

EMPOWERING END-USER BY RISK MITIGATION CONCEPTS IN OPERATIONAL PROCUREMENT THROUGH DIGITIZATION

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ABSTRACT: *The current digital revolution has an impact on every sector of the Business, so automatically the procurement processes will also be affected; words like “Industry 4.0”, “IoT” and “Procurement 4.0” are floating all around. The purpose of this research paper to show that procurement is also a vital part of the supply chain industry. Procurement has three levels in which it is used in the industry i.e. Strategic, Tactical and Operational. The focus is further narrowed down to show operational procurement processes (P2P/R2P) in deep. The risks associated with P2P processes have been discussed in detail, further it is also shown how these risks can possibly be mitigated with automation. Automation of operational procurement processes in today’s competitive world is very important and this research shows how these automation concepts can be implemented, and which benefits will it bring to any organization? Emerging literature, case studies, blogs, expert opinions, citations are used to fulfill this task. This research contributes to explore further research on the automation of tactical and strategic procurement processes*

KEYWORDS: procurement, operational procurement (p2p/r2p), supply chain management, IOT (internet of things), scrm, procurement 4.0, industry 4.0, automation, risk management, maverick buying

INTRODUCTION

The digital revolution is already knocking at our doors, with the fast growth in technology, the supply chains have become more complex, the more the supply chains are complex the more they are challenging and are prone to risks, but the digital age also gives us the edge to do complex things faster. The terms like “Industry 4.0” and “IoT” are hot topics these days and many believe that the supply chains and other industries must be ready to avoid the risks of going out from the race of new era, but the companies must invest in the right technologies, people and processes in order to get the utmost advantages [1].

On other hand, the digital age also simplifies our daily lives in many ways, we can book our flights and hotels in travel portals, we can order things online and do our online banking and many more, simply we cannot live without it [2]. This digital revolution has an impact on almost every industry of the Business which make it prone to different risks, but it has a greater impact on the supply chain industry and as procurement is a vital part of supply chain, automatically the impact will hit the procurement part as well and will make supply chain more prone to risks and thus these complexities have made the procurement processes, time consuming and very costly. If supply

chain is considered as the vein of any organization, procurement is then the injection point of the right material to flow in the vein to keep it running. Procurement has three levels in which it is used in the industry i.e. Strategic, Tactical and Operational. For many people there has been confusion to differentiate between Purchasing and Procurement and in fact, both are not the same, it will be explained later. Risk management associated with operational procurement is also the focus of this research. Risk management is used to plan and avoid possible risk scenarios with traditional strategies. Risk management is methodically distinguishing risks to a supply chain and creating approaches to limit them. Traditionally risk management is all about identifying, analyzing and evaluating possible risks. Different strategies and concepts are used to minimize and mitigate risks. In the scope of this research, we will see that how automation of processes will mitigate the risks operational procurement. Three main research questions to investigate in this research

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

METHODOLOGY

In this research, risk management through automation of processes is shown to mitigate risks associated with operational procurement which is also known as Procurement to pay (P2P) or Requisition to pay (R2P). we have compared conventional operational procurement with automated operational procurements and the risks associated with it. All the processes involved in this procurement type are deeply investigated 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. Further to this, typical organizational scenarios have been taken into consideration and the impacts have been measured through different scenarios.

Procurement and Purchasing are not the same: Purchasing is a narrow and simple function in any organization and it means to buy something for a specific price, while procurement is has a wider domain and includes the entire process through which resources services, people, facilities and material for any project are obtained [3].

Procurement and its types: Procurement is defined by 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 transferred. Typically, procurement can be divided into 3 types.

a. 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 which are critical for the business [4], on the other hand it focuses to reduce suppliers, identifying critical suppliers and maintaining long term relationships with Strategic suppliers [5]. 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

b. Tactical procurement:

Also known as S2C (Source to contract), this refers to the short-term plans upto 1 year and transactional activities to keep the business running smoothly [6]. 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

c. Operational Procurement:

This type of procurement is our focal point in this research.

1.1. Procurement Roles:

In any organization, there must be a procurement department, a set of roles are also defined from strategic level to Operational level in figure 2.1.

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
Buyer	Tactical & Operational
Operational Buyer	Operational

Figure 2.1 Procurement roles

Understanding Risk:

Risk cannot be defined in specific words; it is the probability of the unforeseen occurrence of something, which can have a negative impact on any Business. In general, the supply chain risk is considered to have negative impact on supply chain, it is important to manage negative risk in order to gain maximum productivity rather than studying positive risks, which are already in favour of industry. Different authors have defined risks differently, some important definitions are discussed here:

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 [7].

Risk is the possible chances of taking place of an uncertain outcome or situation that have negative effects on results of a project [8]. 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 [9].

Overall, supply chain of today is more complex and challenging as it was never, with businesses going globally, there are different mode of procurement and transportation involved especially for international supply chains.

As companies are manufacturing in economical parts of world and sell in other parts of the world to gain maximum commercial advantages. This leads to relatively long supply chains, which are quite challenging and require 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 types of risks, which are more common nowadays, are the traceability of goods for transportation and for its entire lifecycle. This traceability of products can give confidence to users about its originality, genuineness and origin. Moreover, in the future of digitalization i.e. “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 disturbs the flow of information or material from base supplier to end customer is considered as risk in supply chain [10]. Risks in supply chain can be categorized into two main types, **a.** External risks **b.** Internal risks. Examples of external risks are Supply risk, geopolitical risks, business risks, environmental risks, demand risks, economic risks etc. Internal risk examples are manufacturing risks, Material flow risks, process risks, technological risk, cultural risks, control risks etc. [11].

Risks with conventional Operational procurement

The conventional operational procurement includes a lot of manual work to perform a P2P cycle; every node of the P2P process is prone to different risks. P2P process includes many individual processes that involve many people and is carried out across different part of an organization. If this process is executed manually, it leads to complexity, sometimes confusion, takes more time and effort, and allows room for human error [12]. Below are some prominent risks associated with manual & conventional P2P processes.

Manual filling processes: This is one of the biggest risks associated with manual operational procurement; this means that all the processes are performed manually by your staff. This process is slow in terms of tasks performance, it includes 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, change management is hard in terms adding or deleting new information to your purchase, increased access time, 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 documentation 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, on the other hand electronic processes are also recommended for the climate (the topic on a hype these days).

RESULTS

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 the 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]. A typical procure to pay process is shown in below figure 3.1



Figure 3.1: Conventional “Procure to Pay” (P2P/R2P) process

A typical traditional operational process includes a lot of manual tasks and events, it also includes many repetitive and small tasks i.e. identifying requirements, approvals, issuance of purchase order, payments etc. and further to this, proper follow up and communication with suppliers [15]. This manual procurement process also includes many manual documentation filing processes which also require a lot of space for document filling that could be very prone to damage, loss and theft [16]. Most of the businesses in this digital era are still using the conventional P2P process to

meet their operational procurement needs knowing the fact that the digital revolution is eradicating the conventional procurement methods, this ignorance is one of the most prominent risk associated with operational procurement. Indeed, it is hard to understand that still the P2P automation to mitigate its risks by significant improvements with speed and accuracy is still under radar for so long [17].

SAP conducted a survey in a partnership with the University of Applied Sciences Würzburg-Schweinfurt Germany with more than 450 procurement leaders as participants across the globe. This survey shows that more than 83% of procurement leaders are of the opinion that this digital transformation would affect the supply chains, as these companies are not ready for the change yet. While on the hand, there were only 5% companies, which are already in the process of adopting to the digital revolution and have already implemented highly automated processes in their organizations [18].

Our idea is to automate all the above cycles in the p2p process, which could save a lot of time, effort and costs. The process/cycles would be broken down into blocks for automation and to be automated with the help of a software running in backend. Below figure 3.2 shows how an automated P2P process should look like when it is divided into blocks.

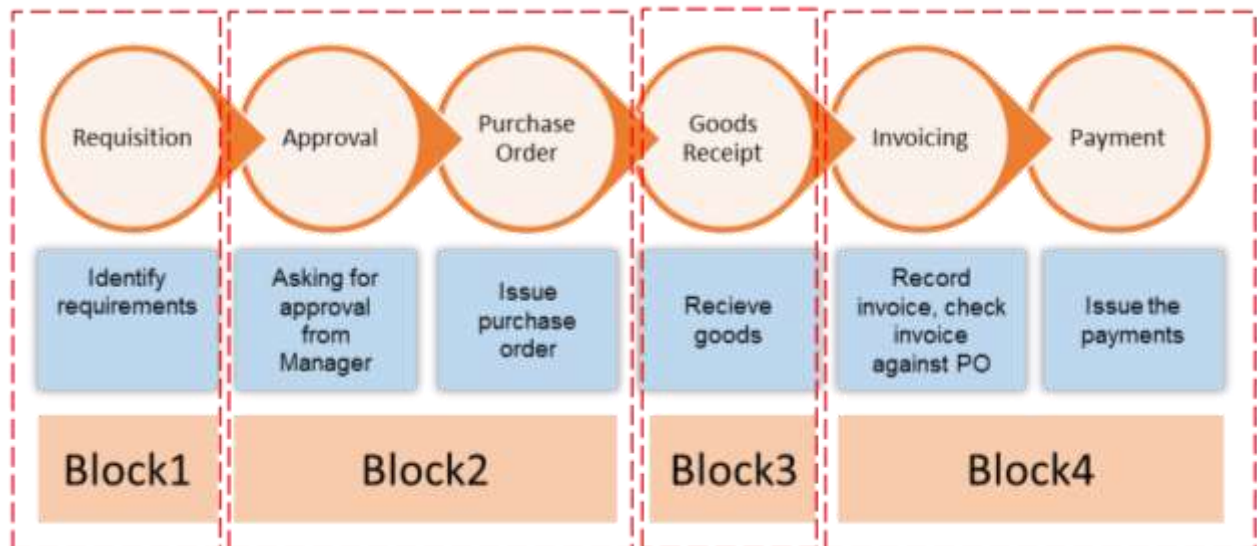


Figure 3.2 Automated "Procure to Pay" (P2P/R2P) process split in blocks

This automation of the processes will result in great cost savings and will mitigate the major risks associated with P2P processes. The details of the process steps are compared in the explanation chapter.

Explanation

In this chapter, we have compared the conventional P2P process with the proposed automated solution and have identified the potential benefits which can be achieved by automating the P2P process across the company.

Conventional P2P process execution cycle

The End user / Customer identify his/her requirements, needs, and send this information to the Operational Procurement department to purchase his/her desired products. The Operational Procurement department receives the request and perform two tasks. 1: Takes approval from manager if required 2: Issuing a PO to the supplier for the purchase. The supplier receives the POs and performs two tasks: 1: Checking the availability of stock of the requested products, if the product is not available, it contacts its internal departments to arrange the products, and if the product is available it proceed to second task 2: Arranging delivery to customer along with a hard copy invoice. The Warehouse on the customer side receives the products and inform the procurement department about the receipt of the products. The operational Procurement check the quantity and quality of products against the PO's, in case of discrepancy, it informs the claim department and suppliers and in case of no discrepancy, it sends an information to the end customer about the arrival of the product and inform the Finance department about the payment approval. The finance department issue the payments and that is how a P2P execution cycle is closed. The conventional P2P process cycle is executed as below 4.1.



Figure. 4.1 Conventional P2P process execution cycle

This process works perfectly 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 40% of the process steps, which could then lead to a lot of time saving.

Proposed Automated P2P process execution cycle

In the proposed concept, the process is mainly automated, the exchange of documents across all notes are electronic, the invoices are automated, and the payment are done electronically. A automated P2P process execution cycle is shown in figure below 4.2.



Figure. 4.2 Automated P2P process execution cycle

The end user should be given an access to an automated system running behind the scene. The user will login into the system and will see a catalog of all the possible supplies /products he needs. The solution will be user friendly. He will just search for the products he/she need, as a result he/she will receive a complete catalog of all the supplies/products along with the information of suppliers who are providing these products, price comparison of that time, availability information, delivery dates and many more.

This will give the end user to choose which product and supplier fits his/her requirements the best. The user will select the choices, which suit him/her the best and will press the button “ORDER”. In the background within milliseconds, all the parameters will be checked which are allocated for the user and for which he already has got pre-approvals and the PO will be sent to supplier. As the supplier will also be using automated systems, his system will check all the information, Item locations, availability etc. and the information will be sent to the automated dispatch desk. The goods/items will be dispatched to the customer and a computer-generated invoice will be sent to the customer as well as to the finance department. The customer will receive the products, he will check quantity, quality of the products against the PO using bar code scanners, if everything is ok an automated an “OK” message will go to the finance department and the finance department will process the payments.

This process will save a lot of time, will bring an overall transparency and will reduced the risks.

Benefits and risk mitigation of the proposed solution:

P2P Automation is the need to time and the companies who do not do it will remain far behind or there are chances that they run out of the business [19].Some of the other key benefits of P2P Automation includes.1. End user empowerment 2. Reduced Maverick-Buying 3. Efficient, effective and transparent cash flow management 4. Streamlined and Optimized workflows 5. Real time budget control, 6. Reduced communication time, 7. Reduced overall costs 8. Improved supplier relationship management.

End user empowerment:

The main an important benefit is the empowering of the end user to skip P2P department for the basic supplies. 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 [20]

Reduced Maverick Buying:

Maverick Buying means that when someone within an organization buys/source a product or service without involving the procurement. Maverick Buying is one of the biggest threats to any Procurement organization, because maverick buying simply bypasses the procurement processes and procedures, contracts, negotiations, price comparisons, contract agreements etc. [21]. Maverick Buying refers to a procurement, which is uncontrolled and unplanned and is executed

without the consultation of procurement department; this process does not compliance with the standard purchase practices, framework agreements, price comparison and negotiation [22]. Maverick buying causes spend “leakage”, it impacts the spend transparency because of the usage of non-contracted standard suppliers [23]. Maverick buying have adverse effects on any organization and can push any company closer to the brink, because it costs you time, money, manpower to perform the purchasing tasks and 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 [24].By automation of the P2P, the transparency level of spend increases, it becomes clear who is buying what from whom at which price, thus the maverick buying could be significantly reduced. Many buyers as well as suppliers who use spend analytics solutions and transactional purchasing systems associate maverick spend reduction as the benefit of their solution [23]. There are certain ways to stop the maverick buying, some organizations prohibit maverick buying as a company policy, some establish clear processes, some arrange trainings to educate the offenders, but all the above are nothing without automation, if you want to achieve better results you need to automate all the processes [25].

Efficient, effective and transparent cash flow:

It is most of the time difficult to get the manual processes efficient as well as effective, but by using automated P2P systems, you will get effective and efficient results and above the overall cash flow will be transparent. It will be clear who is buying what on which price. P2P automation software can provide better cash management capabilities and impressive earnings growth despite challenging market conditions.

Streamlined and Optimized workflows:

By automating the P2P process, the work flows will be optimized and streamlined. This enables procurement to immediately see the approved suppliers, product pricing, and agreed terms & conditions. The automated process will also enable all stakeholders, including suppliers, to view the orders in real time [26]. On the other hand, this will bring clarity and transparency among the process will result in better cooperation and integration between different departments.

Real time budget control & reduced invoice costs:

Real time budget control can gives us the opportunity to keep a track on your funds. The automation of the process has made it possible for an electronic invoicing to go directly to payment without the involvement of any human, so it will reduce the invoice costs immensely [27]. According to some studies an average invoice cost in manual system can range from 10\$ to 15\$.

1.1.1. Reduced communication time:

The automation of P2P will reduce the communication time between the buyer and supplier quite big time.

Some studies show that typical phone calls between a buyer and a supplier can take an average of six minutes per call for basic interactions [15]. On the other hand, the buyer also need time to communicate his managers for approval, and other people involved in the process that also requires time. By using the automated concept these steps will be removed from the process, it will automatically reduce the communication time.

Reduced Costs:

The automation of P2P has a direct impact on the cost savings, enabling automated P2P automated processes can make your business to save in millions by reducing maverick buying, reduced Manuel changes, reduced reworks, reduced cash discount loses [28].

Improved supplier relationship management:

Supplier relationship management is considered as part of strategic procurement, but by the automation of the P2P this process will also be improved. In short, the automation of the P2P processes will provide base for the strategic procurement department to work on their supplier relationship management policies.

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. Supply chain management and procurement are also keeping up 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.

P2P is the operational part of Procurement and it revolves around the execution of the day-to-day procurement activities. It could be referred to as the implementation playground for the achievements of strategic procurement in terms of negotiation and securing best prices, so if P2P is going in the wrong direction the overall procurement will get affected. P2P Automation is the need to time and the companies who do not do it, will remain far-behind or there are chances that they run out of the business.

By the automation of P2P processes not only costs will be reduced, but also the people working in the P2P departments will get a chance to think on more strategic topics which will bring more value to the organization overall. All the process cycles of P2P should be automated and should be treated as one process backed by a user-friendly software.

By automation of the P2P, the transparency level of spend increases, it becomes clear who is buying what from whom at which price, the cash flow management will become more effective and efficient, the workflows will be streamlined thus the maverick buying which is one of the biggest risks associated with procurement could be significantly reduced. On the other hand, it will also empower the end users to procure by themselves against the agreed terms and prices of the procurement department.

Future ideas: The prime 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 two types of procurements could be automated.

- How can digital technologies be used to improve steps of strategic procurement?
- How the tactical procurement could be improved Digital technology

References

- [1] Malvi Goyal, LET'S GET INTERNET OF THINGS (IOT) READY FOR PROCUREMENT!, <https://www.zycus.com>, Jan 4th, 2018.
- [2] Werner Jannings, "www.supplyon.com," www.supplyon.com, 2019. [Online]. Available: <https://www.supplyon.com/en/solutions/purchase-to-pay/>.
- [3] Procurement Academy, Operational Procurement, Procurement Academy, 2019.
- [4] Business Dictionary, "<http://www.businessdictionary.com>," Business Dictionary, [Online]. Available: <http://www.businessdictionary.com/definition/strategic-procurement.html>.
- [5] 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/>.
- [6] Purchase Control, "<https://www.purchasecontrol.com/>," Purchase Control, 2019. [Online]. Available: <https://www.purchasecontrol.com/uk/blog/tactical-purchasing/>.
- [7] 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.
- [8] P. H. D. a. N. K. Simon, " Project Risk Analysis and Management Guide," Association for Project Management, Norwich, 1997.
- [9] H. Kerzner, Project Management: a systems approach to planning scheduling and controlling 9th ed, New Jersey: John Wiley & Sons, 2006.
- [10] 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.
- [11] Crefield, "Understanding Supply Chain Risk: A Self-Assessment Workbook Centre for Logistics and Supply Chain Management at the Cranfield School of Management," 2003. [Online].
- [12] 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/>.
- [13] Margaret Rouse, "www.techtarget.com," Techtarget, 2012. [Online]. Available: <https://searcherp.techtarget.com/definition/procure-to-pay-P2P>.

-
- [14] C. K. LIN, "Operational Procurement/Purchasing," <https://blog.thunderquote.com/2017/03/07/operational-procurementpurchasing/>, 2017.
- [15] Claritum , "https://www.claritum.com," <https://www.claritum.com>, 2018. [Online]. Available: <https://www.claritum.com/challenges-traditional-procurement-process/>.
- [16] 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>.
- [17] 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>.
- [18] P. K. M. Dr. Marcell Vollmer, "CPO Survey 2018, What's the Next Big Thing in Procurement," <https://www.ariba.com>, 2018.
- [19] Amy Grassl, "https://blog.esker.com," Esker Blog, 22 October 2015. [Online]. Available: <https://blog.esker.com/5-benefits-of-p2p-automation/>.
- [20] S. Matters, "http://spendmatters.com," 20 07 2017. [Online]. Available: <http://spendmatters.com/2017/07/20/8-benefits-procurement-technology-tools/>.
- [21] 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>.
- [22] Abhishek Nannore, "https://www.beroeinc.com," Beroeinc, 25 March 2014. [Online]. Available: <https://www.beroeinc.com/whitepaper/maverick-buying/>.
- [23] Paul Rogers, "https://www.scm-portal.net/glossary/maverick_purchasing.shtml," SCM Portal, [Online]. Available: https://www.scm-portal.net/glossary/maverick_purchasing.shtml.
- [24] Rob Biedron, "https://www.purchasecontrol.com," Purchase Control, 20 November 2018. [Online]. Available: <https://www.purchasecontrol.com/uk/blog/maverick-spending/>.
- [25] Charles Dominick,, "https://www.nextlevelpurchasing.com/articles/maverick-buying.php," NLPA, 2013. [Online]. Available: <https://www.nextlevelpurchasing.com/articles/maverick-buying.php>.
- [26] K. Freer, "https://www.corcentric.com," 21 02 2017. [Online]. Available: <https://www.corcentric.com/blog/the-transformative-power-of-p2p-automation/>.
- [27] Palettesoftware.com, "https://www.palettesoftware.com," 06 10 2016. [Online]. Available: <https://www.palettesoftware.com/the-future-of-p2p-2/>.
- [28] 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=%5BSEA%20RCH%5D+Procure+to+Pay&utm_source=adwords&utm_medium=ppc&hsa_tgt=kwd-

424998589641&hsa_grp=54670286338&hsa_src=g&hsa_net=adwords&hsa_mt=b
&hsa_ver=3&hsa_ad=2.

- [29] Brindley Clare, *Supply Chain Risk*, Hampshire: Ashgate Publishing Limited, 2004.
- [30] Deloach J.W., *Enterprise-Wide Risk Management: Strategies for Linking Risk & Opportunity (Financial Times Management Briefings)*, London: Financial Times/Prentice Hal, 2000.
- [31] 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].
- [32] D. Dujak, D.Sajter, "Blockchain Applications in Supply Chain," in *SMART Supply Network*, Cham, Springer, 2019, pp. 21-43.
- [33] Konstantinos Christidis, Michael Devetsikiotis, "Blockchains and Smart Contracts for the internet of things," *IEEE*, pp. 2292-2303, 2016.