CASE STUDY ON COVID-19'S IMPACT ON ENTERPRISE SOFTWARE DEVELOPMENT

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Abstract

The COVID-19 outbreak created an unprecedented context for businesses all around the world. Companies had to face new challenges, resulting in issues related to productivity, duty arrangement, communications, home space negotiations, and their workers' wellbeing. There is not much empirical research on the behavioral, societal, and organizational aspects of COVID-19 and information systems. By analyzing the implemented COVID-19 mitigation strategy, deliverables throughput data, and internal recordings from planning meetings, this single case study aims to provide a detailed view on how the COVID-19 outbreak affected the selected enterprise software development company. The results are then discussed considering Obrenovic et al. Enterprise Effectiveness and Sustainability Model during Pandemic. As the results have not proved any negative impact of the COVID-19 outbreak on the enterprise software development deliverables in the examined company, the possible causes and contributing company attributes are discussed.

1. Introduction

The outbreak of the novel coronavirus SARs-CoV-2 causing the COVID-19 disease, epi-centered in Hubei Province of the People's Republic of China in 2019, has spread to many countries (Velavan & Meyer, 2020). It has put countries, organizations, and citizens in an unprecedented situation the modern digitalized economy has never faced before. Some organizations were not prepared for the sudden switch to remote work, so that they had to carry out changes to progress with digital transformation (Savić, 2020). COVID-19 has dramatically shifted affordances, thus requiring a new communication pattern in terms of frequency, length, and style (Waizenegger et al., 2020). Enterprises characterized by a networked structure, distributed workforce and leadership, flexible and straightforward guidelines, and less interdependence are more adaptable and can deal with disastrous situations more effectively (Obrenovic et al., 2020). One way organizations are increasing their flexibility and distributing the workforce and leadership is undergoing the so-called agile transformations (Fuchs & Hess, 2018). Agile is a set of iterative and incremental software engineering methods (Dikert et al., 2016) that becomes commonplace in many large organizations (Paasivaara, 2017), where agile practices have to be scaled (Paasivaara et al., 2012). Practitioners and consultants offer frameworks for large-scale agile approaches, such as the Scaled Agile Framework® (SAFe) (Fuchs & Hess, 2018). SAFe provides guidelines for achieving business

agility by empowering people to make quick decisions and aligning the right people to do the right work (Knaster & Leffingwell, 2020). Hence, the business agility should better position the enterprise to face the COVID-19 impact.

Every enterprise connected to the global economy had been somehow impacted by the COVID-19 situation. The question is, if the impact of COVID-19 has brought about negative results, decreases in productivity and deliverables. There is only little empirical research on the behavioral, societal, and organizational aspects of COVID-19 and information systems (Ågerfalk et al., 2020). Therefore, more studies are required to understand the way organizations dealt with the COVID-19 impact. This paper contributes to filling the gap by presenting the results from a single case study conducted in a multinational enterprise software development company. The aim is to provide insights into the real-life COVID-19 mitigation and COVID-19's impact. The company's internal documentation on COVID-19 mitigation strategy, data stored in the project management tool and internal recordings are used to examine the COVID-19's impact on running the company. The main contribution of the paper is threefold. First, it presents real-live COVID-19 outbreak mitigation strategy and data depicting the COVID-19 impact on enterprise software deliveries throughput. Second, study provides results from the analysis of internal recordings from planning meetings before and post COVID-19 outbreak, and the findings are discussed in the context of recent state of art. Third, presented findings based on Obrenovic et al. (2020) Enterprise Effectiveness and Sustainability Model during Pandemic can help enterprises better position themselves for further unprecedented situations.

2. Background

This section provides the theoretical background required to understand the context of the study. As the selected company follows the Scaled Agile Framework® (SAFe), SAFe is shortly introduced. Then, some studies focusing on COVID-19's impact on organizations and workers, and the Enterprise Effectiveness and Sustainability Model during Pandemic are described.

2.1. Scaled Agile Framework

Agile, characterized initially as incremental and iterative software development that ensures quick response to change, and is done by closely collaborating teams (Shammi et al., 2011), is spreading through organizations of various types and sizes. The need to scale agile practices goes beyond IT and impacts all corresponding organizational structures (Gerster et al., 2019). As an answer to the need for applying Agile at scale, various frameworks for scaling Agile emerged (Vaidya, 2014). According to the 14th State of Agile Survey (CollabNet VersionOne, 2020), the Scaled Agile Framework® (SAFe) is the most popular framework across large enterprises.

Scaled Agile Framework - SAFe (SAFe, 2020) provides prescriptive guidelines for implementing an enterprise-scale Lean-Agile development. SAFe highlights three levels (Layers) of organization: Team, Program, and Portfolio. For the Portfolio and Full SAFe configurations, the concept of Value Stream is added. The Value Stream is aimed at building and supporting a set of solutions, which are the product, services, or system delivered to the customer (SAFe, 2020). The Team level comprises the agile teams. At the Program level, the so-called Agile Release Trains are introduced to scale many teams and individuals (Putta et al., 2018). Agile Release Train is a long-lived team of agile teams (SAFe, 2020). In SAFe, Agile Release Trains work in 8 – 12 weeks long timeboxes called Program Increments (PI) to incrementally deliver value in the form of working, tested software and systems. Each PI begins with a PI planning event, during which teams estimate deliverables, highlight dependencies and identify risks. Teams are presented with Features, each

representing a service that fulfills the stakeholder's need and is deliverable within one PI. Next, teams create User Stories representing a small pieces of desired functionality, to fulfill the benefit of the feature. Stories are estimated in Story Points, relative numbers without connection to any specific unit of measure. Each story's size (effort) is estimated relative to the smallest story, which is assigned a size of "one". The bigger the size assigned, the higher the complexity of the story. One of the PI planning outcomes is PI Objectives describing what the team plans to accomplish during the PI. The objectives are presented and evaluated by the stakeholders.

To support organizations in managing their large-scale agile environments, software project management tools were designed, such as Rally (Broadcom Inc., 2020). Rally was listed as one of the leaders in the agile planning tools market in Gartner's magic quadrant (Mann et al., 2020). It was marked as providing the highest level of features for managing multiple agile projects for established and mature teams (Mihalache, 2017).

2.2.   Covid-19 Impact

Waizenegger et al. (2020) state that COVID-19 provides a unique context that is significantly different from the pre-COVID-19 outbreak's specifics. Before COVID-19, workers had the autonomy to schedule their professional and domestic tasks flexibly. COVID-19 related changes connected with the enforced working from home have created various challenges resulting in issues related to productivity, duty arrangement, communications, home space negotiations, and wellbeing. To maintain "business as usual", knowledge workers need to adapt quickly to nonconductive working spaces and unfamiliar digital platforms (Waizenegger et al., 2020). Due to the lack of empirical research, Waizenegger et al. (2020) recommended the conduction of further research to answer research questions such as: "*What policies have been initiated and implemented, and how do they support or hamper remote e-working in the post-COVID-19 era?*" (Waizenegger et al., 2020) and "*How has organizational culture shifted and transformed towards the perceptions of remote e-working and flexible working?*" (Waizenegger et al., 2020)

Obrenovic et al. (2020) searched for the factors contributing to enterprise effectiveness and sustainability during the time of the pandemic. Their study concludes that companies with a distributed leadership and workforce are more likely to sustain business operations in times of COVID-19 and any future pandemic. Furthermore, they introduced Enterprise Effectiveness and Sustainability Model during Pandemic (Obrenovic et al., 2020) depicted in Figure 2.
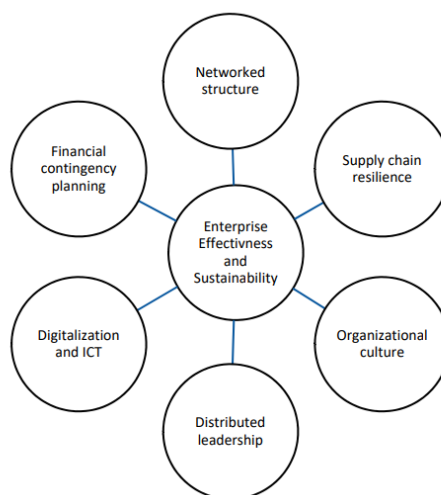

Figure 1 - Enterprise Effectiveness and Sustainability Model during Pandemic conceptual model (Obrenovic et al., 2020)

Obrenovic et al. (2020) described that: (1) organizations with a networked structure are more responsive, resilient in the face of adversity, and are more likely to achieve business sustainability; (2) organizations with a shorter and more diversified supply chain are more likely to sustain their operations during the pandemic; (3) organizations nurturing the culture of flexibility, agility, and resilience find it easier to adapt to changes and reorganize their resources in times of crisis; (4) organizations fostering shared leadership and delegating authority to members of different organizational units allow for the facilitated gathering of intelligence from all functional domains and accounts for faster response to stressful events; (5) prosperous organizations leverage ICT and integrate Intranet, social media, and online communication platforms into their daily business routines, have a better emergency response since they can make use of technology-mediated knowledge, gather, process, and share information and coordinate collaboration in times of crisis; (6) enterprises with financial contingency plans sustain their business operations throughout the pandemic.

3. Research Method

In this section, the overview of the selected method and research steps is provided. Then, the context of the study is described. The case study was selected as a key research method. As Runeson & Höst (2008) state, case studies are used in order to investigate contemporary phenomena in their natural context and allow the researcher to obtain findings through the analysis in depth of typical or special cases and thus understand how the phenomena interact with the context. The conduction of the case study followed the process described by Runeson & Höst (2008) as depicted in Figure 1.
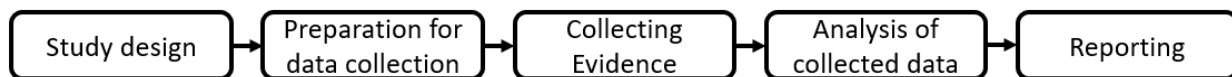

Figure 2 - Case study process *(Runeson & Höst, 2008)*

3.1. Study Design

The objectives of the case study were defined as follows:

- Objective 1 - Examine the COVID-19 outbreak mitigation strategy applied in a multinational enterprise software development company

- Objective 2 - Examine the impact of the COVID-19 outbreak and applied mitigation strategy on the throughput of development teams in a multinational enterprise software development company

- Objective 3 - Examine the impact of the COVID-19 outbreak and applied mitigation strategy on the work planning mechanisms in a multinational enterprise software development company

3.2. Preparation for Data Collection

With an intention to determine and uncover the impact of COVID-19 on the enterprise software development in the selected organization, the data for the period before the COVID-19 outbreak and post-outbreak were required. Hence, it was planned to gather data for the period from February 2019 to March 2021. This timeframe represents 13 months before the COVID-19 outbreak and 13 months post-outbreak. To meet Objective 1, the internal COVID-19 mitigation communication was

used. To meet Objective 2, archival data were used, specifically data available in Rally, the company's project management and tracking tool. To meet Objective 3, archival data were used, specifically recordings from the company's planning sessions.

3.3.   Collecting Evidence

To collect data for the Objective 1, the authors obtained access to the intranet page summarizing all the corporate communication about COVID-19, mitigation strategy, and recommended tools. Next, for Objective 2, the authors obtained access to the project management tool Rally and generated reports for further data analysis using custom reporting templates. The results were downloaded and stored in *.xls files. Last, to fulfill Objective 3, the authors were granted access to the archive with the recordings of the company's records of quarterly planning meetings stored on the company's intranet. All the required data for the examined period were found and downloaded for further analysis.

3.4.   Analysis of Collected Data

Obtained data were analyzed in detail, starting with the analysis of the company's COVID-19 mitigation intranet page. The synthesized insights were extracted into notes and then trimmed for further reporting. Next, custom reports were created using the inbuilt capabilities of the Rally tool. The extracted data were converted to excel and processed there to expand the analysis and reporting capabilities. Then, all gathered recordings from PI Planning team readouts were reviewed. During the review simple systematic annotation (open-coding) was used with intention to mark any COVID-19 related information, statements, risks, or other mentioned impact. The coding was done manually without usage of any data analysis software.

3.5.   Reporting

The outcomes from previous steps were synthesized and summarized. The final reports from the study conduction are presented in Section 4. It was decided to present the data in the form of a combination of descriptive text and graphs.

3.6.   Mapping to Enterprise Effectiveness and Sustainability Model During Pandemic

To understand the preparedness of the examined company for the COVID-19 outbreak and validate the existing research with the reported results, we mapped the current company settings to Obrenovic's et al. (2020) Enterprise Effectiveness and Sustainability Model during Pandemic. The results are provided in Section 5.

3.7.   Case Study Context

The selected organization has been on the market since 1970's. After the acquisition in 2018, it became part of a multinational corporation with more than 20 000 employees. The organization examined in this study underwent the agile transformation in 2016, and since then, the Scaled Agile Framework has been followed. There are various SAFe configurations applied within the organization. The examined Value Stream uses the Portfolio SAFe (SAFe, 2020) configuration. The single-case study was conducted in a division that delivers mainframe software. The analyzed Value Stream specifically focuses on workload automation software, written mostly in low-level programming languages. For newer components, modern user interfaces, higher-level languages like C, Java, or JavaScript are used. The majority of products are represented by onpremise

software sold to customers with license and support for a three-year period with renewal for another three years. The typical customer is a big multinational corporation from various sectors.

There are two Agile Release Trains, together containing 29 agile teams, in the examined Value Stream. The teams are working in sprints of 2 to 4 weeks within the three months Product Increments (PI). Every PI starts with a PI Planning event, which ends with the so-called "PI Readouts," where the teams present and commit to objectives for the upcoming PI, receive feedback, and accept from the stakeholders and leadership. During the PI Readouts, the teams use customized dashboards in the Rally tool, containing the overview of the objectives, features, risks, internal dependencies, and the draft of the plan for the upcoming iterations. The PI Readouts are done by every team and have a maximum of 15 minutes timebox per team. Aside from the objectives, teams also present identified risks and interdependencies with the other teams. PI Planning is done in person if the localization of the team members permits. Typically, the geographically collocated team members gather in one meeting room and connect with the other PI Planning participants via a video conferencing system. Leadership, teams, and even team members within one team are distributed mostly in the Czech Republic and the United States of America. The company culture fosters presence in the office, requiring that the in-house members meet face-to-face daily. Home offices are exceptional.

4. Results

In this section, the results from a single case study are presented. We provide three different perspectives. First, the insights into the COVID-19 outbreak mitigation strategy in the selected company are presented. Second, the results of the Rally tool data analysis are provided. Third, the PI Plannings recordings analysis results are described.

4.1. COVID-19 Mitigation

The first COVID-19 related communication was distributed on January 24, 2020. Travel restrictions to Wuhan, China were restricted, and all travelers were instructed to be more cautious. On January 28, 2020 employees were asked to follow hygiene recommendations, avoid contact with people having any COVID-19 symptoms, and if not feeling well, work from home. Since February 6, 2020, common office areas have received increased cleaning and disinfection. Starting February 13, 2020, all non-essential travel to China and other countries identified as high-risk were restricted. Since February 28 2020, all business trips to high-risk countries were suspended, and all employees were encouraged to avoid personal travels to these countries. Employees returning from high-risk countries were restricted from entering offices for 14 days upon the arrival. Local government actions and quarantines were announced to be respected. Employees' attendance at tradeshows or conferences was suspended. March 3, 2020, employees in high-risk countries requested to work from home, if possible. If office presence was needed, social distancing techniques had to be utilized to minimize interaction with other employees. No visitors were allowed, gyms and breakout rooms closed. All internal and external business trips were suspended. March 24, 2020, the company rearranged office work to follow all local orders by government authorities. The sites started to operate on split shifts, dividing employees into four groups shifting every week, resulting in 25% presence in the office. Starting April 7, 2020, facemasks were required while on-site worldwide. Since April, the mitigation has remained and differentiated by local authorities' orders and recommendations. i.e. in the Czech Republic, the offices remained closed when the government declared a state of emergency (March 12 – May 17, 2020, October 5 – February 14, 2021, February 15 – February 27, February 27 – April 11). Since July 6, 2020, the

shift rotation was changed by dividing employees in two groups only, resulting in an expected 50% presence in the office. When finishing the case study, the suspension of travel, social and physical distancing measures, office rotations, compulsory wearing masks in the office, and reflecting local authorities' orders and recommendations were prevailing.

4.1.1. Mitigation Tools and Support

We reviewed the intranet page related to the corporate communication about COVID-19, and here we summarize our findings. The regular e-mail communications were sent weekly, informing employees about the updates in the mitigation strategy. Every employee had to pass a mandatory web-based training on the COVID-19 mitigation policy. The COVID-19 Intranet portal was created to summarize all available information on COVID-19 mitigation and specific information localized and tailored for all continents and states the company operates in. Employees were distributed Ergonomic Guide for Working From Home in PDF format, which contained best practices for setting up sufficient working space at home, building a home office daily schedule, recommendations for small physical exercises, and a detailed guide on properly setting up ergomical work seat in the home environment. Next, employees were provided a Remote Workforce Toolkit, a set of essential toolkits in situations where they had to work from home or remotely. It contained a VPN connection guide and troubleshooting; information on home network troubleshooting; information on using internal software tools; manuals, best practices, and tips for working with WebEx; and manuals, best practices, and tips for using collaboration tools. The company also opened a COVID-19 testing reimbursement program, which allowed every employee to have a COVID-19 laboraty test and claim its cost every two weeks. This program has later been accompanied by the distribution of self-testing kits to employees.

4.2. Development Teams Throughput

We have examined the impact of the COVID-19 outbreak and applied mitigation strategy on the throughput of development teams in a multinational enterprise software development company. A time period of 26 months was selected for analysis. The period covers 13 months before the COVID-19 outbreak (February 2019 – February 2020) and 13 months after the COVID-19 outbreak (March 2020 – March 2021). The throughput is represented by the number of completed Features and User Stories per month. A Feature represents a service that fulfills a stakeholder's need, and a User Story represents a small piece of the desired functionality to fulfill the benefit of the feature. In practice, it means that one Feature consists of multiple User Stories. The data originate from the Rally tool. Figure 3 represents the total number of Features completed in respective months. Figure 4 depicts a number of User Stories completed in respective months.
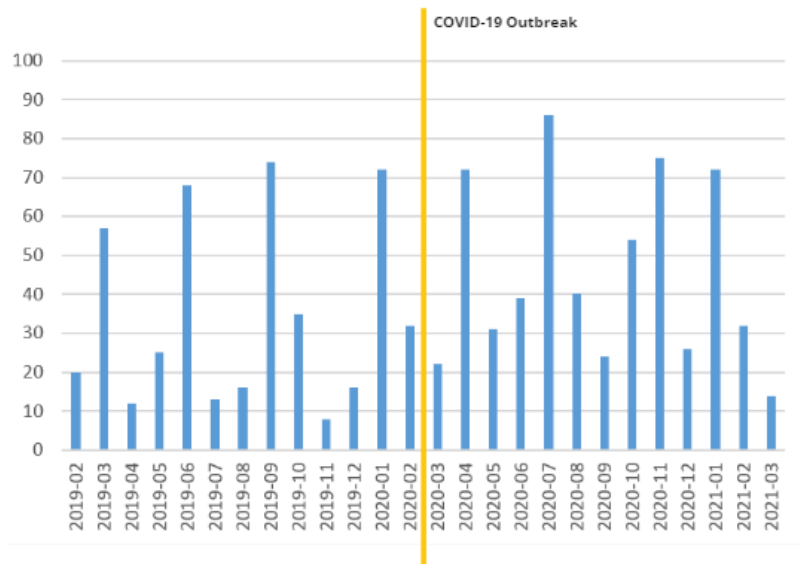
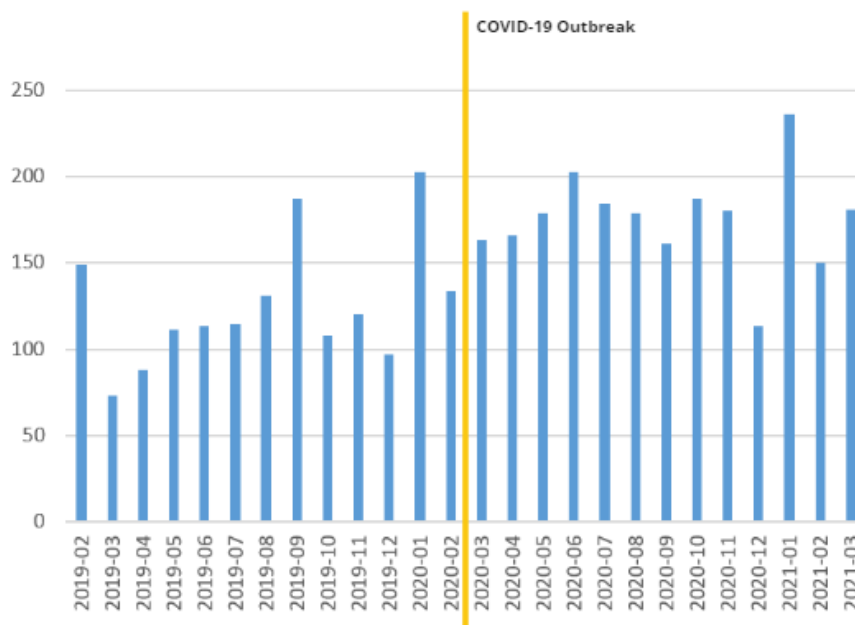*Figure 3 - Completed Features in period February 2019 - March 2021*

Figure 4 - Completed User Stories in period February 2019 - March 2021

There is no visible downtrend in the deliverables. In fact, the throughput in absolute numbers has increased since the COVID-19 outbreak. When comparing the cumulative numbers, there were 448 Features completed in February 2019 – February 2020 and 587 in March 2020 – March 2021. It represents a 31% increase in Feature delivery throughput. A similar finding is visible with the stories, where 1629 User Stories were completed in February 2019 – February 2020 and 2282 in March 2020 – March 2021. It is a 40% increase in User Story delivery throughput in absolute numbers.

Next, we have included the complexity point of view to verify if the increase in delivery is not caused by delivering stories of lower complexity. The tool allowed to export only the statistics per quarters. Therefore we selected the time period April 2019 – March 2021. Figure 5 represents the total number of Story Points accepted in respective quarters.
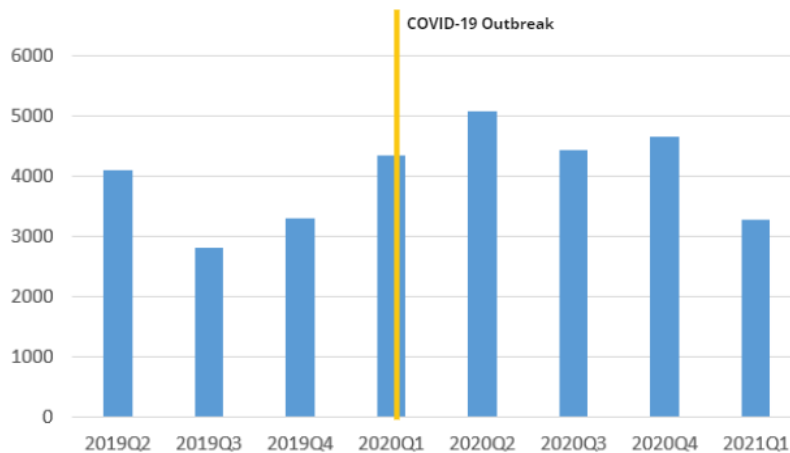
Figure 5 – Number of Story Points accepted per Product Increment 2019Q2 – 2021Q1

When comparing the cumulative numbers, there were 14543 Story Points accepted in the April 2019 – March 2020 period and 17468 Story Points accepted in the April 2020 – March 2021 period. It is a 20% increase conforming with the uptrend visible in the delivery of Features and User Stories.

4.3. Video Analysis

During the video analysis, 34 recordings in total length of 54 hours and 52 minutes were reviewed. The recordings were captured during the nine PI Plannings that were held in the period from January 2019 to March 2021. All recordings were captured in video conference software tool WebEx. Our main intention was to identify any differences for the periods before and after March 2020. In the recordings from the period after March 2020, we specifically searched for COVID-19 related information, statements, risks, or other mentioned impact.

We have not identified any risks related to COVID-19 articulated by the teams during the PI Readouts. Similarly, there were no pivots identified in the presented objectives as a response to the COVID-19 outbreak, nor concerns related to a possible decrease in the team's throughput. The only change in the plans was postponing all announcements about the end of support for outdated versions of products not to aggravate the customers' situation by any enforced upgrades. Based on these findings, we concluded that COVID-19 had minimal impact, and the enterprise software development continued in the "business-as-usual" form.

The visible difference comparing the period before and post-March 2020 was that people in similar geolocations, even present in the same office, would not gather in shared rooms. Every single participant was connected to the PI Planning individually from theirs local PC. Unfortunately, the recordings covered only the readouts, not the planning process itself. Therefore, we could not evaluate the potential impact of the remote collaboration within every team, nor the tools they used, or challenges faced. However, the PI Planning readouts were not affected by the switch to full-remote at all. Similar tools as in the period before March 2020 were used, WebEx and Rally. Overall, there was no visible impact or significant difference in the PI Readouts content before and after the COVID-19 outbreak.

5. Discussion

The presented results showed no visible negative impact of the COVID-19 outbreak in the company's examined Value Stream focusing on enterprise software development. The unprecedented situation the modern digitalized economy has never faced before created by the COVID-19 outbreak (Savić, 2020) led to the implementation of various COVID-19 mitigations impacting productivity, duty arrangement, and communications (Waizenegger et al., 2020). In the examined company, the impacts of implemented COVID-19 mitigation strategy were mostly related to travel restrictions, social distancing, and rotation shifts. Before the COVID-19 outbreak, the company enforced presence in the office, and home offices were not commonly approved. The switch to full-remote collaboration introduced a new standard all employees had to adjust to. Surprisingly, based on the provided evidence, this had left no impact on the teams' throughput. In fact, the throughput in absolute numbers of delivered features and stories increased, and the teams completed 31% more features and 40% more stories during the 13 months post COVID-19 outbreak from March 2020 to March 2021, compared to 13 months period per COVID-19 outbreak. However, the incerase in amount of Story Points delivered was only 20%. The periods April 2019 to March 2020 and April 2020 to March 2021 were compared. Still, all metrics showed visible uptread. Thefore, we conclude there was no measurable negative impact on the throughput of the teams.

We did not discover any challenges or risks related to COVID-19 the teams would present during PI Planning Readouts. Furthermore, we have not identified any changes to the readouts process and content when comparing the pre and post COVID-19 outbreak periods. We have only identified the difference in how the employees gathered for PI Planning. People in similar geolocations, even present in the same office, did not gather in shared rooms. Every single participant was connected to the PI Planning individually from their local PC. However, the PI Planning readouts were not affected by the switch to full-remote at all. It was an unexpected finding that examined Value Stream continued in "business-as-usual "regime without obvious pivots or decreases in deliverables during the COVID-19 outbreak.

For the explanation of our findings we used the Effectiveness and Sustainability Model during Pandemic described by Obrenovic et al. (2020). Obrenovic et al. (2020) provided six propositions of an Effective and Sustainable company. Here, we provide the reflection of these propositions in the examined company.

"*Proposition 1. Enterprises with a networked structure and high level of virtuality sustain their business operations in times of a pandemic.*" (Obrenovic et al., 2020). The examined company follows the Scaled Agile Framework (SAFe), which provides guidelines for achieving business agility (Knaster & Leffingwell, 2020). Additionally, it organizes various roles around Value Streams to deliver a set of solutions to the customer which results in the creation of a networked structure.

"*Proposition 2. Enterprises with a shorter and more diversified supply chain sustain their business operations in times of a pandemic.*" (Obrenovic et al., 2020) The benefit of enterprises focused on software development is their relative independence of any supply chain to remain sustainable. They mostly use just internal resources to produce software products. Therefore, they are not impacted by any impediments in the deliveries of supplies.

"*Proposition 3. Enterprises with an adaptive and flexible culture sustain their business operations in times of a pandemic.*" (Obrenovic et al., 2020) Agile, which has a response to change as one of its fundaments (Shammi et al., 2011), is nowadays not used only by small teams but scales to whole organizational structures. This is the case of examined organization. Therefore, the changes needed

to happen in a short term to address specific needs or adhere to the updated business strategy can be done in relatively short terms with minimal impact on the throughput. The change is happening by nature in Agile, so that it is not visible in change of throughputs. The organizations adapt to turbulence in business environments without disturbing the throughput of deliverables.

"*Proposition 4. Enterprises with distributed leadership and workforce sustain their business operations in times of a pandemic.*" (Obrenovic et al., 2020) The examined company had leadership and workforce distributed in the Czech Republic and the United States of America. When the COVID-19 started to rocket, measures were implied to avoid close contact of even collocated employees. The leadership was not distributed just geographically and physically, but also as per the role. SAFe empowers people to make quick decisions and align the right people to do the right work (Knaster & Leffingwell, 2020) that contributed to removing possible delays caused by full remote collaboration.

"*Proposition 5. Enterprises with advanced digitalization and internet technology sustain their business operations in times of a pandemic.*" (Obrenovic et al., 2020) Due to the characteristics and distribution of teams, agile release trains, development silos, and even the leadership, the examined company employees were used to collaborate remotely even before the social distancing measures were implemented. It positioned the company well for the full remote working that followed after the COVID-19 outbreak.

"*Proposition 6. Enterprises with a financial contingency plan sustain their business operations in times of a pandemic.*" (Obrenovic et al., 2020) The effects of the COVID-19 outbreak in the examined company are unlikely to be fully realized or reflected in results until future periods. That is given by the characteristics of the business and the usual 3year renewal contracts. However, the first year with the COVID-19 influencing businesses worldwide had left no visible impact on the deliverables. If this is going to change is currently unpredictable.

Our findings contribute to the verification of the Obrenovic et al. (2020) model. We see similarities in the propositions provided in the model and the examined company settings. The Agile transformation and SAFe implementation conducted in 2016 in the examined company contributed to the overall organizational preparedness for the mitigation of the COVID-19 outbreak. As the teams were used to collaboration in distributed environment before the COVID-19 outbreak and were used to leveraging technologies to ease the collaboration, the switch to full-remote with implied social distancing did not lead to a visible impact on the deliverable throughput or planning process. Additionally, as the company is not dependent on any external suppliers to deliver the products and has a model of 3year renewal contracts, the fluctuations in deliverables as a possible result of the COVID-19 outbreak were not observed. The company's fast response to the COVID-19 outbreak, regular updates, and implied restrictions seem to successfully protect the employees, leaving no impact on the throughputs caused by the reduced capacity of the teams. Similarly, neither the teams nor the leadership expressed any concerns about the COVID-19 outbreak impact in the examined video recordings.

Our paper provides a valuable contribution for both practice and research communities by uncovering the real-live COVID-19 outbreak mitigation strategy and an organization setting that contributed to the successful remission of the COVID-19 negative impact on the company's deliverables. Additionally, the paper advocates the reliability of the Obrenovic et al. Effectiveness and Sustainability Model during Pandemic (Obrenovic et al., 2020). Although more case studies are required to enable the generalization of findings on COVID-19's impact on enterprise software development, we believe that the information provided in this paper can help enterprises better prepare themselves for further unprecedented situations.

5.1. Limitations of the Study

The presented results were obtained in one Value Stream of a large multinational enterprise and, therefore, might be influenced by the local context. Achieving validity in a single case study is a known challenge, especially when compared to a research focused on large random samples. The advantage of large samples is breadth, whereas their problem is one of depth. For a case study, the situation is reverse (Flyvbjerg, 2006). Therefore, the case-study method in general can certainly contribute to the cumulative development of knowledge (Flyvbjerg, 2006).

Internal factors impacting the data, such as people gaining and improving their skills, staff replacement, and changes in management positions, were not considered. It is possible that mentioned changes contributed to improvements in the throughput, as well as the overall mitigation.

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