Identifying the Practices of Digital Transformation

Based on a Systematic Literature Review

Initiatives using digital technologies as an enabler have been studied and implemented by many enterprises in recent years, mainly due to the increasing demand from customers for value-added products and services delivered faster and more conveniently.[1] This persistent increase in digital capabilities has resulted in endless new challenges. The rapid pace of innovation, the competitive dynamics within industries, and the opportunities and threats created by new digital technologies have fundamentally changed the business environment.[2, 3] Moreover, these disruptive innovations by both incumbents and new entrants have caused the failure of traditional enterprises that were not capable of reinventing themselves in this new digital ecosystem.

Thus, appropriate digital transformation is a core strategy for most enterprises that hope to compete and survive.[4] Success in this endeavor is paramount, and the implications of failure may be dire. Digital transformation has become a new buzzword, garnering attention from top management and becoming one of the top concerns of chief executive officers (CEOs). Even so, research indicates that there may be a shortage of scientific material addressing this issue.[5, 6, 7] For instance, a literature review that analyzed 2,833 articles published in eight leading IS journals between 2007 and 2016 reveals that "a mere 0.2% addressed the impact of digital transformation on IT while 2.3% cover topics of digital transformation, innovation, or digital technologies."[8]

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Paradoxically, in a 2013 survey, 78 percent of respondents said that "achieving digital transformation will become critical to their organizations," but 63 percent said "the pace of technology change in their organizations is too slow."[9] In another study, 90 percent of respondents "anticipate that their industries will be disrupted by digital trends to a great or moderate extent," but only 44 percent said their organizations were adequately preparing for the disruptions to come.[10]

These data demonstrate the need to build proper tools and mechanisms to help enterprises transform their businesses in this digital era. But so far, the concept of digital transformation has not generated consensus regarding its definition. For example, one author states that "the best understanding of digital transformation is adopting business processes and practices to help the organization effectively compete in an increasingly digital world."[11] Another author defines digital transformation as "the use of new digital technologies to enable major business improvements (such as enhancing customer experience, streamlining operations, or creating new business models)."[12]

According to these two definitions, one can adopt different interpretations of digital transformation without necessarily being wrong. The second definition is employed here, focusing on the importance of new digital technologies that shape how enterprises conduct their business. After examining the state of the art of digital transformation and initiatives undertaken by selected enterprises, a systematic review of the literature on the topic of digital transformation can be presented.

Digital Transformation

Ubiquitous digital technologies have had a growing impact on organizations. In fact, "new digital business models are the principal reason just over half of the companies on the Fortune 500 have disappeared since the year 2000."[13] Some examples of organizations that have been unable to keep up with technological advances include Kodak, which missed "the digital photography revolution,"[14] and Blockbuster, which went bankrupt after being overtaken by Netflix.[15] Both suffered from digital inertia, denoting an "inability to rapidly develop and implement new digitally based business models."[16]

> "AS TECHNOLOGY CHANGE ACCELERATES AND NEW DIGITAL SOLUTIONS EMERGE, MANY ORGANIZATIONS FEEL THE PRESSURE TO PERFORM A DIGITAL TRANSFORMATION."

Across industries, enterprises feel an urgent need to become digital because they know that if they do not, competitors and new entrants will disrupt the status quo and take their places.[17] Corroborating these concerns is the fact that digital transformation has been added to enterprises' business agendas. According to one study, "80% of respondents regard digital transformation as being important for their company's overall business strategy."[18] Much of this pressure comes from customers who want to do business with organizations offering innovative products and services that incorporate high-level technology.

As technology change accelerates and new digital solutions emerge, many organizations feel the pressure to perform a digital transformation. This pressure increases due to changing preferences and expectations of customers and users.[19] In addition, employees expect the enterprises they work for to be at the forefront of digital transformation. An online survey completed by 1,559 people in 106 countries found that "fully 93% of employees agreed that digital transformation was the right thing right now for their companies to do, and 73% strongly agreed."[20]

However, although senior managers are putting a great deal of effort into achieving true digital transformation, their results have failed to meet the expectations and ambitions of top leaders. Risk related to digital transformation was ranked as the

number-one concern in 2019 among CEOs and senior executives, "yet 70% of all DT [digital transformation] initiatives do not reach their goals," and "of the [US]$1.3 trillion that was spent on DT last year, it was estimated that [US]$900 billion went to waste."[21]

A significant percentage of digital transformation failures can be attributed to the wide range of barriers faced by enterprises, as cited in **figure 1**. These obstacles provide a sense of the complexity of digital transformation and explain why so many enterprises struggle to take advantage of digital opportunities.

Although many enterprises struggle to take advantage of digital opportunities, other enterprises manage to take advantage of the benefits of emerging technologies and achieve a high level of digital maturity. Among enterprises that are considered digitally mature, there are certain similarities and points of convergence (**figure 2**).

As expected, many of the characteristics of enterprises undergoing successful digital transformation are related to overcoming the previously mentioned obstacles. These common attributes are a good basis for developing a framework that can guide other enterprises through a digital transformation. However, it is also useful to provide more detailed practices that can be used as a reference.

Systematic Literature Review

Digital transformation is a complex issue that has a considerable effect on an enterprise's business operations.[22, 23] In-depth interviews with 157 executives from 50 organizations in 15 countries revealed that although some enterprises gain value from transforming parts of their businesses, only a few are fulfilling their true potential, and many are still trying to determine whether and how to change.[24] Thus, the objective of this systematic literature review (SLR) is to simplify the digital transformation process by identifying reference practices related to digital transformation. The research question addressed by this study is: What are the reference practices for digital transformation?

For this review, the search process consisted of a manual search for relevant articles using a search string in multiple data sets. After the search, 138 articles from 2004 to March 2019 were collected from all the data sets in use. Of these 138 articles, 45 were duplicates. Then, by applying inclusion and exclusion criteria, the number of articles was decreased to 37. Articles unrelated to digital transformation were excluded. A total of 56 articles

Figure 1—Barriers to Digital Transformation

Barriers	Hartl[a]	Fitzgerald[b]	Hoberg[c]	Baskin[d]
Lack of urgency		X		
Lack of digital talent			X	X
Gaps in cross-functional knowledge			X	
Lack of digital culture	X	X		X
Poor communication				X
Constant competition				X
Insufficient funding		X		
Unclear roles and responsibilities		X		
Regulatory concerns		X		
Unrealistic expectations				X
Business units implementing independently in silos		X		
Limitations of IT systems		X		
Lack of vision		X		
Unclear business case		X		

Source: (a.) Hartl, E.; T. Hess; "The Role of Cultural Values for Digital Transformation: In-sights From a Delphi Study," 23rd Americas Conference on Information Systems (AMCIS), Boston, Massachusetts, USA, 2017. (b.) Fitzgerald, M.; N. Kruschwitz; D. Bonnet; M. Welch; "Embracing Digital Technology: A New Strategic Imperative," MIT Sloan Management Review, 2013. (c.) Hoberg, P.; H. Krcmar; G. Oswald; B. Welz; "Skills for Digital Transformation—Research Report," Initiative for Digital Transformation at the Technical University of Munich, Germany, 2015. (d.) Baskin, K.; "5 Reasons Companies Struggle With Digital Transformation," Webinar MIT Sloan Management Review, 2018.

Figure 2—Characteristics of Digitally Mature Enterprises				
Characteristics	Sebastian[a]	Horlacher[b]	Russell[c]	Zomer[d]
Digital strategy that defines a social, mobile, analytics, cloud and Internet of Things (IoT) (SMACIT)–inspired value proposition	X			
Operational backbone that facilitates operational excellence	X			
Digital services platform that enables rapid innovation and responsiveness to new market opportunities	X			
Better understanding of digital consumer behavior, preferences and choices			X	
Greater digital intensity (i.e., more investment in technology-enabled initiatives)				X
More integrated digital strategy				X
Higher proportion of top management team members with a background in digital technology and innovation				X
More decentralized management structure				X
Greater investment in skill-set building				X
Stronger risk-taking culture				X
Stronger communication skills		X		

Source: (a.) Sebastian, I. M.; *et al.*; "How Big Old Companies Navigate Digital Transformation," *MIS Quarterly Executive*, vol. 16, iss. 3, 2017, p. 197–213. (b.) Horlacher, A.; T. Hess; "What Does a Chief Digital Officer Do? Managerial Tasks and Roles of a New C-Level Position in the Context of Digital Transformation," 49th Hawaii International Conference on System Sciences, Institute of Electrical and Electronics Engineers Computer Society, 2016. (c.) Russell, K. D.; P. O'Raghallaigh; P. O'Reilly; J. Hayes; "Business to Digital Transformation: A Proposed Framework for Achieving Business Intelligence Alignment," Irish Academy of Management Annual Conference, University College Cork, Ireland, 2018. (d.) Zomer, T.; A. Neely; V. Martinez; "Enabling Digital Transformation: An Analysis Framework," University of Cambridge, USA, May 2018, *https://cambridgeservicealliance.eng.cam.ac.uk/resources/Downloads/Monthly%20Papers/MayPaper_EnablingDigitalTransformationAnAnalysisFramework.pdf*.

were rejected based on the inclusion and exclusion criteria.

After collecting the data, the last phase of the SLR methodology presents the results of the analysis of the selected articles and answers the research question. To better explain the basis for identifying relevant practices from the literature, the next section provides quotations from the articles that justify the selection of those practices, thus defending the important contribution of a specific practice in the context of a digital transformation initiative.

Practices

The practices documented in the selected articles were identified based on the following quotations:

- **Manage digital strategy**—"DT success will only occur when a digital strategy that follows realistic goals leads to an appropriate integration considering the impact."[25] "Prior research has come to the conclusion that organizations need to approach their digital transformations by designing a digital business strategy."[26]
- **Manage business processes**—"Processes are fundamentally reconsidered in the digital transformation of organizations."[27] "Digital transformation cannot be done without rethinking existing business processes."[28]
- **Manage innovation**—"Continuous innovation is a unique quality of digitalization, and it can change a business model."[29] "Digitally mature organizations, are characterized by the following: Product innovation—they employ digital technologies in order to provide innovative products and services."[30]
- **Manage changes**—"Change management in which specific changes related to people, processes, and technologies, due to the adoption of digital transformation are managed."[31] "The implementation of digital transformation leads to the change of internal conditions in an organisation including the change in decision making, financial conditions and business performance."[32]
- **Manage human resources**—"For digital transformation, an organization relies on smart, creative employees with a digital, boundary spanning skillset, including skills such as striving for the latest technical development or mastering data analytics."[33]

- **Manage customer experience**—"As noted by many researchers a customer centric approach is vital for successful digital transformation in a company."[34] "Successful digital transformation begins with an understanding of digital consumer behaviour, preferences and choices."[35]
- **Manage culture**—"Digitally mature organizations are characterized by the following: Culture—they are open to and command an understanding of digital technologies; relevant skills are deeply rooted in the organization."[36] "DT should evolve as the philosophy of our life and part of the new digital culture that affects all personal, corporate, industrial, government, commercial and social orders. The internal digital culture of the organization must be constantly evolving."[37]
- **Manage enterprise architecture**—"The literature has also argued for enterprise architecture (EA) being a precondition to successful digital transformation."[38]
- **Manage governance**—"To sustain transformation results and keep the related business processes on track, an appropriate process governance approach is required. It needs to be clear how the performance of a process and the success of a digital transformation is measured. Required responsibilities and accountabilities need to be defined."[39]
- **Manage information and data**—"The ability to collect data and use of information derived from data are unique attributes to digital transformation."[40] "Most of our interviewees believed that data is the foundation of success in the digital economy because it affects many actions fields related to digital transformation."[41]
- **Manage collaboration**—"Efficient collaboration between business and IT units is an enabler of organizational digitalization."[42] "Digital transformations both requires and enables a stronger collaboration and connection (Obj) between different business units."[43]
- **Manage business model**—"Digital transformation requires profound changes in the business models of the organization."[44] "Digital transformation changes the business model of an organisation by re-designing the cost and revenue structure in an organisation."[45]
- **Manage knowledge**—"The goal of this paper is to present the role of knowledge as a source of digital transformation process, especially the importance of sharing knowledge when communicating and networking between organizations in marketing channels."[46]
- **Manage digitization and automation**—"The basis for all levels of digital transformation is the digitization of analog sources, for example, the conversion of paper documents into digital documents or the measurement of environmental conditions translated into digital signals using sensors."[47] "Digitalization also includes robotization and automatization of actions, better ergonomics—ease and speed of access and propagation, possibility to receive and transfer data and information from many and to many subjects."[48]
- **Manage communication**—"Generally, the communication is an essentially relevant topic for its transformation in both dimensions: internal ('the more transparent and open communication is, the quicker and more effective the transformation') and external in terms of the exchange with other banks and the client-bank relationship."[49]
- **Manage monitoring and control**—"Monitor and correct the course: The introduction of new technologies can cause a great interruption of the work flow, it is necessary to 'monitor its implementation,' it is important to listen to the opinions and concerns of the interested parties and adjust their implementation as necessary to achieve its adoption."[50]
- **Manage business agility**—"Agile design and implementation are important for a successful digital transformation. Fast changing market requirements are an essential driver of digital transformations."[51]
- **Manage products and services**—"Digital transformation affects the offerings of products and services by embedding innovation and improving their features."[52] "DT leads to the development of more digital products and services which use network-effects for the creation of value."[53]
- **Manage portfolio**—"Transformation projects are defined and prioritized based on the impact of

the involved processes and their overall impact on the goals of the company. The resulting dynamic project portfolio management allows to deliver most value through process digital transformations and adjust the project portfolio based on changing company and market requirements."[54]

- **Manage structure**—"Structural changes have also been highlighted as a key dimension of every digital transformation endeavour."[55] "Some of the challenges linked to failure to attain successful DT revolve around: appropriate organizational structures suitable for DT."[56]
- **Manage digital channels**—"In relation to the business of digital transformation, the customer touch points and the customer engagement usually need to be considered."[57] "Internal and external omni-channel communication is an essential element for DT but it must be rich in its contents."[58]
- **Manage security**—"Our interviewees ranked data security among the major challenges of digital transformation. Strict regulations and unpredictable consequences in case of data loss or leakage require organizations to deliver superior data security as a brand promise and to minimize downside risks."[59]
- **Manage partnership**—"Digital ecosystems help organizations quickly offer new products and services to a global customer base."[60]

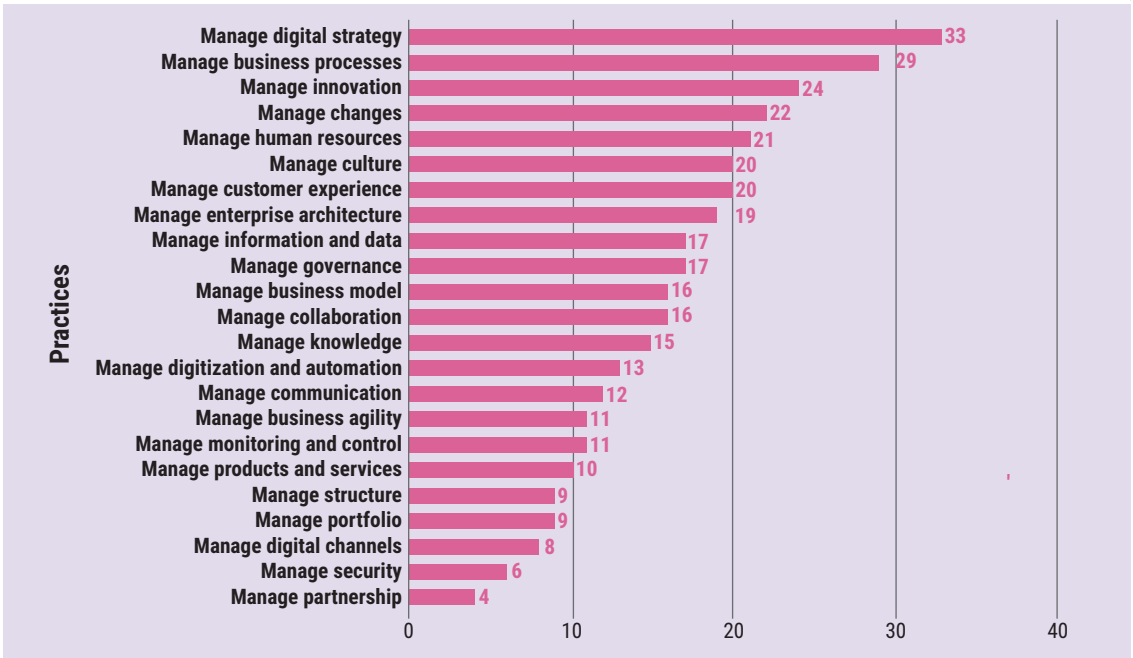
Analysis

The practices identified represent a broad range of what could be involved digital transformation. When analyzing these practices, it is possible to conclude that their execution will involve several departments and numerous stakeholders, connoting the transfunctional nature of digital transformation. The interconnection among practices can also be predicted based on this analysis. An interdependence between results and practices may exist, and the output of some practices may be considered as input of other practices. However, it appears that some practices can be carried out in parallel, not demonstrating a dependence on the completion of one for the start of another.

Figure 3 shows the number of articles that mentioned each practice identified, allowing a better perception of where the focus lies in the context of digital transformation. **Figure 4** shows which practices were addressed in which articles.

The literature suggests a special emphasis on digital strategy, business processes and innovation given the high frequency with which these three practices were mentioned in the articles.

Figure 3—Number of Articles That Mention Each Practice



Several authors stressed the importance of having a digital strategy and recommended that creating such a strategy should be one of the first actions taken in a digital transformation. For the successful implementation of digital transformation, defining and planning a digital strategy plays a decisive role.

Business process management involves the monitoring and control of relevant activities and the results obtained at the end of those business processes. It is expected that with business process management, enterprises will be able to modify and improve their processes, making them more efficient and achieving greater resource utilization. Other practices can influence and have a decisive impact on the improvement of business processes, such as digitization and automation.

> "FOR THE SUCCESSFUL IMPLEMENTATION OF DIGITAL TRANSFORMATION, DEFINING AND PLANNING A DIGITAL STRATEGY PLAYS A DECISIVE ROLE."

Innovation is another essential criterion for digital transformation, in that it denotes a competitive

Figure 4—Intersection Between Practices and Articles

Practices	Lederer[a]	Ershova[b]	Ershova[c]	Sathananthan[d]	Heilig[e]	Gimpel[f]	Seufert[g]	Schuchmann[h]	Sánchez[i]	Issa[j]	Gehrke[k]	Stanković[l]	Sandberg[m]
Manage digital strategy	X	X	X	X	X	X	X	X	X	X	X	X	X
Manage business processes	X			X	X	X	X		X	X	X		X
Manage innovation	X	X		X	X	X	X	X	X		X		X
Manage changes				X	X	X	X	X			X		X
Manage human resources		X	X		X	X	X	X	X	X			X
Manage customer experience	X			X		X	X	X	X			X	
Manage culture				X	X	X	X	X	X	X	X	X	
Manage enterprise architecture					X	X		X	X	X			X
Manage governance		X	X		X	X			X		X		X
Manage information and data				X	X	X		X	X	X	X		X
Manage collaboration	X				X	X	X	X			X		X
Manage business model				X		X	X		X				
Manage knowledge					X			X			X	X	
Manage digitization and automation	X				X				X		X		X
Manage communication								X			X		
Manage monitoring and control					X	X			X	X		X	X
Manage business agility						X	X		X		X		
Manage products and services	X			X	X	X	X						
Manage portfolio			X			X		X		X			
Manage structure										X	X		
Manage digital channels				X		X	X	X				X	
Manage security				X									X
Manage partnership					X	X			X				

Sources: (a.) Lederer, M.; S. Betz; W. Schmidt; "Digital Transformation, Smart Factories, and Design—Contributions of Subject Orientation," International Conference on Subject-Oriented Business Process Management, 2018. (b.) Ershova, T. V.; Y. E. Hohlov; S. B. Shaposhnik; "Methodology for Digital Economy Development Assessment as a Tool for Managing the Digital Transformation Processes," Eleventh International Conference, Management of Large-Scale System Development, Moscow, Russia, 2018. (c.) Ershova, T. V.; Y. E. Hohlov; "Digital Transformation Framework Monitoring of Large-Scale Socio-Economic Processes," Eleventh International Conference, Management of Large-Scale System Development, Moscow, Russia, 2018. (d.) Sathananthan, S.; P. Hoetker; D. Gamrad; D. Katterbach; J. Myrzik; "Realizing Digital Transformation Through a Digital Business Model Design Process," Internet of Things Business Models, Users and Networks, Copenhagen, Denmark, 2017. (e.) Heilig, L.; E. Lalla-Ruiz; S. Voß; "Digital Transformation in Maritime Ports: Analysis and a Game Theoretical Framework," Netnomics, vol. 18, 2017, p. 227. (f.) Gimpel, H.; S. Hosseini; R. X. R. Huber; L. Probst; M. Röglinger; U. Faisst; "Structuring Digital Transformation: A Framework of Action Fields and Its Application at ZEISS," Journal of Information Technology Theory and Application, 2018. (g.) Seufert, S.; C. Meier; "From eLearning to Digital Transformation: A Framework and Implications for L&D," *International Journal of Advanced Corporate Learning*, vol. 9, iss. 2, 2016, *http://dx.doi.org/10.3991/ijac.v9i2.6003*. (h.) Schuchmann, D.; S. Seufert; "Corporate Learning in Times of Digital Transformation: A Conceptual Framework and Service Portfolio for the Learning Function in Banking Organisations," *International Journal of Advanced Corporate Learning*, vol. 8, iss. 1, 2015, p. 31–39. (i.) Sánchez, M. A.; "A Framework to Assess Organizational Readiness for the Digital Transformation," Dimensión Empresarial, vol. 15, iss. 2, 2017, p. 27–40, *https://www.researchgate.net/profile/Marisa_Sanchez/publication/319653685_A_FRAMEWORK_TO_ASSESS_ORGANIZATIONAL_READINESS_FOR_THE_DIGITAL_TRANSFORMATION/links/59b8656aa6fdcc68722ce281/A-FRAMEWORK-TO-ASSESS-ORGANIZATIONAL-READINESS-FOR-THE-DIGITAL-TRANSFORMATION.pdf*. (j.) Issa, A.; B. Hatiboglu; A. Bildstein; T. Bauernhansl; "Industrie 4.0 Roadmap: Framework for Digital Transformation Based on the Concepts of Capability Maturity and Alignment," 51st International Academy for Production Engineering (CIRP) Conference on Manufacturing Systems, Procedia CIRP, vol. 72, 2018, p. 973–978. (k.) Gehrke, L.; R. Bonse; M. Henke; "Towards a Management Framework for the Digital Transformation of Logistics and Manufacturing," 23rd European Operations Management Association (EurOMA) Conference, 2016. (l.) Stanković, J.; J. Djordjević-Boljanović; "Knowledge as a Source of Value in the Process of Marketing Channel Digital Transformation," The 1st Internet & Business Conference (IBC), Croatia, 2012. (m.) Sandberg, J.; J. Holmström; K. Lyytinen; "Digital Transformation of ABB Through Platforms: The Emergence of Hybrid Architecture in Process Automation," *op cit* Urbach, p. 273–291.

Figure 4—Intersection Between Practices and Articles *(cont.)*

Practices	Baryshnikova[a]	Costa[b]	Arbaiza[c]	Tiţu[d]	Manfreda[e]	Vogt[f]	Russell[g]	Caputa[h]	Ryan[i]	Ylinem[j]	Hansen[k]	Paschek[l]	Schmitz[m]
Manage digital strategy	X	X	X	X	X	X	X	X	X	X	X		X
Manage business processes	X	X	X	X	X	X	X	X	X	X	X	X	X
Manage innovation	X	X		X	X	X		X		X			X
Manage changes	X	X	X	X		X	X	X	X	X			X
Manage human resources			X	X			X	X	X	X	X		X
Manage customer experience	X		X	X	X		X	X	X	X			
Manage culture	X	X	X				X		X	X			
Manage enterprise architecture		X	X					X	X	X	X		
Manage governance		X	X			X	X		X				
Manage information and data	X		X			X	X	X	X				
Manage collaboration				X		X	X		X	X	X		
Manage business model		X	X		X	X		X	X				
Manage knowledge		X			X		X	X		X	X		
Manage digitization and automation		X			X			X			X	X	
Manage communication		X	X	X		X		X			X		X
Manage monitoring and control		X	X	X					X				
Manage business agility										X			X
Manage products and services	X			X									
Manage portfolio							X						
Manage structure	X									X			
Manage digital channels	X												
Manage security	X	X						X					
Manage partnership													

Sources: (a.) Baryshnikova, A.; V. Taratukhin; "Digital Transformation Framework for Smart Factory," Americas Conference on Information Systems (AMCIS) Workshops, 2017. (b.) Costa, S. L.; L. Pereira; A. Akkari; "A Proposed Framework to Identify Digital Trans-formation Maturity in Small Industries," Proceedings of the 4th Workshop on Inno-vative Engineering for Fluid Power, 2018. (c.) Arbaiza, C.; "Critical Variables for Success in the Technology Adoption Process in the Framework of Digital Transformation," Proceedings of the International Conference on Information Management and Management Science, 2018, p. 109-113. (d.) Tiţu, A. M.; A. Stanciu; Ş. Ţiţu; "Business Process Outsourcing: Integrity in an Era of Digital Transformation," *Journal of Electrical Engineering, Electronics, Control and Computer Science*, vol. 4, iss. 1, 2018, p. 1–4. (e.) Manfreda, A.; "New Business Models—From Business Process Redesign to the Digital Transformation," *CroDiM*, vol. 1, iss. 1, 2018. (f.) Vogt, C.; M. Gersh; C. Spies; K. Bengler; "Digital Transformation in Healthcare: How the Potential of Digital Health Is Tackled to Transform the Care Process of Intensive Care Patients Across All Healthcare Sectors," *op cit* Urbach, p. 343–361. (g.) Russell, K. D.; P. O'Raghallaigh; P. O'Reilly; J. Hayes; "Business to Digital Transformation: A Proposed Framework for Achieving Business Intelligence Alignment," Irish Academy of Management Annual Conference, University College Cork, Ireland, 2018. (h.) Caputa, W.; "The Process of Digital Transformation as a Challenge for Companies," Zeszyty Naukowe Politechniki Częstochowskiej Zarządzanie, vol. 2, iss. 27, 2017, p. 72–84. (i.) Ryan, J.; S. Daily; B. Doster; C. Lewis; "A Case Study Perspective to the Digital Transformation of a Hospital's Perioperative Process," Proceedings of the 52nd Hawaii International Conference on System Sciences, 2019. (j.) Ylinem, M.; S. Pekkolal; "A Process Model for Public Sector IT Management to Answer the Needs of Digital Transformation," Proceedings of the 52nd Hawaii International Conference on System Sciences, 2019. (k.) Hansen, A. M.; P. Kraemmergaard; L. Mathiassen; "Rapid Adaptation in Digital Transformation: A Participatory Process for Engaging IS and Business Leaders," *MIS Quarterly Executive*, vol. 10, iss. 4, 2011, p. 175–185. (l.) Paschek, D.; C. T. Luminosu; A. Draghici; "Automated Business Process Management in Times of Digital Transformation Using Machine Learning or Artificial Intelligence," Materials Science, Engineering and Chemistry (MATEC) Web of Conferences, 2017. (m.) Schmitz, M.; C. Dietze; C. Czarnecki; "Enabling Digital Transformation Through Robotic Process Automation at Deutsche Telekom," *op cit* Urbach, p. 15–33.

advantage achieved through the use of new digital technologies.

In addition, the selected articles contained considerable discussion of the management of customer experience, indicating the importance of a customer-centric approach. Here, the focus is on providing an engaging experience to ensure a loyal and consistent relationship with customers.

In contrast, the practice of managing partnerships was mentioned less frequently. This may indicate a lack of studies related to this specific practice in the field of digital transformation. However, it may also mean that this practice is simply less important in digital transformation initiatives. The articles that do address partnership management suggest that some enterprises that lack the resources or knowledge to implement and manage the infrastructure required to use digital technologies need to establish partnerships with other enterprises that can offer digital solutions and technological capabilities that will enable them to digitize operations and business processes. Consequently, making a strategic partnership agreement enables enterprises to achieve greater efficiency, quality and customer satisfaction.

Figure 4—Intersection Between Practices and Articles *(cont.)*

Practices	Rudman[a]	Zomer[b]	Sahu[c]	Fuchs[d]	Scupa[e]	Warner[f]	Kirsten[g]	Berghaus[h]	Gama[i]	Ochara[j]	Kirchmer[k]
Manage digital strategy	X	X	X	X		X	X	X	X		
Manage business processes		X	X			X	X	X		X	X
Manage innovation	X	X				X		X	X	X	
Manage changes	X	X	X	X		X					
Manage human resources		X		X			X		X		
Manage customer experience	X		X			X	X	X			
Manage culture		X		X		X	X	X			
Manage enterprise architecture			X	X	X		X	X	X	X	
Manage governance		X					X	X	X		X
Manage information and data			X				X		X		
Manage collaboration					X	X		X			
Manage business model	X		X			X	X		X	X	
Manage knowledge				X			X		X	X	X
Manage digitization and automation					X			X		X	
Manage communication					X		X			X	
Manage monitoring and control			X								
Manage business agility			X	X		X		X			X
Manage products and services			X			X	X				
Manage portfolio						X		X	X		X
Manage structure		X	X	X	X						X
Manage digital channels			X					X			
Manage security					X						
Manage partnership		X									

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Enterprises that are considered digitally mature tend to have in-house human resources that are capable of managing digital assets effectively and notoriously. It is possible that these enterprises do not consider partnership a crucial factor for digital transformation because they already possess reliable and scalable digital platforms. In fact, traditional enterprises may seek partnerships with these digitally mature enterprises with the objective of becoming more digitally proficient themselves.

Despite the usefulness and applicability of the SLR methodology, the identified practices should not be seen as the only ones relevant for achieving a successful digital transformation. It is possible for enterprises to obtain digital maturity by committing themselves to only a limited number of the practices identified here or by adopting other practices that allow them to achieve the same goals.

Conclusion

Given the lack of a scientifically based framework to guide digital transformation, the goal of this study was to identify the practices relevant to that initiative. With that goal in mind, a systematic literature review was conducted to answer the following research question: What are the reference practices for digital transformation?

The answer to this question resulted in **figure 4**, showing the intersection between articles and practices. In addition, the bulleted list under the subheading "Practices" presented the practices identified by the SLR and the corresponding justifications contained in those articles to provide evidence that the practice in question is relevant to digital transformation.

A more detailed analysis of the results of the SLR confirmed that having a digital strategy was the practice most frequently discussed in the selected articles, whereas partnership management was the least discussed practice.

The main limitations of this study were the *ad hoc* identification of practices (i.e., without using a formal method) and the lack of definition of the practices and their purposes, goals and activities.

The future work will involve the development of a process assessment model based on the list of practices identified, followed by the application of that model in a real organizational context, preferably in several enterprises that differ in size and industry, to demonstrate the model's validity and usefulness. Another goal is to deploy a website application that enterprises can access to evaluate their digital transformation maturity.

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