qualitative factors such as reliance on a partner and their helpfulness are considered, as well as quantitative factors like meeting the agreed requirements from a partner in terms of providing safe materials.

Majority of the respondents agreed that the trust between buyers and suppliers has increased overall with the adoption of digital tools. However, trust build up is achieved over a period. Whenever a new digital tool is incorporated in the processes, there are trust issues between the buyers and suppliers in the initial days.

Procurement managers have noted that initially, suppliers had doubts about the accuracy of the results shown in the e-procurement module in ERP. For example, reverse auction results were met with distrust, as suppliers wondered if dummies were present in the sourcing event to drive prices down. Buyers also had difficulty accepting the outcome of the tools used, as they questioned if suppliers were colluding outside the system to not make any further bids.

When digital tools were not used, the procurement activities were carried out manually and at each step, buyers and suppliers interacted mostly in person. That helped to build trust faster about the veracity of the suppliers and vice versa. The respondent stated that interaction with suppliers done in person helps build trust faster than using a vendor onboarding tool, since documents can be forged more easily in the latter case. However, it was agreed that these trust issues were addressed over time with increased adoption of the tools and understanding of digital tools. It was also noted that the increase in trust was due to the increase in transparency about processes and outcomes. The respondent observed that earlier, suppliers were not certain if the scope of work shared with them was the same as the scope of work shared with other suppliers in the sourcing event. However, with e-sourcing implemented, transparency has increased (Frohlich and Steinb, 2020). This observation is in line with Batwa & Norrman (2021) proposition that digital technology (blockchain) will enhance trust between the supply chain partners through increased credibility.

The trend was similar in case of satisfaction in BSRs. During initial days of digital tool adoption, satisfaction diminished from earlier levels. Majority of the respondents concurred that there was nothing wrong in the digital tools inherently, however it has more to do with the change management and transition plan, which caused the dissatisfaction among the stakeholders. Dissatisfaction causes unnecessary strain in the BSR. One of the respondents recalled their experience of when iCertis (a Contract Management tool) was implemented. Due to a lack of proper transition plan, it caused havoc during the initial days, with contracts needing to be reinitiated causing unnecessary re-work. Additionally, issues were faced during the initial period because of the difference in digital maturity between buyers and suppliers, as well as the level of tech-savviness of the organizations. Digital signature was mandated for contract signing, but smaller companies did not have that, leading to a lot of dissatisfaction among smaller suppliers. Despite the struggles at the beginning, similar to trust, satisfaction also improved overtime and, buyers appreciated the faster and efficient processes, while suppliers appreciated the transparency of the processes and outcomes. It was noted that the adoption of digital tools gave more time for value adding activities and allowed

suppliers to see where they ranked in reverse auction and bid accordingly.

4.2 Impact of Digitalization on Processual Elements of BSR

The Processual elements in BSR studied in this research were processes, cooperation and conflict, and interaction. As far as processes are concerned, digital tools help in the standardization and formalization of processes, subsequently bringing process efficiency and compliance. Automation and cloud technologies has made lot of processes less time consuming.

The respondents expressed their relief that they no longer must create Purchase Orders for non-strategic purchases due to the automatic creation of Purchase Orders and invoices. This has allowed them to have more time to focus on strategic activities. This is in accordance with the observations made by Viale & Zouari, 2020. It has been noted by the majority of buyers that supplier data management is a non-value adding activity that can be made more efficient with the implementation of RPA. One respondent shared their experience of the number of follow-ups that were required in order to update a single Bank detail of a supplier and how they wished there was an option to do it themselves. This task has now become much simpler with automation.

A strong, long-term cooperation can be seen as a foundation for establishing a beneficial relationship (Ocicka and Wieteska, 2019). Cooperation between supplier and buyer has also been impacted by digitalization, however the direction of impact (positive or negative) is determined by different contexts. For example, in terms of adoption of a new digital tool, it is easier to convince tech- savvy suppliers to get onboarded first and are generally cooperative, however smaller business with lower level of digitalization do not cooperate much. Some of the suppliers are more cooperative while some are not. The respondents speculated that it might be because of the investment that is required to use digital tools. Moreover, if the relationship is mostly transactional, then there is resistance to change. One of the respondents noted that when E-sourcing was implemented, some of the suppliers who were already familiar with such tools cooperated and got on-boarded. However, it was the smaller businesses that did not cooperate and resisted the change, possibly due to the investment in systems, infrastructure, and training that was needed to use digital tools.

There are instances when buyer and supplier get into conflicts. The conflicts may arise because of misunderstanding of the scope of work or due to misunderstanding of the contractual nuances. Cloud technologies arm the buyers with the easy accessibility and retrievability of data, and big data analytics help them with the proper insights extracted from the analysed data. The availability of data helps in fact-based conflict resolution. The respondents highlighted that digital communication tools like Zoom, Microsoft teams have helped to resolve conflicts faster now. However, for tough discussions, buyers still prefer in-person meetings over digital tools. It was suggested by the respondents, that in a conflict discussion, having the right data makes issue resolution faster. When the data speaks, it can either convince the buyer or the supplier. This has been seen in cases of conflicts arising due to missing addendums to master contracts. It is believed that having an in-person meeting can change the atmosphere of the conversation and allow for better communication than a Zoom call.

With the advent of digital tools like zoom, Microsoft teams, the number of interactions has increased manifold. A meeting can be organized with the click of a button and can be attended from anywhere and on any device. This has helped in faster decision making resulting in better efficiency of the processes. However, on the flipside, the quality of the outcome of a meeting has become worse. It has been observed that when people are called to a zoom call, even those who are not necessary to the meeting are included. This leads to a lot of cross talking, wasting a lot of time and diminishing the quality of the meeting.

Partners who interact closely can benefit from learning and sharing knowledge and expertise (Ocicka and Wieteska, 2019). Buyers also noted that physical interactions are irreplaceable, also agreeing that the frequency of in person interactions have reduced. They concurred that it is a lot easier to build rapport, manage conflicts and take tough decisions in an in-person interaction, thus aligning with the observation made by Křenková et al., 2021.

4.3 Impact of Digitalization on Structural Elements of BSR

The structural elements studied in this research are that of power balance and complexity in a buyer supplier relationship. Data plays an important role during negotiations. The party (buyer or supplier) having the most suitable data and insight always has the upper edge in a negotiation. Big data analytics have helped buyers to use the huge data available to them and get strategic insights, which can be used subsequently during negotiations for favourable outcomes (Ittmann, 2015). The availability of large set of data does not guarantee beneficial outcomes in a negotiation. The more important part is to have the most strategic insights obtained using advanced analytical tools (Chick and Handfield, 2014). Most often, the same set of data is available to both the supplier and buyer. Whoever can make use of the data, carry out advanced analysis and obtain more meaningful insights has the better chance of achieving desired results. However, the analysis of data and the subsequent outcome is largely dependent on the quality of the input data. As one of the respondents put it, "Data analysis" is a 'garbage in-garbage out' activity. When proper data is put into the tool, relevant insights are yielded. Conversely, if bad data is put in, the fact-based decision-making process is jeopardized.

Big data analysis works best when all the data required for analysis are captured in the digitized format at transactional level. If any required data set is a manual input to the system, the vulnerability of the system increases, as manual data input is an error prone activity. Moreover, when data is obtained from multiple systems, users must be extra cautious about their seamless integration. If one of the links is broken, the entire analysis can be subjected to miscalculation.

Digital infrastructure in one of the factors determining the complexity of buyer supplier relationship. The

complexity increases manifold when buyers are required to juggle between multiple systems to carry out different activities. Moreover, if the integration between the systems is not streamlined, teething issues start surfacing. One respondent recollected about the technology landscape in their organization wherein, a custom tool is used for vendor onboarding, ERP for requisition, PO and Sourcing event creation, and iCertis (CMS) for contract management. Along with this, some other tool is used for invoice collection and payment. A significant amount of time is spent navigating through this labyrinth of systems. When the buying organization and selling organization are using different tools for the same activity, the complexity increases. This leads to compatibility issues between the different tools in two different ecosystems. In order to comply with each other's system requirements, a lot of duplication in work becomes inevitable. If the tools are integrated or the same tool is being used, it would become a lot easier.

4.4 Impact of Digitalization on Governance Elements of BSR

The governance element of BSR studied in this research was contractual governance. Supply chain activities and contracts go hand in hand. Before the supplier provides the services or goods, a duly agreed and signed contract is necessary. However, there are instances when formal contracts are not signed, for instance, in the case of one-time purchases from vendor, in which the PO terms and conditions serve as contractually binding.

Digital tools like iCertis have made the contract-lifecycle-management activities more transparent and efficient. Now, it is easier to document a contract when you have the terms and conditions readily available to you. One of the respondents recollected that before the implementation of the contract management system (CMS), they had to copy the terms from a previous contract to document a new one, which was a tedious process. However, after the CMS implementation, they can see all the clauses in a single place and with few clicks the contract is almost ready. A contract consists of general terms and ordering document, and the general terms mostly remain unchanged.

Storage and Retrievability of contracts are some other benefits of using cloud tools. There is a constant flux of employees in organization. When employees leave, many critical information and contract documentations leave with them. In the absence of digitally stored contract documents, it becomes difficult for the person who has recently taken over the new role, to further the subsequent activities. However, digital tools have made the organizations system dependent and not person dependent, which is one of the prime objectives of any digital transformation activity. A respondent shared his experience, recollecting the initial days when he joined the organization, when there were no contract management tools. They had to scour through multiple cupboards containing hordes of contracts, to get a particular contract that was needed for renewal. Now, with iCertis, all the contract documents have been digitized.

Using digital tools has significantly increased transparency in the system and assisted organizations in ensuring compliance. Having all the data accessible in the system has made complying with statutory audits much simpler. Those who used to dread being subjected to these audits previously, due to the difficulty of retrieving contracts, now no longer have to worry. No longer is there a need to spend weeks preparing, as every action taken is recorded. Even if there is a sudden audit, they no longer have to feel anxious.

4.5 Negative Impacts of Digitalization on BSR

The benefits of a digital transformation project and adoption of digital tools are plenty; hence, every forward-looking organization is embracing technology. However, there is a flipside to the story. As has come out from the interview responses that the success of any digital tool adoption lies in the entire implementation process. If not done correctly, the outcome is never favourable. Training and mentorship, timely communication to all the affected stakeholders, and change management are some of the critical aspects to consider for a successful implementation. One of the respondents expressed that it was an ambitious plan to make digital signature mandatory for all the suppliers, since not all the suppliers were prepared for this. So, a decision was made to allow manual signature as well, since business had to continue. This led to a lack of clarity of the standard processes in contract signing and left the concerned parties in a messy situation.

Automation has helped in procurement activities by allowing buyers to spend more time on value adding activities. However, automation of a process is hugely dependent on software. When multiple systems are integrated through automation, then the challenge is even greater. Outage in one system can make all the subsequent activities fail. In one of the respondent's organizations, the Supplier Master Data Management was an automated process, and RPA bots were utilized to capture data (like supplier bank details and address) from a custom tool, where documents were uploaded by suppliers. These details were then updated in the ERP system. Once, there was an issue with the integration which caused the RPA bots to be unable to update details and the MDM team was not certain on how to proceed, leading to a wait for the issue to be rectified. This caused the supplier to be displeased.

New tools such as Zoom, Microsoft teams, have led an altogether different mode of communication with suppliers. It is easier than ever before to schedule and conduct a meeting.

However, this has its own negative side. It was noted by a respondent that communication done over Zoom does not have an audit trail unless the session is recorded. When communication was done through emails, there was an audit trail. The respondent also noted that an extra task of sending Minutes of Meeting after every meeting was added unnecessarily.

Cloud technologies are helpful but when there is a plethora of different systems, the complexity of the process increases unnecessarily. The increase in complexity depletes the satisfaction level in a buyer supplier relationship.

Digital tools increase the rigidity in the system because there are certain business rules defined for the system to work as per expectation. This makes the systems less flexible in case of exception handling. For example,

once a contract has been digitally signed by all of the parties involved, it becomes very difficult to make any changes. Any changes that are made require the entire process to be restarted.

Cloud technologies are hugely dependent on the availability of internet. A digital tool with multiple bugs and intermittent availability of internet, can cause unnecessary strain in a buyer supplier relationship. Especially, in case of real time events like reverse auction. An internet issue or a systemic issue can render a supplier incapable of bidding in an auction, thus jeopardizing his chances of getting business. This oftentimes results in many sour conversations between the buyer and suppliers after the auction has finished.

By leveraging big data, companies are able to gain a competitive advantage through the use of various analytics techniques. These techniques enable us to uncover insights, patterns, correlations, and associations that would have been difficult to discover through traditional methods of small data analysis (Jeble et.al, 2018). Big data analytics is as good as the input data. If the input data is not correct, then the information obtained after the analysis is also unreliable. Trust between suppliers and buyers can be badly impacted, as one respondent noted that a spend analysis was immensely helpful in one negotiation that the person had with a strategic supplier. It was an important deal, and the individual had thought they had all the necessary and accurate information. However, a colleague alerted them to a mistake in the analysis which was caused by incorrect item selection. This mistake was thankfully discovered before it led to an embarrassing situation in front of their suppliers.

5. CONCLUSIONS

5.1 Theoretical Implications

The current study uses qualitative empirical data from semi-structured interviews with procurement experts from the service industry organizations in India. The study contributes to the present studies in the following ways:

First, as highlighted by Veile *et al.*, 2020, extant studies mostly focus on either digital technology solely or study the impact of digital tools on SCM, disregarding the holistic study of the impact on BSRs. The current study enhances the understanding of BSR in the context of Industry 4.0 by conducting a holistic analysis of the impact of digital tools on the different elements of BSR.

Second, the study extends the observation made by Krenkova *et al.*, 2021 that even though organizations are adopting Robotic process automation, certain procurement activities like negotiations, conflict and grievance redressal, and building synergistic relationships with supplier requires human intervention. Majority of the respondents in the current study emphasized the relevance of in-person meetings and personal relationships to build better relationship, in agreement with observations made by Butt, 2019. Additionally, the study broadens the observation made by Viale, & Zouari, 2020 by providing the positive impacts alongside the negative impacts of process automation.

Third, the study extends the current understanding that data and meaningful insights obtained from analysis of the data can provide an organization with competitive edge

(McAfee and Brynjolfsson, 2012; Kache and Seuring, 2017, Chick and Handfield, 2014). The current study has highlighted how availability of information at the time of negotiations can help each party to obtain favorable outcomes. The respondents also agreed that the right insights obtained from data can increase productivity and satisfaction in the buyer supplier relationship (Ittmann, 2015). The current study also highlighted the importance of having correct input data to get reliable insights using big data analysis in procurement.

5.2 Limitations and Future Research

The current study has some limitations, which are expected from a qualitative exploratory study. It is difficult to develop theoretical contribution from the data obtained through a qualitative study. The results obtained from the study are based on the perceptions of few respondents. Thus, the generalizability to a larger population is limited. Additionally, the respondents are based out of India and the business environment present in India heavily influences their responses. Moreover, the sampling technique used in the study was convenience sampling and the respondents had a background of service industry. Hence, the results when applied to other industries must be done with caution. The digital tools analysed in this study are big data, cloud technologies and automation, however there are other Industry 4.0 technologies which might have an impact on the buyer supplier relationships.

There are several opportunities to further the current study in future. Firstly, a different industry can be studied to evaluate if the results can be generalized. Secondly, a quantitative study can be conducted to validate the results and quantifying the cause-and-effect relationship between the variables. In addition, the study analysed the buyer supplier relationship from the buyers' perspective only. Future studies can integrate the perspectives of the supplier to complement the study and its findings. Additionally, future studies can enhance the current study by researching the effect of other Industry 4.0 technologies such as Machine Learning, Artificial Intelligence, and cybersecurity. Finally, yet importantly, future studies can differentiate the BSRs in the context of supplier type, with special consideration to Small and Medium Sized Enterprises (SMEs).

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APPENDIX

Table 1 Literature review framework

I: Search Process Documentation	
Data source	**Search process documentation**
Google Scholar	Preliminary search using defined keywords (Tab.II), time period 2017 - 2021
	Results sorted by relevance and high rank were given to most cited literature
EBSCO, PROQUEST	Only Scholarly Journals/Academic Journals were considered (Primary screening)
	Retrieve and review abstracts in terms of inclusion criteria (secondary screening)
	Retrieve and review full text in terms of inclusion criteria (final screening)
Reference lists	Screening reference lists of already included papers
	Retrieve identified papers (Google)
	Review identified papers in terms of inclusion criteria
II: Search terms used	
Search terms used	"Industry 4.0" / "Buyer Supplier Relationship" + "Procurement 4.0" / "Automation" + "Supply Chain Management"/ "Inter firm relationships" / "Big data Analytics" + "Supply Chain Management" / "Buyer Supplier Relationship" + "Digital Transformation" / "Supply Chain Performance" / "Cloud Computing + Procurement"
III: Inclusion criteria used	
Screening phase	**Inclusion criteria**
Primary Screening	English language
	Search keywords identified in the title or text of displayed search result
	Time period - 2017-2021 (increased for some search terms to2015-2021)
	First page (10 records) sorted by relevance
	Scholarly Journals/Peer reviewed
	No duplicates

III: Inclusion criteria used	
Screening phase	**Inclusion criteria**
Secondary Screening (abstracts, keywords)	A research article / study
	Addressing digital technologies in supply chain management
	Buyer supplier relationship and digital tools
	Procurement 4.0
Final Screening (full text	Full-text article available

assessment for eligibility)	Criteria used for Secondary Screening
Screening reference lists of the already included papers	Article is addressing the concept of buyer supplier relationship
	Papers describing industry 4.0 in supply chain management

Table 2 Respondent's profile and interview duration

Interviewee	Respondents Designation/Title	Interview Duration
Buyer A	Manager Procurement (IT Services)	22 Min
Buyer B	Manager Procurement (Office Supply)	40 Min
Buyer C	Senior Manager Procurement (Marketing)	40 Min
Buyer D	Manager Procurement (Marketing)	25 Min
Buyer E	Manager Procurement (IT Hardware)	30 Min
Buyer F	Senior Manager Procurement (Network)	35 Min
Buyer G	Senior Manager Procurement (Legal)	45 Min
Buyer H	Senior Manager Procurement (HR)	45 Min
Buyer I	Senior Manager Procurement (IT)	45 Min
Buyer J	Manager Procurement (Network)	25 Min
Buyer K	Manager Procurement (IT Services)	22 Min
Buyer L	Manager Procurement (Office Supply)	40 Min
Buyer M	Senior Manager Procurement (IT Services)	45 Min
Buyer N	Manager Procurement (Marketing)	25 Min
Buyer O	Manager Procurement (IT Hardware)	30 Min
Buyer P	Senior Manager Procurement (Admin)	35 Min
Buyer Q	Senior Manager Procurement (Legal)	45 Min
Buyer R	Senior Manager Procurement (Marketing)	40 Min
Buyer S	Senior Manager Procurement (IT)	44 Min
Buyer T	Senior Manager Procurement (Legal)	45 Min
Buyer U	Senior Manager Procurement (Admin)	43 Min
Buyer V	Senior Manager Procurement (IT Services)	45 Min
Buyer W	Manager Procurement (Network)	24 Min

Table 3 Interview protocol used in the semi-structured interviews

Question	Purpose	Content
Opening	Provide interviewee the details of the study, objectives and seek consent to participate in the study	Brief about the research objectives
1	To investigate the impact digital tools on the behavioural elements like trust and satisfaction in the buyer supplier relationship	How do you think the advent of digital tools are impacting the trust and satisfaction in the buyer supplier relationship?
2		Is there any negative impact of digitalization on trust build up and satisfaction?
3	To investigate the impact digital tools on the cooperation, interaction and conflict in the buyer supplier relationship	How do you think the advent of digital tools are impacting the processual elements like cooperation, interaction and conflict in the buyer supplier relationship?
4	To investigate the impact digital tools on the cooperation, interaction and conflict in the buyer supplier relationship	Is there any negative impact of digital tools on cooperation, interaction and conflict?
5	To investigate the impact digital tools on the structural elements like power balance and complexity in the buyer supplier relationship	How do you think digital tools are impacting the power balance and complexity in the buyer supplier relationship?
6	To investigate the impact digital tools on the governance elements like contractual governance in the buyer supplier relationship	How do you think digital tools are impacting the contractual governance in the buyer supplier relationship?

7	To understand the presence of any negative impact of digitalization on the buyer supplier relationship	What do you think are the negative impacts of using digital tools in the context of buyer supplier relationship?
8	To understand the impact on supply chain performance	How do you think digital tools have impacted the supply chain performance?

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