

# **THE IMPACT OF DIGITIZATION ON TACTICAL PROCUREMENT AND ITS RISKS MANAGEMENT**

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## ABSTRACT

The digital revolution currently is affecting every sector of business, today's businesses cannot survive independently, rather they must work in collaboration to survive in the market and to achieve their results. This digitization is prominently hitting the supply chain industry and as procurement is a vital part of supply chain, automatically this impact will be shifted to the procurement industry as well. The purpose of this research paper is, to show how procurement is a vital part of the supply chain industry and which are the risks associated with it, further the research takes deep dives in the Tactical procurement processes and analyzes

which are the prominent risks associated with tactical procurement, how huge the impact of this risk can be to any organization? In addition, what could be possible risk mitigation strategies to deal with these risks? Emerging literature, case studies, blogs, expert opinions, market knowledge, practical business experiences and citations are used to fulfill this task. This research can contribute to explore further research on automation of strategic procurement processes.

**Key Words:** *procurement, tactical procurement (S2C), procurement 4.0, SCM, SCRM, IoT (Internet of things), Industry 4.0, automation, risk management*

## INTRODUCTION

With the current growth in technology the world is changing with a rapid speed, the companies cannot survive in the industry all alone, collaboration and cooperation are the need of time and because of this the supply chains are becoming more complex than ever which makes the supply chain more prone to risks. The world is heading towards automation and worlds like "IoT", "Industry 4.0" the hot topics; experts believe that supply chains must invest in the right technologies, people and processes to stay in the digital race [1]. The digital revolution is influencing every industry, but its greater impact is on the supply chain industry because supply chain of today is not possible without collaboration, more collaboration means involvement of more parties, more parties means more processes, more processes means more complexity and more complexity means more risks. Procurement is an important part of the supply chain and it involves collaboration between many parties, so this impact of digital revolution is also hitting the procurement industry and is making the procurement processes prone to risks. Procurement is divided into 3 levels i.e. Operational Procurement, Tactical Procurement and Strategic Procurement. The focus in this research is to deep dive in the Tactical procurement processes and to analyze which are the risks associated with tactical procurement, how huge the impact of this risk can be to any organization and what could be possible risk mitigation strategies to deal with these risks. Risk management is all about identifying, analyzing, evaluating and mitigating possible risks, which could affect the business processes.

In the scope of this research, we will see that how automation of processes can play a vital role mitigate the risks in tactical procurement. Four main research questions to investigate in this research

1. What is procurement and its main types?
2. What are the processes of Tactical procurement?
3. What are the potential risks associated with Tactical procurement processes?
4. How automation can have an impact to mitigate risks Tactical procurement?

## LITERATURE REVIEW

### Procurement and its Types

Procurement is the action of acquiring goods, services or works from an external source. It is a process in which two or more parties find and agree on terms, how these goods, services and works are going to be executed to achieve a certain goal. Typically, procurement can be divided into 3 types.

**(1) Operational procurement:** Operational procurement commonly known as P2P (Procure to pay) or R2P (Requisition to pay) is the process of requisitioning, Purchasing, receiving, paying for the good or services needed. The name comes from the ordered sequence of procurement and financial processes, starting with the first steps of procuring goods or services to the final steps paying for it [13]. Operational procurement deals with the orders after a contract has been set, and it works for the daily purchasing needs of an organization, it involves buying goods and services for an organization, managing deliveries and contract and finally dealing with complaints if any [14].

**(2) Tactical procurement:** Also known as S2C (Source to contract), this refers to the short-term plans (up to 1 year) and transactional activities to keep the business running smoothly [2]. This type of procurement also a vital part of procurement and involves steps: Requirement specification, Invitation of tenders, Negotiation (auctions), contract creation, contract management, supplier evaluation, Supplier master data management and claim management. This type is the focus of our research and is discussed in details in the next chapters.

**(3) Strategic procurement:** It is also known as P2S (Plan to Strategy), it refers to long term organization wide plans to ensure timely supply of goods and services those are critical for the business [3], on the other hand it focuses to reduce suppliers, identifying critical suppliers and maintaining long term relationships with Strategic suppliers [4]. This type of procurement is the most important type of procurement, it deals with the overall strategic topics and has the biggest impact on cost saving. The typical steps of a P2S process are. Spend analysis, Demand management, Market analysis, Material group strategy, Supplier qualification, Supplier risk analysis, Supplier development

## Procurement Roles in Organizations

As procurement is a vital part of any supply chain, there must be a procurement department in any organization from small to big size companies. The roles or titles could vary from company to company. Procurement in contrast with old times are taking attention in recent times, a set of roles are defined from strategic level to operational level in figure 1.

| Position / Title                | Procurement Level                  |
|---------------------------------|------------------------------------|
| CPO (Chief Procurement Officer) | Strategic                          |
| Procurement Director            | Strategic                          |
| Category Manager                | Strategic & Tactical               |
| Sourcing Manager                | Strategic & Tactical               |
| Procurement Manager             | Strategic & Tactical & Operational |
| Strategic Buyer                 | Strategic & Tactical               |
| Buyer                           | Tactical & Operational             |
| Operational Buyer               | Operational                        |

**Figure 1: Procurement roles in organizations**

## Supply Chain Risks

One cannot define risk in specific words; it is the probability of the unforeseen occurrence of something, which can have a negative impact on any Business. Different authors have defined risks differently; some important definitions are. Risk is a direct measure of probability of its occurrence and its potential degree of damage that can take place by selecting the given risky situation [5]. Risk is the possible chances of taking place of an uncertain outcome or situation that have negative effects on results of a project [6]. Another general definition can be as; risk is outcome of likeliness of an event to occur at a certain time and location, which has the possibility to adversely impact on the organization [7].

The Supply chain of today is more complex and challenging as it was never before, with businesses going globally with a lot of collaboration, there are different mode of procurement and transportation involved especially for international supply chains. Companies are manufacturing in economical part of world and sell in other parts of the world to gain maximum commercial advantages. This could lead to relatively long supply chains, which are quite challenging and costs a lot of time and resources. Slight change in demand and disturbance in scheduling can lead to a high cost change. At the same time, this can also lead to different type of risks like penalties, loss of perishable items, delays for goods in lean manufacturing, where goods are planned for just in time etc. Other type of risks, which are more common nowadays, is traceability of goods for transportation and for its entire lifecycle. This traceability of product

can give confidence to user about its originality, genuineness and origin. Moreover, in the future of digitalization of “Industry 4.0”, supply chain will be more complex and there is a need to develop new ways to integrate with “Industry 4.0”.

Anything in supply chain that disturb the flow of information or material from base supplier to end customer is considered as risk in supply chain [8]. Risks in supply chain can be categorized into two main types, **a.** External risks **b.** Internal risks.

**Examples of external risks** are Supply risks, geopolitical risks, business risks, environmental risks, demand risks, economic risks etc.

**Internal risks examples** are manufacturing risks, Material flow risks, process risks, technological risks, cultural risks, control risks etc. [9].

### Risks with Tactical Procurement Processes

The conventional tactical procurement includes a lot of different processes which are in deep independent from each other. All these steps so connected with each other, if one of them is not done properly it will affect the whole process. On the other hand, all these processes steps are standalone within themselves and risks are associated with each process step. If these processes are manually executed, they would lead to complexity, sometimes confusion, and would take more time and effort, and will allow room for human error [10]. Below are some prominent risks associated with manual & conventional S2C processes. Here we have mentioned some general prominent risks associated with overall procurement processes. **Manual filling processes:** This is one of the prominent risks associated with manual procurement processes; this means that all the processes are performed manually by your staff. This process is slow in terms of tasks performance, it includes a risk of damage to your sensitive and important records in case of fire or natural disaster, the documents can be misplaced, it requires records storage space, hard change management in terms adding or deleting new information to your purchase, increased access time not, low security in terms of theft, and higher costs. It can also lead to losing your supplier and clients, who would not want their information to be mishandled. **Maverick Buying:** It is the risk that the buyer buys products without the consultation of the procurement department, this type has been discussed in much details below. **Risk of damage and misplace:** This risk is associated to the document part of the process and means that the documents can be misplaced and can be prone to damage. **Hard to Make Changes:** All the orders are not perfect every time, sometimes or most of the times you need to change your order because the customer requirement is changed, this means if you want to make change to an existing order, you have to copy to original and this will make it difficult to track all the changes. **Access Time:** As the process is manual it automatically means that the access time to store, organize, hunt an order or its file will be highly time consuming, this will slow down the overall process. **Lack of Security:** The manual P2P process is always prone to security risk; the manual filling can be less secure than electronic filing systems. Misplaced documents can easily go into wrong hands. **Higher**

**Cost:** Manual processes are always expensive as compared to the electronic processes. **Beside the above general risks below are the are risks associated with Tactical procurement processes.**

**Requirements specifications risks:** It is the potential for losses due to a project's requirement gathering process, such risks are directly tied to the quality of requirements in that low-quality requirement leads to a risk to the entire project [11]. The risk involved here is not getting and collecting the correct requirement specification. This is because we have different parties involved within procurement, so if a customer/organization wants to procure something products or services and they are not communicated to the procurement department, the whole processes will be started with false information and it will result in garbage in garbage out. These risks could be Wrong stakeholders, missing stakeholders, incomplete or ambiguous requirements, infeasible or conflicting requirements.

**Tender process risks:** Tendering means to invite bids for a specific procurement project within a definite deadline [13]. The formal request for a tender is called an RFT. The target of this process to invite the right parties to the right tender in order ensure maximum competition and transparency. This process step has a direct impact on the next steps, if the wrong suppliers are invited to participate in the tender, there are huge chances that you get the wrong suppliers, wrong prices on board. In the manual process there are often situation where the many deserving parties are not invited to the tenders, this leads to wrong or incompetent suppliers onboard, lack of transparency, little room for negotiation, which leads to extra costs, no accountability.

**Negotiations risks:** This process step is one of the important in the tactical procurement process, this process starts after the suppliers submit their offers, the suppliers are shortlisted against certain criteria's and only those suppliers are invited for negotiations. This is the decider point to make sure that the right suppliers, with the right prices, right SLAs, right SLAs and terms & conditions are through to the next rounds. Normally this process takes some time to finalize the final suppliers, suppliers are invited to different rounds to make sure you get the right supplier on board. The traditional negotiation processes are face to face, these processes are so effective that one doesn't want to automate them. The risks though here is the waste of time, the procurement departments is involved since the beginning and many cases some of the suppliers are rejected in the 2<sup>nd</sup> or 3<sup>rd</sup> round of negotiation where the suppliers don't comply to SLA's, terms and conditions etc, the automation can help to save some time by further filtering the real deserving suppliers to sit in face to face negotiations. The proposed concept is to send the SLA's, terms and conditions in advance to the suppliers, the suppliers should participate in e-Auctions etc. and if the suppliers comply to the those, only then the supplier will be invited to face to face negotiations. Here the other important factor to send the right negotiators to the negotiations, a wrong negotiator can ruin the process and the benefits could go to suppliers, the negotiations should be skilled to ensure your company gets the maximum out of the deal and should have the capacity to understand the breaking points of the suppliers.

**Contract management risks:** Contract management is the most important part of the tactical procurement, here everything is documented whatever is agreed between the two parties and has a legal status. In every business contract are important because they document the expectations, prices, terms and conditions agreed by the parties involved and they safeguard all the parties in case of mishaps. [14]. In the manual contracts the contracts are signed and stored, and in many cases, there are risks that contracts get expired and are not noticed by parties which can then result in damages. Other risks associated with manual contracts could be possible human errors, rough discounts, waste of time [15]. According to a research by an independent international Association for contract & commercial Management (ISCMM), a poor contract management costs companies 9% of revenue [16].

**Supplier data management risks:** In tactical procurement supplier data management also referred as supplier master data management, it is the framework which is used to manage a detailed set of records about the suppliers working with those companies, this information includes goods & services i.e. sourced for suppliers in full details [18]. Supplier master data is the key for a long lasting effective strategic administration of your suppliers, supplier management is often a complex task where a lot of documentation would be involved and needs to be efficiently managed [19]. Information is power in any industry, the information is directly proportional to your suppliers, the more supplier the more information, the more information the more complexity, the more the complexity the more prone to risks. Despite the clear benefits of having high quality of supplier master data, many companies still rely on their manual processes to manage this complex data [20].

**Supplier evaluation risks:** Supplier evaluation is the base for supplier selection process. The supplier selection is based on the ability of a supplier to deliver his services in terms of quality, quantity, cost and delivery time [22].

## **RESEARCH METHODOLOGY**

In this research, we have shown how automation can help to mitigate the risks associated with tactical procurement. We have started broader by defining the procurement and its types, tactical procurement processes in details, the risks associated with every process step. Then we have compared conventional / manual processes of tactical procurement with our proposed automated tactical procurement. All the processes involved in both these procurement types are further investigated with keeping in mind their pros and cons, and concepts have been identified how these risks can be reduced or mitigated. Different research studies, websites, interviews, videos, market surveys and expert opinions have been taken into consideration to show why automation of all the procurement processes are need of the time.

## RESULTS AND EXPLANATION

Tactical Procurement, also known as “Source to Contract” S2C is the process of procurement which starts from the requirement identification and ends with a complete contract with suppliers, The process steps involve in this process are deeply depended on each other and if one of the process step is executed improperly it will have a negative impact on the overall strategy. A typical tactical procurement process is shown in figure 2.



**Figure 2: Typical Tactical Procurement process**

A typical traditional tactical procurement process includes a lot of manual tasks and events, it also includes many repetitive and small tasks and above all a proper communication has to be done at any given time with the suppliers[25]. This manual procurement process also includes many manual document filing processes which itself requires a lot of space for document filling that could very prone to damage, loss, theft [26]. In this digital era most of the companies are still using the conventional S2C processes despite knowing the fact that the digital revolution is eradicating the conventional procurement methods [27]. According to a survey from SAP most of the procurement leaders are from the opinion that the digital transformation would affect the supply chains as many of the companies are still not ready to change, on the other hand there are very small number of companies which are already in the process to digitize their procurement processes [28].

Our idea is to fully automate some of the above processes of the tactical procurement to save a lot of efforts and time, create more savings and bring high level of transparency, while few processes cannot be fully automated because there are emotions and human interaction involved, but if the other processes are automated it will provide a greater visibility and transparency to human and they will benefit from it big time. We will break down the processes into blocks and will suggest some concepts to automate the processes. This automation of processes will result in great cost savings and will contribute to mitigate the major risks associated with S2C processes. In this section we have compared the conventional/manual S2C processes with our proposed automated solutions and have identified the potential benefits which could be achieved.

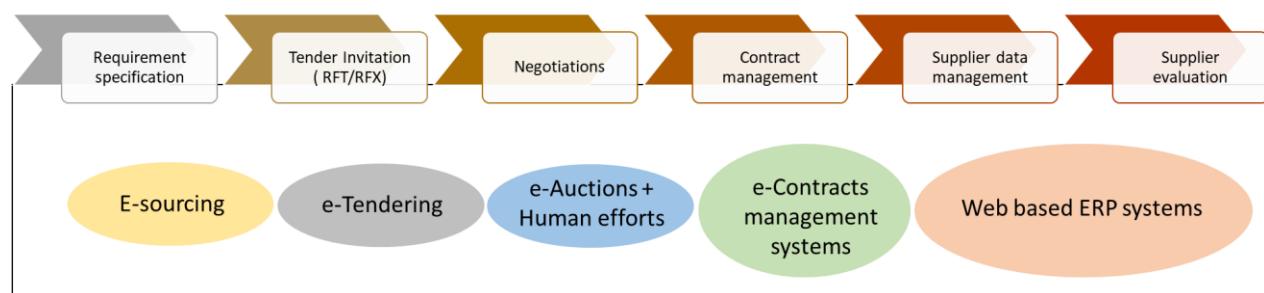
### Conventional S2C Process Execution Cycle

This process starts when a company wants to develop a short-term strategy to keep your business running smoothly. The company identify its needs and then starts to collect information regarding its requirements. this step is known as requirement specification. Requirement

specification is the first step of the Tactical procurement; and is the process of collecting and writing down the requirements of a stakeholder, the goal of this process is to get complete, consistent, clear and easy to understand requirements [12]. In the conventional method the tender process must go through steps and there are very limited parallel steps involved. First a team is planned, tender and evaluation criteria are defined, supplier long list is created, issuance / publishing tender. This manual process can work on satisfactory level and contributes to the company's results, but it requires a lot of time and it engages the procurement department in so many unnecessary steps and increases their efforts, while on the other hand the procurement department does not get time to think on strategic topics. In order to make this process faster and effective below automated concept is proposed which will reduce up to 40% of the process steps, which could then lead to a lot of time saving.

### Proposed Automated S2C Process Execution Cycle

In the proposed concept, all the processes associated with S2C are automated, beside this the exchange of documents and communication exchange across all nodes are electronic, the requirement are collected are automated, the tender process is automated, the negotiation are automated, contract management process is automated and the supplier management processes are also automated with the help of software solutions running in the background. An automated S2C process execution cycle is shown in figure below 3.



**Figure 3: Proposed automated Tactical Procurement process**

### Automated Requirement Specifications

This process cannot be fully automated as human interaction is important, but we propose to implement a platform between the customer and procurement, the procurement would collect the requirements through that platform accompanied by standard templates. Once the requirements are collected an automated requirement analysis platform will finetune the information and will perform automated analysis of the requirement specification will provide a firm basis to the next steps of the S2C process, it will reduce the garbage in garbage out risks. In market there are many software's available which can perform this task on an individual basis.



**Figure 3a: Requirement specification in Tactical Procurement process**

### Automated Tender Processes

By automated tendering processes, the overall tender cycle time is reduced, it helps in fast and accurate pre-qualification of suppliers. The automated tendering process can also be called e-tendering processes.



**Figure 3b: Tender Process in Tactical Procurement process**

### Automated Negotiations

Implementing automated negotiation models can save a lot of time and effort, the negotiation doesn't mean achieving only the best price, it is more than that. These processes can either be fully or partially automated depending on the deal type. In the automated negotiation different models which could be referred as e-auctions are used, some of the famous models are, English reverse auction, Sealed bid auction, Dutch forward auctions, Japanese reverse auctions.



**Figure 3c: Negotiations Process in Tactical Procurement process**

### Contract Automation

The idea is to replace the manual contract management systems with automated contract systems, because with the passage of time these manual trends will be outdated. These could be referred to as smart contracts. You can save time in the signature processes, there are many software already in the market where all the contracts are digitally signed. DocuSign... The automated contracts are efficient, no more time wasting for building templates, it is easy to trace

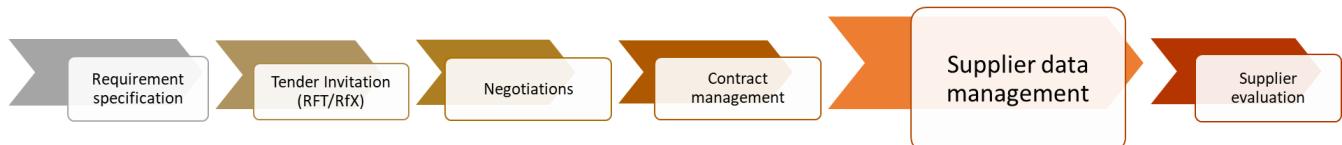
and track the status, automated reminders for the deadlines and renewal. It will lower the overall costs, will bring more transparency, will provide better security and stronger compliance [17].



**Figure 3d: Contract Management Process in Tactical Procurement process**

#### Automated Supplier Data Management

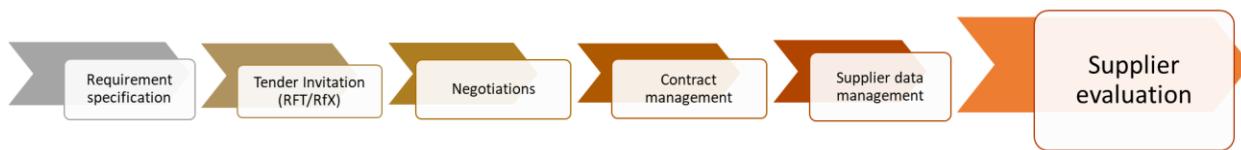
Information is power, the more information. Automated supplier data management would help to reduce or even eliminate all the risks, as there would be high level of transparency involved, you would be able to track and trace what is ordered from which suppliers, how much, why and where, it has a direct impact on your spend management processes. It will also help to minimize the risks of fraud and will improve the claim management processes. The automation of this process provides the opportunity to the companies to utilize their time more effectively and focus on finding the right suppliers for their needs, it also track the active suppliers and reduce the time spent on managing the non-active suppliers, it also makes the supplier onboarding process more efficient [21].



**Figure 3.2e Supplier Data Management Process in Tactical Procurement process**

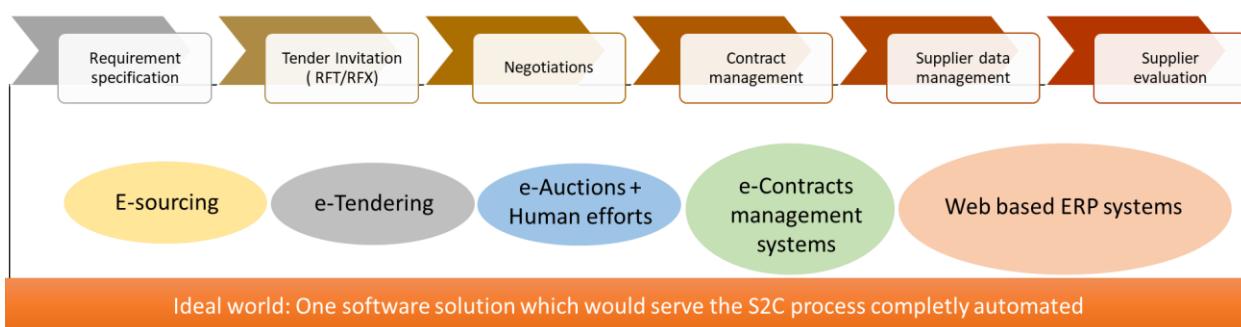
#### Automated Supplier Evaluation

Supplier evaluation is a really important step of tactical procurement, it gives the companies a guideline which suppliers should be given the business, if the suppliers are not evaluated correctly it can make your whole business prone to risks. One should never give an assignment to a supplier who is not the correct one for that specific job. In the recent years, there have been incidents where; The suppliers are evaluated under certain criteria, the criteria are pre-defined by the business and all the data are; The suppliers are classified into A, B, C suppliers, which shows the importance of those suppliers to your business, you can have your preferred supplier, which whom you can automate your operational procurement processes.



**Figure 3f: Supplier Evaluation Process in Tactical Procurement process**

The ideal solution would be to automate the whole S2C process with one software solution, which could be then connected with the P2P process as well and this whole process, the companies have who want to embrace digitization should think of one solution which could not only automate the tactical procurement but rather the whole procument as one.



**Figure 4: One software solution for the whole Tactical Procurement process**

### Possible Risk Mitigation Benefits of Proposed Solution

As procurement automation is the need of time, the companies who wouldn't automate will remain far behind or would run out of systems [29]. Benefits of the automation which will mitigate the risks are:

**Cost reduction:** The prime goal of any procurement is to generate more savings, and the automation of the processes will achieve this direct as it has a direct impact on savings, costs reductions, cost avoidance. The automation of process can make the business to save in millions by reducing maverick buying, long processes, waiting times, reworks, manual tasks [38].

**Optimized workflows:** The automation of the S2C processes will optimize and streamline the existing workflows, as the S2C processes requires a lot of collaboration and cooperation between the teams, so optimization of workflows will ensure the success of the procurement processes. This will enable the procurement to trace and track the approved suppliers, the SRM, prices, the agreed terms and conditions and bottlenecks. On the other hand, it will also enable the stakeholders including suppliers to view the process flows in real time, which will lead to better cooperation between all departments [36].

**Improved supplier relationship management:** Good supplier relationship management is the key to success of any procurement organization, and this is considered as a top priority in the strategic procurement. The automation of the supplier management will provide the basis to work with the right suppliers. By having the right suppliers in the system, the overall trust level will be increased which will result into best results.

**Reduced process and communication time:** One of the most important part in procurement is the time, the more time you waste the more your procurement loses, this time could be the process cycle time or the communication time with suppliers or internal. The automation of S2C process will reduce the communication time between the procurement and supplier as well within the execution of processes, this will lead to the overall success of the organizations. When we talk about the communication with suppliers, some researches show that typical communication calls between the supplier and procurement takes an average of 6 minutes per call for basic interaction [25]. So, if this communication is reduced even to 3 minutes per call, it will have a tremendous impact on the performance of the procurement.

**Budget control & reduced invoice costs:** Another important benefit of the S2C automation would be to have a good grip and control on your budget, the overall funds will be tracked and traced more efficiently. If your invoices are automated, the invoice costs will be reduced immensely [37].

**Transparent cash flows:** With the manual process it is difficult to achieve efficient and effective results, but with the automation of the processes you can achieve transparent cash flows, it will bring clarity who is buying what at which prices under which term and conditions. The automation of this process can provide better cash management and impressive earning growth for any organization.

**Improved transparency level:** The automation of the S2C process will increase the transparency level, if information is considered as power, then the transparent information could be considered as super power. Improved transparency can have an impact on all the steps of the S2C procurement processes, your requirement specification process which is the basis for S2C will start transparent and your process will go into the right direction towards improvement.

**Solid basis for P2P processes:** The P2P process is the implementation playground of the S2C processes, if your S2C processes are automated, transparent and up to mark, automatically your P2P processes will be improved and best in class, on the other hand with the P2P automation the end user is automatically empowered. The user will be provided with electronic catalogues, from which he/she can select his required products easily. With electronic catalogues, the suppliers offer and provide products electronically and provide buyers more visibility into product and price information [30].

**Reduced Maverick Buying:** Maverick Buying means that when someone within an organization buys/source a product or service without involving the procurement and this is one

of the major risks to any procurement organization [31]. Maverick buying causes spend “leakage”, it impacts the spend transparency because of the usage of non-contracted standard suppliers [33]. If you don’t have total spend visibility, you cannot perform effective spend analysis, organization money is wasted, proper data management is compromised and above all the risk of non-compliance increases [34]. As the automation of S2C processes increase the transparency level of spend, thus the maverick buying could be significantly reduced.

## **CONCLUSION**

Procurement is one of the most important part of supply chain management, if the procurement processes are properly executed the remaining steps of supply chain will be automatically improved which would produce better results in terms of cost savings and customer satisfaction. As the world is already progressing into the digital revolution, so most of the industries are moving toward digitization and supply chain management and procurement are also keeping their pace to remain in this race of digitization if not it will stay behind and will be vanished from the scene. In today complex world, achieving savings is not enough; the digital transformation needs to transform procurement from corporate functions to customer centric services.

Tactical Procurement defines short terms strategies and plans up to 1 year to keep your business running smooth and consist of different independent processes. The tactical procurement is one of the bases for the execution of operational procurement processes. So, if your S2C process are going into the wrong direction, the overall procurement performance will be affected. If the companies and organizations want to go with the same pace with the digital revolution of the world, these processes of the tactical procurement should be automated. The automation of the S2C processes will not only reduce the costs, but will increase the transparency level of spend, the contracts will be efficiently managed, the correct suppliers who can do the job better will be taken on board, the risks of the manual processes will be mitigated, a great amount of time will be saved, the overall performance of the organization will be improved and above all a solid platform for the automated P2P processes will be set.

Future ideas: The basis target of procurement will always be to save money and to get best deals for customers. This research paper could be a door opener to see how the other type of procurements could be automated.

## **REFERENCES**

- [1] Malvi Goyal, LET'S GET INTERNET OF THINGS (IOT) READY FOR PROCUREMENT!, <https://www.zycus.com>, Jan 4th, 2018.
- [2] Purchase Control, "<https://www.purchasecontrol.com/>," Purchase Control, 2019. [Online]. Available: <https://www.purchasecontrol.com/uk/blog/tactical-purchasing/>.

- [3] Business Dictionary, "<http://www.businessdictionary.com>," Business Dictionary, [Online]. Available: <http://www.businessdictionary.com/definition/strategic-procurement.html>.
- [4] CIPS (Chartered Institute of Procurement & Supply, "<https://www.cips.org>," CIPS (Chartered Institute of Procurement & Supply, [Online]. Available: <https://www.cips.org/en/knowledge/procurement-topics-and-skills/strategy-policy/procurement-strategy-development1/strategic-procurement/>.
- [5] Lowrance,W.W., "The Nature of Risk'in Schwing, RC and Albers, WA (eds.) How Safe is Safe Enough," Plenum Press, New York. NY, 1980.
- [6] P. H. D. a. N. K. Simon, " Project Risk Analysis and Management Guide," Association for Project Management, Norwich, 1997.
- [7] H. Kerzner, Project Management: a systems approach to planning scheduling and controlling 9th ed, New Jersey: John Wiley & Sons, 2006.
- [8] Norrman, A. and Lindroth, B., "Supply Chain Risk Management: Purchasers' vs. Planners' Views on Sharing Capacity Investment Risks in the Telecom Industry.," in *11th International IPSERA conference*, Enschede, The Netherlands, 2002.
- [9] Crefield, "Understanding Supply Chain Risk: A Self-Assessment Workbook Centre for Logistics and Supply Chain Management at the Cranfield School of Management," 2003. [Online].
- [10] Jamie Taylor, "<https://www.basware.com>," Base Ware, 2018. [Online]. Available: <https://www.basware.com/en-gb/blog/february-2018/what-is-purchase-to-pay-and-why-would-you-automate/>.
- [11] John Spacey , "Simplifiable," <https://simplifiable.com>, 11 April 2017. [Online]. Available: <https://simplifiable.com/new/requirements-risk>.
- [12] Omar Elgabry, "medium.com," OmarElGabry's Blog, 13 September 2016. [Online]. Available: <https://medium.com/omarelgabrys-blog/requirements-engineering-elicitation-analysis-part-5-2dd9cffafae8#targetText=Requirements%20Specification,to%20understand%2C%20complete%20and%20consistent.&targetText=First%20iteration%20you%20specify%20the,a%20more%20>.
- [13] Will Kenton, "Investopedia.com," Investopedia, 9 April 2019. [Online]. Available: <https://www.investopedia.com/terms/t/tender.asp#targetText=Tendering%20usually%20refers%20to%20the,response%20to%20a%20takeover%20offer..>
- [14] S. Faris, "<https://smallbusiness.chron.com/>," Chron, 25 March 2019. [Online]. Available: <https://smallbusiness.chron.com/importance-contracts-business-906.html##targetText=In%20business%2C%20contracts%20are%20important,will%20be%20paid%20for%20services..>

- [15] Ernesto Carrera, "<https://www.springcm.com/>," [Online]. Available: <https://www.springcm.com/blog/weighing-automated-with-manual-contract-management>.
- [16] T. Cummins, "<https://www.iaccm.com/>," IACCM, 29 October 2012. [Online]. Available: <https://www.iaccm.com/resources/?id=6845>.
- [17] Tara Naugter, "<https://www.contractworks.com/>," Contract works, 11 August 2017. [Online]. Available: <https://www.contractworks.com/blog/4-benefits-of-using-an-automated-contract-management-system>.
- [18] smart, "<https://www.smartbygep.com/>," GEP, 2019. [Online]. Available: <https://www.smartbygep.com/insight/procurement-glossary/what-is-supplier-master-data-management##targetText=Supplier%20Master%20Data%20Management%20is,records%20about%20a%20company's%20suppliers..>
- [19] B. Duteil, "<https://blog.ecratum.com/>," Ecratum, 2017 Jan 2017. [Online]. Available: <https://blog.ecratum.com/supplier-master-data-why-is-data-quality-important-for-smes>.
- [20] Direct Commerce, "<https://www.directcommerce.com/>," Direct Commerce, 16 Feb 2017. [Online]. Available: <https://www.directcommerce.com/blog/ap-automation-and-vendor-master-data/>.
- [21] Nicholas Pearce, "<https://www.hicxsolutions.com/>," HICX, 12 December 2018. [Online]. Available: <https://www.hicxsolutions.com/supplier-master-data-management-benefit-organisations/>.
- [22] Business and Employment, "Procedure for Evaluation and Selection of suppliers," 2011). [Online]. Available: <http://procurement.hubpages.com/hub/Evaluation-and-selection-of-suppliers>.
- [23] Margaret Rouse, "[www.techtarget.com/](https://www.techtarget.com/)," Techtarget, 2012. [Online]. Available: <https://searcherp.techtarget.com/definition/procure-to-pay-P2P>.
- [24] C. K. LIN, "Operational Procurement/Purchasing," <https://blog.thunderquote.com/2017/03/07/operational-procurementpurchasing/>, 2017.
- [25] Claritum , "<https://www.claritum.com/>," <https://www.claritum.com>, 2018. [Online]. Available: <https://www.claritum.com/challenges-traditional-procurement-process/>.
- [26] M. H. D. Systems, "The Disadvantages of Manual Document Filing Processes," 2017. [Online]. Available: <https://blog.mesltd.ca/the-disadvantages-of-manual-document-filing-processes>.

- [27] Richard Fransis, "<https://www.business2community.com/>," Business 2 Community, 2013. [Online]. Available: <https://www.business2community.com/strategy/why-every-business-should-consider-purchase-to-pay-automation-part-1-0497095>.
- [28] P. K. M. Dr. Marcell Vollmer, "CPO Survey 2018, What's the Next Big Thing in Procurement," <https://www.ariba.com>, 2018.
- [29] Amy Grassl, "<https://blog.esker.com/>," Esker Blog, 22 October 2015. [Online]. Available: <https://blog.esker.com/5-benefits-of-p2p-automation/>.
- [30] S. Matters, "<http://spendmatters.com/>," 20 07 2017. [Online]. Available: <http://spendmatters.com/2017/07/20/8-benefits-procurement-technology-tools/>.
- [31] Linda Ashok, "<https://www.zycus.com/>," Zycus, 15 July 2019. [Online]. Available: <https://www.zycus.com/blog/procurement-technology/ways-to-identify-and-stop-maverick-buying.html>.
- [32] Abhishek Nannore, "<https://www.beroeinc.com/>," Beroeinc, 25 March 2014. [Online]. Available: <https://www.beroeinc.com/whitepaper/maverick-buying/>.
- [33] Paul Rogers, "[https://www.scm-portal.net/glossary/maverick\\_purchasing.shtml](https://www.scm-portal.net/glossary/maverick_purchasing.shtml)," SCM Portal, [Online]. Available: [https://www.scm-portal.net/glossary/maverick\\_purchasing.shtml](https://www.scm-portal.net/glossary/maverick_purchasing.shtml).
- [34] Rob Biedron, "<https://www.purchasecontrol.com/>," Purchase Control, 20 November 2018. [Online]. Available: <https://www.purchasecontrol.com/uk/blog/maverick-spending/>.
- [35] Charles Dominick,, "<https://www.nextlevelpurchasing.com/articles/maverick-buying.php>," NLPA, 2013. [Online]. Available: <https://www.nextlevelpurchasing.com/articles/maverick-buying.php>.
- [36] K. Freer, "<https://www.corcentric.com/>," 21 02 2017. [Online]. Available: <https://www.corcentric.com/blog/the-transformative-power-of-p2p-automation/>.
- [37] Palettesoftware.com, "<https://www.palettesoftware.com/>," 06 10 2016. [Online]. Available: <https://www.palettesoftware.com/the-future-of-p2p-2/>.
- [38] myInvenio, "<https://www.my-invenio.com/>," 2019. [Online]. Available: [https://www.my-invenio.com/p2p-roi-calculator/?utm\\_term=%2Bbenefits%20of%20%2Bp2p&utm\\_campaign=%5BSEARCH%5D+Procure+to+Pay&utm\\_source=adwords&utm\\_medium=ppc&hsa\\_tg=t=kwd-424998589641&hsa\\_grp=54670286338&hsa\\_src=g&hsa\\_net=adwords&hsa\\_mt=b&hsa\\_ver=3&hsa\\_ad=2](https://www.my-invenio.com/p2p-roi-calculator/?utm_term=%2Bbenefits%20of%20%2Bp2p&utm_campaign=%5BSEARCH%5D+Procure+to+Pay&utm_source=adwords&utm_medium=ppc&hsa_tg=t=kwd-424998589641&hsa_grp=54670286338&hsa_src=g&hsa_net=adwords&hsa_mt=b&hsa_ver=3&hsa_ad=2).
- [39] Werner Jannings, "[www.supplyon.com/](https://www.supplyon.com/)," www.supplyon.com, 2019. [Online]. Available: <https://www.supplyon.com/en/solutions/purchase-to-pay/>.

- [40] Procurement Academy, Operational Procurement, Procurement Academy, 2019.
- [41] Brindley Clare, Supply Chain Risk, Hampshire: Ashgate Publishing Limited, 2004.
- [42] Deloach J.W., Enterprise-Wide Risk Management: Strategies for Linking Risk & Opportunity (Financial Times Management Briefings), London: Financial Times/Prentice Hal, 2000.
- [43] Jim Lawton, "<http://blog.sourcinginnovation.com/>," 2007. [Online]. Available: <http://blog.sourcinginnovation.com/2007/02/14/five-types-of-supply-risk-and-how-to-mitigate-them.aspx>. [Accessed April 2019].
- [44] D. Dujak, D.Sajter, "Blockchain Applications in Supply Chain," in *SMART Supply Network*, Cham, Springer, 2019, pp. 21-43.
- [45] Konstantinos Christidis, Michael Devetsikiotis, "Blockchains and Smart Contracts for the internet of things," *IEEE*, pp. 2292-2303, 2016.