ASSESSING PROCESS EXCELLENCE WITH DIGITALIZATION

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Abstract

The paper aims to identify the main process excellence elements that contribute to digital transformation of a service company. These main factors determine organizational possibilities to explore the benefits of digital process excellence and to communicate the value of process improvement to company's stakeholders. Current body of knowledge focuses mainly on industrial digitalization or Industry 4.0. The exploration of a service company brings new perspectives to the non-material process flow at the industry. The research has a quantitative approach with qualitative supporting data. It reviews project documentation to determine process performance improvements. Semi-structured interviews with key project office team members complement the findings from the available documents. The data assessment of processes determines the digital preparedness. It is expected that a higher level of digitalization implies higher level of process performance. The process preparedness analysis determines the processes value contributors. The paper results contribute with the discussion on agile trends of project life cycle and its role within the fourth industrial revolution at service companies. The research findings constitute a solid basis to review an organization's process digital preparedness.

Keywords: performance management, process excellence, digital preparedness;

JEL Code: O22, O31, C80;

Introduction

Thanks to an enormous change in the thinking of consumers in the past decade, companies nowadays face several urgent challenges about how to fulfil customers' needs faster, though on the strategic level. The truth is that staying on the cutting edge requires far more companies' action rather than reaction. Conditions on the market seem clearer than ever – adapt latest trends more quickly than the competition, but remain sustainable. Based on the digital transformation

happening in the society known as well as Industry 4.0, the business models are being reshaped dramatically and the research of new technologies is driven by its limitless potential. Implementing new digital solutions became a must and real-time data providers are slowly taking the advantage and the market share of their competitors in the industries, where time discrepancies are not tolerated anymore.

Having said that, it is not a surprise that companies want to get a full understanding of the possible benefits digitalization has to offer and how to make those advantages work directly for their business processes. Managing the performance indicators through continuous and iterative improvements of process excellence attributes becomes then the center of sustainable digitalization. Therefore, the paper aims to identify the main process excellence elements that contribute to digital transformation of a service company. It examines the maturity level of specific processes in a service operation and attempts to identify the key value factors that facilitate the digital transformation process.

1 Theoretical background

This paper explores the lack of service operation inclusion in the current development of Industry 4.0 (i4.0) and digitalization. Furthermore, it reviews the importance of project management in service operations and the relevance of process effectiveness within these operations in order to create a framework to develop a methodology to measure process preparedness for i4.0 in service operations.

The current development of i4.0 and digitalization focuses on manufacturing facilities. This new approach involves high tech solutions to improve manufacturing and supply chain processes. Moreover, the last decades have developed companies with far larger service offer instead of products (Suarez, Cusumano, & Kahl, 2013) and it is possible to find some references about i4.0 applicability in industrial service operations (Lee, Kao, & Yang, 2014). The software industry presents usual servitization examples (Narayanan, Balasubramanian, & Swaminathan, 2011) with reference to the process improvement (Harter & Slaughter, 2003).

The review of improvement approaches such as Toyota Production System (Spear & Bowen, 1999) and Lean management (Womack & Jones, 1996) marks its beginnings at the manufacturing systems. Today these approaches improve processes out of manufacturing facilities such as Lean Health Care (Dahlgaard, Pettersen, & Dahlgaard-Park, 2011), Lean Office (Liker & Morgan, 2006) or Agile programming (Dyba & Dingsoyr, 2008).

Project management is a usual characteristic of a service operation. The service development needs a project management approach to come up with suitable solutions ("products or services"). Consequently, the service operation maturity level reflects the project management maturity level of each particular operation (Grant & Pennypacker, 2006). Additionally, the solution development under the project management approach includes process performance (Brown & Eisenhardt, 1995). Although the projects and their final outputs mostly differ, they share similar stages as well as their sequence chain and therefore allow the introduction of process management for their effective development (Liker & Morgan, 2006). Process maturity then directly influences the quality of the solution (Harter, Krishnan, & Slaughter, 2000). Based upon this background, the analysis of process efficiency among the projects of a service operation becomes a complementary approach to analysis of process preparedness.

2 Methodology

To grasp the sense of digitalization the research discusses, it is essential to clarify the levels of digital change considered further. Following stages of change are identified based on the amount of engagement they provide to all participants influenced by its occurrence.

1. Digitization – Informative function by analog-to-digital conversion of data
2. Collaborative digitalization – Integrating function within 2 or more people, IT devices or systems, virtualization of content and processes to achieve optimization of self-management or collaboration
3. Digital transformation – Disrupting function by realigning business model, technology investments across the whole organization by implementing principles of Industry 4.0

1.1 Process segment & sample

In the beginning, it is crucial to narrow down the examined sample of processes to avoid differences in variables which determine a process across the departments and their activities. As a sample data for analysis, project life cycle processes of a service company are chosen. The chosen project deliverables are focused either directly or indirectly on IT solutions, which leads to designing 14 process groups as the milestones in the usual project flow. Research methodology takes a perspective of B2E (Business-to-Employee) process segment.

1.2 Process Improvement Scheme for Industry 4.0 (PIS i4.0)

The study suggests a new descriptive process-driven maturity model with its application on the actual data. The main idea of the PIS is to implement the principle of solution-oriented approach based on the objective process need. The process need does not aim to replace the tangible process scope, though its abstract concept ensures the scalability and modularity of the process improved. Thus, it requires higher level of creativity, focus and foremost critical thinking. This atypical way of process delivery assessment within B2E processes is own to most of the shared solutions of Industry 4.0 or the manufacturing industries and the concept of servitization. However, it is still quite rare when it comes to optimization of company's internal processes. The model outlines 5 process steps followed by guidelines for assessment of each of them. Developing the structure, it is essential to be specific enough to aid on how to understand the process, and yet leaving sufficient space for individual interpretation.

Tab. 1: Process Improvement Scheme for Industry 4.0

PIS step	Objective	Purpose	What to ask?
Baseline	Determine the process start and end	Defined process, future benchmark	**What** does a process deliver? What is the process need?
Assess	Identify current process need delivery, prepare primary areas for digitalization	New perspective on data assessment	**How** is the process need satisfied? How can we save time or cost?
Optimize	Implement relevant principles of Industry 4.0, determine new desired process start and end	Solution-oriented approach in process improvement	**Where** is the process value? Where are the bottlenecks? Where are the process strengths?
Measure	Quantitatively track the implemented change	Data collection for analysis and clear communication of results	**When** does a change indicate results?
Deliver	Realize the scope, inform the stakeholders	Alignment with a business goal	**Who** can support the change across the organization?

Source: Authors

Inseparable part of the model is the description of each maturity level to ensure the relevance of application. It is also of great importance to understand the often small nuances differentiating stages from each other, as can be seen in the table on the next pages.

Tab. 2: PIS i4.0 Maturity Levels Description

PIS step	1 - Reactive	2 - Managed	3 - Defined	4 - Integrated	5 - Optimized
Baseline	Process is not recognized; Process need develops or changes throughout the process;	Process is defined on an operational level by its input, output and steps that need to be completed; Stakeholders are not or not clearly stated;	Process is defined and documented; Process has assigned a process owner and clear decision points to prevent possible errors;	Process is defined, documented and interrelated with compliant processes; Process documentation is placed in the cloud-service solution and can be viewed or edited by employees;	New process definitions are automatically suggested based on the most frequent employee activities identified by the integrated system;
Assess	Process is executed almost each time differently; Created data are not stored or not stored digitally;	Process execution depends on the usual way how majority of employees does it, and therefore has a tendency to become standardized; Created data are stored offline but with no intention for future use;	Process has a consistent approach for its data assessment; Data are stored in the system for their future manipulation; Data need to be often edited manually between several non-integrated systems to allow further manipulation;	Process is assessed end-to-end (E2E) and adheres to organizational capabilities; Process addresses multiple perspectives for its stakeholders; Created data are automatically stored in the cloud-service solution and can be viewed or edited by employees;	Process is expected to assess data cross-functionally and has no problem working with high granularity; Data are stored in the cloud-based service with one main data source; Process data are assessed by using real-time analytics and high-security solution (Machine Data Collection, Internet of Things);
Optimize	There is no need for digital optimization identified; Preserving the	Process evolves impulsively throughout its life cycle; Digitalization replaces most of daily activities in	Process is reviewed and optimized regularly based on internal organizational standards; Most of the time process is not	Integration of systems offers employees a comprehensive way to spot bottlenecks or opportunities for creating new value and therefore scale	Process regulated by i4.0 principles ensures improved productivity by auto-generated system reports defined for different stakeholders; System

	status quo; Only basic digitization solutions are available supported by analog/manual process execution;	separate non-integrated systems or offline programs;	optimized proactively, since it requires extra administrative effort;	processes accordingly; Process is prepared for implementation of relevant principles of Industry 4.0; Some of the i4.0 principles might be already functioning;	predicts and suggests areas for optimization; Process shows high level of modularity and scalability;
Measure	Only necessary or ad hoc measurements are done by individuals or teams;	Ex-post measurements are done to evaluate the basic process performance indicators; There is no specialized job description or department for monitoring the optimization changes;	Key process performance indicators are defined, standardized and measured regularly throughout the process; Measurements are based on internal organizational standards;	Process KPIs are automatically measured in the system from the collected data; Employees are actively engaged in the process monitoring (process RACI roles) and can access reports with run-time data to understand the progress;	Process excellence is automatically measured in the intelligent system, which offers decentralized decisions and potential risks; Employees role is to communicate economical value of measurements regularly;
Deliver	Process delivery differs each time; Expected process outputs are unpredictable, incomplete or exceeding the process scope;	Process delivers the expected scope, but does not communicate new value to all stakeholders evenly; Success of delivery depends on the effort of individual or team;	Process delivers the expected scope and process owner documents lessons learnt; Stakeholders are informed;	Processes include interdependent steps among its delivery; Real-time data help to prevent unexpected time-lags or delays; Stakeholders are informed automatically by system;	Process deliverable has a clear link to a business goal; Process excellence is part of strategic investments and supported by the organizational leadership;

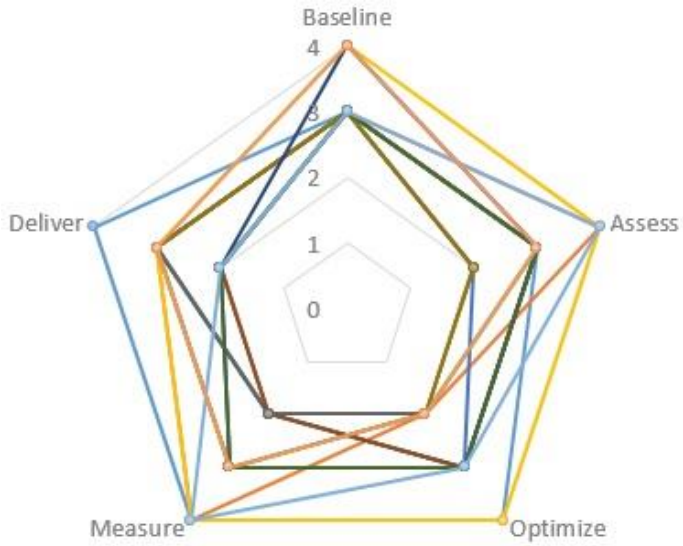
Source: Authors

2 Findings & Discussion

To apply the maturity model and quantify the process excellence on an operational level, the paper assigns the grade of process preparedness from 1 (lowest) to 5 (highest) to each process step of 14 identified milestones of a project life cycle with a focus on IT/ICT projects.

The level of process step maturity is assigned based on the provided PMO documentation, reports and internal database analyses. To supplement and interpret the hard data accordingly, the paper takes into consideration 9 semi-structured interviews conducted with key PMO members. The years' experience of employees internally varies between 0, 5 – 23 years and between 2 – 18 years externally.

Fig. 1: Application of PIS i4.0 in a project-oriented service company



Source: Authors

The maturity level corresponds with the definitions outlined in the PIS i4.0 and is considered to be a random variable. The analysis of data and evaluation of semi-structured interviews is visualized in Figure 1, where we can see several facts valid for this case. Processes are baselined according to usual practices of project management and even if the level of baseline is relatively high, it does not ensure high level of delivery – what could be explained by having the process documents well described though less binding for employees. It is similar with measuring the process, where numerous companies stagnate these days and pile up data not even necessary for future manipulation, still reaching high grade of maturity. On the contrary, it is different with assessment of the process – where a low level of assessment occurs, there is a low level of optimization, measuring and delivery as well. Same logic can be applied on the optimizing, which in most cases extrapolates the maturity of its following process steps. The overall maturity trend of the process steps appears to be naturally consistent.

Considering the evolution of defining and measuring processes, these steps are rightfully executed on the highest maturity levels and companies have them usually well settled.

However, communicating the value of shifting them to a new level is the real challenge of the upcoming years for process owners. For all these reasons, assessment and optimization are the main process value contributors from the PIS i4.0 perspective. These factors decide on the breaking points between digitalization and real digital transformation of processes and share the same disrupting power to change the future baseline and delivery.

3 Limitations & Practical implications

Looking at the limitations of the study by and large, we might spot that the maturity models prevail as a framework for assessment and understanding of process capabilities. In spite of this tendency, several arguments have raised doubts about the relevance of use of such models due to its limits in scope or, more frequently, by denying its direct link to tangible value (Thomas & Mullaly, 2008). Some of the studies admit a relation between maturity and performance, though do not confirm the statistical significance of correlation between the two. (Ibbs & Kwak, 2000).

Taking these perspectives into account, the future research would undoubtedly concentrate on the longitudinal study within similar project departments in various service organizations and report the process iterations regularly, not only in a descriptive way by a single application. Secondly, the model would be adjusted to cover the strategic importance indicator and therefore connect the process improvement with a relevant business goal and its costs, shedding light on the business case of digitalization.

Conclusion

While numerous maturity models are being released, their real purpose remains on helping the companies regulate the performance improvement intentionally. This is achieved by making the model as accessible for real use as possible. The suggested maturity model for processes (PIS i4.0) uses digitalization as a facilitator of change to drive inefficiencies out of the processes, often by changing the way of process delivery. As a result, this might include shortening the average times of project delivery, increasing the efficiency of communication and collaboration between the process stakeholders and preparing the process for future scalable solutions by its modularity.

Although this might seem obvious given the circumstances of living in the environment full of abrupt inventions, it suggests that the attainability of the highest maturity levels of the

previous models has changed. Digitalization will be a crucial facilitator for changing the way the processes are assessed and optimized. As stated in one of the conclusions at World Economic Forum 2016 in Davos, Industry 4.0 will entirely depend on the software development and the manner, in which companies will handle the increasing complexity of the end products and reflect the agile principles into its operations and project life cycle management.

Vice versa, the business operations will need to be those initiators of change by aligning their processes with focus on sustainability to avoid legal or security concerns and potential loss of control over their data.

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