Reviewing digital transformation from micro and macro approaches – Case study of the DIGITRANS project

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Abstract. *The DIGITRANS Project aims to assist SMEs in the Danube Region of the European Union to achieve digital transformation (DT). However, the question remains whether the DIGITRANS methodology is sufficient for SMEs to initiate DT. This study reviewed the literature related to DT and conducted case studies to review the performance of DIGITRANS projects. The literature analysis indicated that DT includes both a micro approach and a macro approach. Based on the case studies, which focused on the respective DT status of SMEs in Croatia and Bulgaria, the DIGITRANS methodology primarily uses the micro approach to handle internal barriers and efforts to resolve external barriers remains limited.*

Keywords: DIGITRANS, Business Transformation, Institutional theory, Micro approach, Macro approach

1 Introduction

According to the 2018 SBA Fact Sheet, small and medium enterprises (SMEs) generated EUR4,156 billion in economic value and employed 94.8 million people in the 'non-financial business economy' in EU-28 countries in 2017. Thus, SMEs accounted for two-thirds of overall employment and 56.8% of the overall value added in the non-financial business sectors of these countries. Moreover, the fact sheet identified digital technology as an important driver of economic growth and that SMEs lack sufficient support for digitalization and digital transformation. Digitalization is a strategy for improving effectiveness and efficiency (Febrianti et al., 2018) that encompasses the organization, processes, communications, and users. Thus, digitalization inevitably affects the entire business organization.

As technologies change, the underlying concepts and patterns of technology application also change from digitization to digital transformation (DT). DT integrates digitization with the optimal technical means and emphasizes agility, design thinking, and a user centric approach to design.

The assumptions, perspectives, and general principles of particular scientific theories or experiences impact the approach taken to DT. The results of literature reviews indicate that processes and methods of digital transformation differ depending on whether micro or macro approaches are used.

DIGITRANS, funded by the EU Interreg Danube Transnational Programme and implemented between 01/01/2017 and 30/06/2019, was a major, SME-focused digital transformation project. EUR2.1 million and 2.5 years were invested in this project to help SMEs in seven countries in the Danube Region implement the digital transformation of their business models. Project work included analyzing the impact of digital technology on current business models and developing innovative new business models that optimized the potential of these technologies. Under this project, the DIGITRANS method, consisting of various tools and a blended learning platform, was developed (Moraliyska & Antonova, 2018; Miron et al., 2018).

However, does the methodology developed under the DIGITRANS project really work for the SMEs? Although there is already a significant body of research related to DT, few studies have classified this research in terms of DT perspective. Therefore, a literature review approach was applied in this study to classify and summarize the DT principles of each perspective. Next, based on these theoretical points, the DIGITRANS methodology was reviewed and DT principles were summarized. This study applied a

case-study approach that reviewed the DT barriers faced by two of the countries participating in the DIGITRANS project, Croatia and Bulgaria, to assess the effectiveness of the DIGITRANS methodology in resolving these barriers.

2 Literature Review

2.1 Different perspectives on Digital Transformation

Numerous studies have addressed DT from a variety of perspectives. However, none has attempted to classify these studies based on theory point. This study distinguished DT-related studies into two categories based on their use of a micro or macro approach. Micro approaches define DT from the perspective of individual firms or organizations, while macro approaches define DT from the perspective of an industry or institution.

Although most researchers have adopted a micro approach to defining DT, they have approached this issue from a variety of perspectives. Bockshecker et al (2018) emphasized the process perspective of DT, conducting a systematic literature review and defining DT as a process of organizational or societal change that empowers new (information and communication technology (ICT) to transform business models, processes, products, and organizational structures. Westerman et al. (2014) adopted a purpose/ benefit perspective to define DT as the use of technology to radically improve performance. In this perspective, DT benefits may arise from using new technology (e.g., using new hardware or software to develop new products/services) or from transforming to a customer-centric organization and providing better customer service.

Institutional theory is an important theoretical basis of macro approaches to DT. Institutional theory posits that the institutional environment, including belief systems, normative frameworks, and regulatory systems, has an influence on organizations that, on occasion, may be stronger even than market pressures (Sherer et al., 2016). Hinings et al (2018) applied institutional theory to define DT as bringing new, potentially transformative technologies or innovations into a company, organization, or ecosystem. Similarly, Loebbecke and Picot (2015) posit that digitization may change, replace, or destroy institutions and industries.

To better define DT, perspectives other than those mentioned are necessary in order to offer different modes of action and reaction (Heavin & Power, 2018). For example, the micro perspective may identify a solution from a pool comprising customers, processes, business models, integration, capabilities, strategies, and IT infrastructure (Westerman et al., 2014; Pihir et al., 2018; Sahu et al., 2018), while the macro perspective may suggest how to align or compromise with institutions/industries (Hinings et al., 2018; Bunduchi et al., 2015).

2.2 The institutional theory

The institutional theory postulates that organizations operate within institutions with differing organizational forms and behaviors based on the assumption that organizations are rational systems that must nevertheless adapt to their environment, which comprises suppliers, customers, and competitors (Hinings et al., 2018). Institutions pressure organizations to conform to institutional expectations (DiMaggio et al., 1983). This pressure comes in three types: coercive, normative, and mimetic (DiMaggio et al., 1983). Coercive pressures may be formal or informal. Mimetic pressures push an organization to imitate a successful peer organization during conditions of uncertainty. Channels for normative pressures include professionalization and relational networks (Bunduchi et al., 2015; DiMaggio et al., 1983). Organizations typically have five options for responding to institutional pressures (Oliver, 1991), including acquiescence, compromise, avoidance, defiance, and manipulation (Bunduchi et al., 2015; Oliver, 1991). Acquiescence, which includes habit, imitation, and compliance, reflects an unconscious, blind, or conscious decision to obey institutional requirements. Compromise reflects an active effort to balance, pacify, or bargain with external constituents in order to resolve conflicting expectations to mutual satisfaction. Avoidance reflects attempts to preclude the need to conform to pressures. Defiance reflects resistance to, dismissal of, or challenge to the pressure. Finally, manipulation reflects the proactive effort to substantively change institutional requirements.

Digital transformation assumes the adoption of new digital technologies. Thus, under institutional theory, the success of DT depends on the new technology gaining legitimacy within the institution. Based on this, researchers have explored IT adoption behavior and the process of digital innovation / transformation. Bunduchi et al. (2015) developed a conceptual framework based on institution theory for analyzing IT adoption and identified both successful strategies for encouraging the adoption of new IT and cases of failed innovation and failure to reconcile differing expectations.

Digital innovation is the new creation of novel products, services, or ideas such as new structures, values, or beliefs (Hinings et al., 2018). DT brings digital innovation into the institution and may cause change and threaten, replace, or complement existing rules. Hinings et al. (2018) proposed three types of

institutional arrangement for DT based on institution theory. The first is digital organization forms, which are digitally enabled new structures or values that may constitute the core of the organization. One example is the crowd-based platforms used by Airbnb. The second is digital institutional infrastructures, which are digital technologies that allow a standard setting for coordination / interactions among numerous actors in an institution such as Blockchain. The third is digital institutional building blocks, which are generally accepted, customizable modules that may be mixed or matched for innovation or change.

3 Selected cases

The case study approach is suitable for exploring factors that influence a situation (Hancock & Algozzine (2016). This study applied the case study method to probe the limitations of the methodology used by DIGITRANS. Case information may be collected via interviews, observation, and documentation (Hancock & Algozzine (2016). The availability of data availability should be considered when performing data collection (Miron et al., 2018). To acquire a deep understanding of DIGITRANS' methodology and status, "DIGITRANS" was used as the key word to retrieve related research articles from Scopus database and Google Scholar. Nine articles that were related to DIGITRANS and included Croatia and Bulgaria status reports were identified. To insure validity, data source triangulation was applied to search multiple data sources (Baškarada, 2014; Twining et al., 2017), including the official websites of DIGITRANS (https://digitrans.me/psm/introduction), the Technology Innovation Centre Međimurje (TICM, [https://ticm.hr/] DIGITRANS' Croatian partner), and the Institute of Technology and Development (ITD) Foundation (http://itd-bg.eu/, DIGITRANS' Bulgarian partner). Moreover, "digital transformation barrier" was used as a key word to retrieve related articles both for comparing with our cases status and for identifying general barriers to DT.

4 EU DIGITRANS project status

4.1 DIGITRANS methods

The DIGITRANS project developed an appropriate innovation methodology and training materials for SMEs (https://digitrans.me/psm/introduction). The main objective of this approach was to enable SMEs to create innovative business models that were competitive and sustainable. More than 300 SMEs participated in training sessions and workshops that used this methodology (Kinitzki et al., 2018).

The DIGITRANS methodology treats DT as a two-phase process of innovation and transformation. The innovation phase covers the two sub-phases of analysis and design. The analysis sub-phase applies design thinking to empathize and define the impact of digital technologies on consumers, competitors, and suppliers as well as to redefine the requirements of customers and relevant stakeholders. The design sub-phase also applies design thinking to ideate, prototype, and test the concept of the digitally transformed business. Based on the new requirements from the analysis sub-phase and using the ideating approach, solutions are generated, the solution's prototype is visualized, and tests are performed during the design sub-phase. The transformation phase implements actions based on the results of the innovation phase such as creating a new business model in order to achieve organizational transformation. To implement transformation, an organization must consider existing resources and evaluate the gap that must be filled in order to transform to the new business model, to check the competence of employees, to shape the new organizational culture, and to continue improvements.

4.2 The status of Croatia

The DIGITRANS project team developed the digital transformation methodology with partners from countries in the Danube Region, including Germany, Austria, Slovenia, Hungary, Croatia, Romania, and Bulgaria. To assure that this project aligned with the national context in each country, one research institute or university and at least one business-support or similar institution in each of the countries were involved in developing the DIGITRANS methodology. In Croatia, the University of Zagreb's Faculty of Organization and Informatics (FOI) is involved in the development of the methodology, tools, and training concepts. TICM, an innovation and incubation hub established in 2010 to support business using the triple-helix concept connecting higher-education institutions, SMEs, and the public sector, provides training and consulting services to SMEs.

Within the DIGITRANS project, TICM serves as a regional catalyst, supporting SMEs that are in the process of digitally transforming their business using the DIGITRANS methodology. In addition, TICM is a business and technology incubator that helps young hi-tech entrepreneurs start and grow their businesses. Furthermore, TICM provides consulting to existing SMEs on funding strategies for their RDI projects and organizes training and seminars on various technology and business-related topics.

On the EU DT Scoreboard (2018) for EU-28 countries, Croatia ranked 18th on the Digital

Technology Integration Index (DTII) and 26th on the digital Transformation Enablers' Index (DTEI). The purpose of DTII and DTEI is to rate the performance of EU members in terms of DT and related enabling conditions. The index of DTEI includes: infrastructure, access to finance, and the demand for and supply of related skills.

Bedenikovic et al. (2017) interviewed Croatian SMEs in Varaždin and Međimurje Counties to determine the status of DT among SMEs in these counties. They found a relatively high level of awareness of DT and that the DT process was being hindered by several key obstacles. These obstacles included workforce unwillingness to adopt novel technologies, insufficient investment in employee ICT skills, and inadequate staffing by ICT specialists at the company level and insufficient investment in R&D and DT implementation at the national level (Bedenikovic et al. (2017).

4.3 The status of Bulgaria

In Bulgaria, Sofia University St. Kliment Ohridski and the ITD Foundation filled roles similar to those of FOI and TICM in Croatia. The goals of the ITD Foundation are to promote knowledge and the innovation culture and entrepreneurial spirit of Bulgaria's young people and SMEs. ITD is engaged in training and facilitating the use of new technologies in business and education, focusing on methodological research and disseminating ICT best practices. In addition, ITD bridges the academic community and industry in Bulgaria with the goal of fostering technology transfer. ITD is developed training and consulting services for SMEs based on DIGITRANS project activities to encourage their digital transformation and digital innovation processes. These services are implemented via either workshops or one-to-one meetings. Furthermore, ITD provides an incubation space for Bulgaria's young people and SMEs.

On the EU DT Scoreboard (2018) for EU-28 countries, Bulgaria ranked 26th on the DTII and last (28^{th}) on the DTEI. Schwertner (2017) investigated Bulgarian SMEs, finding that they are aware of the importance of digitization and that obstacles to DT included human factors, cultural traditions, the resistance of employees to change, lack of relevant knowledge, lack of good practices, lack of adequate resources, and lack of motivation and risk taking. In general, Bulgarian firms are not ready for DT and lack critical DT-related competences and knowledge, finances resources to invest in DT, and experts to support DT (Schwalbach, 2018).

4.4 Comparison with other research into digital transformation barriers

Various studies have identified similar barriers to DT among SMEs. Ivanov (2018) interviewed 46 experts from manufacturing companies to elicit their opinions regarding barriers to DT. These experts identified 5 categories of barriers, including inadequate skills, technical, individual fear, organizational and cultural, and environmental.

Ebert (2018) used a grounded theory approach to investigate DT barriers and found ecosystem-related barriers such as industry DT readiness and capitalization as well as organization-related barriers such as technology readiness and innovation-process integration. Moreover, Kane et al. (2015) classified DT barriers into internal and external categories. Internal barriers included lack of strategy and ROI visibility, while external barriers included insufficient qualified employees and difficulties in accessing funding - especially for SMEs. Kane et al. (2015), using the dataset from a 2014 MIT Sloan Management Review global survey of 129 countries and 27 industries in 2014 found that effective digital strategies should clearly identify the transformation process, talent engagement, and business model; play an important role in digital maturity; and receive support from top executives in order to become the culture norm (Vogelsang et al., 2019). However, more than 50% survey respondents pointed out that the most significant barrier to DT was lack of a digital strategy (Vogelsang et al., 2019).

5 Conclusion and suggestions

Based on this review of the literature, the DT barriers faced by Croatia and Bulgaria SMEs are similar to those faced by SMEs in many other countries. These barriers may be classified as either internal or external, with internal barriers related to the lack of DT strategy and ROI visibility and external barriers related to the lack of qualified employees, standards, and financial resources (Bedenikovic et al., 2017; Schwertner, 2017; Schwalbach, 2018; Ivanov, 2018; Ebert & Duarte, 2018; Kane et al., 2015).

The DIGITRANS methodology may help SMEs deal with internal barriers such as strategy. According to the DIGITRANS methodology, the organization must review their environment during the innovation phase of digital transformation and foster a business culture marked by team involvement, collaboration, and constant improvement during the transformation phase. This means that the DIGITRANS project may facilitate intra-organization improvement. The micro approach focuses on the intra-organization, for

example improving corporate strategy, using digital technology to improve processes and operational efficiencies, and providing satisfactory products / services to customers.

The macro approach seeks solutions outside of the organization such as setting up new platforms, forming new standards, and collaborating with other institutions / industries.

The DIGITRANS project provides methods and tools, while project partners organize workshops, face-to-face meetings, and online consulting in their respective counties. This approach was found to encourage the participants to analyze their environment; redesign their business models, business processes, and products/services; and reevaluate the competencies and capabilities of their employees. All of these activities were internal to the organizations and gave significantly less attention to interactions with other organizations and had only a minor effect on external barriers.

Croatian and Bulgarian SMEs were found to face similar external barriers when participating in DIGITRANS project activities. Lack of competent employees and ICT specialists is an internal problem that is hard to resolve using external resources.

Digital transformation was found to relate closely to the implementation of new digital technologies. Although both require financial resources, these resources were not the only barrier. Moreover, investing in technology makes no sense without changes to processes, customer relationships, and the entire eco-system or without building an agile organization that is open to innovation and similar interventions.

In order to overcome the barriers to DT using the principles of institutional theory, the following actions are suggested:

1. Encourage SMEs to cooperate with medium and large enterprises in order to align their digital transformation initiatives, gain legitimacy among larger corporate peers, and transfer in good practices related to motivation, risk taking, education, and financial resources.
2. Encourage medium and large enterprises in each region and different industries to take the lead in building an ecosystem that is favorable to DT. These enterprises may play an important role in constructing new platforms (digital organizational forms), new standards (digital institutional infrastructures), and new modules (digital institutional building blocks) and in providing financial resources for the partnering SMEs.
3. Establish and maintain networks of excellence, living labs, and platforms for the learning and exchange of best practices.
4. Build an ecosystem comprised of SMEs, research institutions, universities, and the public sector to help resolve the lack of competent employees and ICT specialists. This may be achieved by developing digital innovation hubs (DIHs). The European Union has already begun developing DIHs, although significant investment is still needed in order to realize their full potential. DIHs should place greater emphasis on "train-the-trainer" activities. In the next phase, DIHs may serve as hubs for fostering the digital transformation of SMEs using the DIGITRANS or other methodology. To serve in this role, DIHs must have access to highly skilled experts in ICT and business.

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