

Investigation into the Role of Leadership in the Management of Digital Transformation for Small and Medium Enterprises

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Abstract—Digital technology is transforming the landscape of the industrial sector at a precedential level by connecting people, processes, and machines in real-time. It represents the means for a new pathway to achieve innovative, dynamic competitive advantages, deliver unique customers' values, and sustain critical relationships. Thus, success in a constantly changing environment is governed by the ability of an organization to revolutionize their business models, deliver innovative solutions, and capture values from big data analytics and insights. Businesses need to re-strategize operations and develop extra capabilities to cope with the necessity for additional flexibility and agility. The traditional "command and control" leadership style is structurally and operationally incompatible with the digital era. In this paper, the authors discuss how transformational leaders can act as a glue in the social, organizational context, which is crucial to enable the workforce and develop a psychological attachment to the digital vision.

Keywords—Internet of things, strategy, change leadership, dynamic competitive advantage, digital transformation.

I. INTRODUCTION

IN today's market environment, digital technologies dictate the pace of change and alter business rules constantly. With an expectation of more than 1 trillion of connected devices by 2030 [1], [2], the Internet of Things (IoT) is anticipated to become the main driving force for visionary leaders who want their organization to effectively lead their industry evolution. In fact, the exponential spread of smart connected products and services is profoundly challenging the status quo, introducing the perspective for radical changes in the entire industrial arena [3]. Clearly, the transformational power of digital technology challenges not only the technical capabilities of an organization but the whole spectrum of its competitiveness [4]. Thus, to fully exploit its potential there is a serious need to profoundly integrate digital technology in the organization as a whole i.e. processes and strategies.

The traditional businesses approach in the industrial sector can no longer withstand the new industry forces [5], [6]. Smart products and services have the potential to redefine customer value and thus intensify competition due to the expanding boundaries of industries [7]. Many traditional industries encounter significant threat from digital companies. The ubiquitous nature of the digital phenomenon increases the

necessity for an extra adaptable and agile management style where various units are aligned to the digital vision. This offers leaders the opportunity to advance management by openly innovate the way capabilities are defined and created [8] allowing dynamisms in the capability creation [9] to suite complex competition, market uncertainty, and to allow companies to focus on customers rather than competition. The key is to continuously reconfigure what an organization is doing rather than depending on seismic change that demands leaders to restructure their business.

II. LITERATURE REVIEW

The fast adoption of smart digital technologies is laying the foundation for new business models at the forefront of the 21st century challenge. However, most companies face several hurdles that prevent an effective integration of digital capabilities in their strategies.

Connecting physical products to the internet means that users and producers can exchange real-time data and therefore, communicate instantaneously, achieving an increasing level of interdependency that was unthinkable before [10]. Internet-based technologies are seen as the main force that eliminates the boundaries between both internal and external environments and thus, reshaping the organizations' structure, strategy, capabilities and value proposition [11]. In fact, even though the IoT changes the way in which data are collected, analysed and used, strategically promoting the digitization requires much more than a data-intensive approach.

In order to capitalize on the digital revolution ambition, organizations should dynamically develop new capabilities [9] to meet the constantly shifting consumer demand and market requirements. Building an agile and highly adaptable organization that smoothly and promptly fulfils customer needs and wants is the core challenge that leaders face in driving the digital transition [12]. Digital leadership considers workforce as the most valuable asset and strongly depends on empowering them. This becomes the catalyst for the digital transformation converting organization's vision into processes, putting the workforce at the heart of this revolutionary process. This ensures that organization progress and growth are sustainable in the future [13], [14].

To reinforce workforce empowerment, leaders need to ensure that an interdisciplinary collaboration mind set is rooted in the organization environment and culture allowing creative and innovative application of tacit knowledge [15]. The collaborative approach allows the organization to

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experience change in various functions of the business and to continuously reassess its capabilities to deliver on the digital vision of the business. By contrast, executives who are focused on leading digital change only in one part of the organization will create a dysfunctional organization that is incompatible with the overall business goals [16], [17].

Many organizations, presumably due to inflexible business structure, are not yet ready for promoting the profound change essential for reforming their core businesses. Although, addressing this issue is not simple for any organization, it is vital to understand that fostering the digital transformation requires supporting and promoting new ways of learning, working and making informed decisions [8], [16].

In 2009, Kotter emphasizes on the importance of leaders to promote the “always-on” transformation approach in the organization to build a highly adaptable and flexible culture of change [16]. Indeed, digital transformation drives leaders to promote transformational actions aimed at senior management leading cultural changes, leveraging internal synergies, and strategically aligning people and processes with the organization’s digital vision.

Beer and Nohria stated that by promoting a bottom-up approach, employees can associate themselves with digital change [18]. By orchestrating the entire organization and ensuring strong alignment, leaders should be able to inspire an atmosphere of trust and respect where they are stimulated to go beyond direct responsibilities. As a result, it would be possible to build a highly adaptable and dynamic organization that promptly responds to market fluctuations and consumers’ needs [9].

III. METHODOLOGY AND MODEL

The overall aim of this study was to investigate the role of organizational leadership in harnessing the 21st century technological revolution to effectively drive the digital transition. To do so, the authors intended to identify the core leadership challenges that deter smooth transition into a digital business. Furthermore, the authors aimed at evaluating the digitization from a wider perspective by considering the workforce role. This helps in defining the strategic approaches needed for digital transformation.

TABLE I
LIST OF SME INTERVIEWEES WITH EXPERTISE IN IoT

| Name | Job Title | Company | Country |
|--------------------|---------------------------------------|---------------------|---------|
| Antariksh Akhave | Process Engineer | Segula Technologies | UK |
| Maurizio Brignoli | Co-founder & Chief Technology Officer | Avanix Technologies | Italy |
| Pier Paolo Bardoni | Founder and Chief Operating Officer | Things | Italy |
| Luca Gelmetti | Innovation Manager | Cegos Italia | Italy |

In order to meet the research aim and developing new knowledge in the field, the authors conducted semi-structured interviews with senior management in one SMEs business from the United Kingdom and three SMEs businesses from Italy as shown in Table I. The interviews have been conducted to seek expert evidence on the objectives of this research

However, all interviewees are knowledgeable in the field of digital transformation and have experienced various levels of IoT implementations with their businesses.

IV. THE FINDINGS

A. The Transformative Path

All the interviewees consider cloud-based technology as the main force that is going to profoundly change not only the way by which value is created and delivered but also how consumers, organizations and employees communicate, collaborate and interact. The interviewees argue that, IoT expanding products’ capabilities is a powerful tool because it enables organizations to lower costs, shorten time to market and to capture customers’ insights in real time. Therefore, organizations for the first time can truly fulfil customers’ requirements and deliver personalized customer experiences.

“IoT is revolutionizing the entire manufacturing sector because it touches everything in any industry, and it can be applied in any field” (Mr. Akhave).

Interestingly, it is widely accepted that digitization is an ongoing, risky and challenging journey that forces, and indeed challenges, today’s leaders in promoting and supporting a significant shift in organizational structure and culture. Almost unanimously the interviewees agreed that transformational leaders are very much needed in driving the digital revolution and are key for succeeding in the digital era.

“IoT is great, it allows speeding the development of new products, capturing customers’ information. Organizations should embrace the idea that digital transformation is a prerequisite to maintain competitiveness in the market” (Mr. Bardoni).

B. Internal Dynamism

Digital leadership does not only boost the cooperation but also encourages the workforce in developing a sense of ownership within their organization that further motivates and engages people in aligning their goals with the organization’s strategy. Furthermore, Mr. Akhave argued that creating internal dynamism is core for having a fully engaged, motivated and empowered workforce. This allows organizations to identify new opportunities in a very effective way and simultaneously.

“... only by promoting and supporting a genuine dialogue across the entire organization, it is possible to start the journey towards digital transformation and subsequently offer an excellent product or service to our customers.” (Mr. Brignoli).

“Executives may design the best strategy but, to transform an organization, leaders have to bring all people in their organization together and give them the power to make decisions and the freedom to apply their knowledge creatively” (Mr Gelmetti).

The interviewees clearly have a common concern with how today’s leaders perceive digitization. In fact, too often leaders overlook the importance of internal collaborations and interdisciplinary teamwork due to executive management

focuses on developing technical capabilities. Mr. Brignoli discusses that even though investing in new IT infrastructures is very important, lack of internal cooperation, siloed organizational structure and departments' independence inhibit the flow of information and knowledge sharing, which weaken the digital transformative process.

"Leaders need to recognize the criticality of internal communication and inter-departments collaboration to create competitive advantage, which without it will be tough to optimize the use of the information captured from customers" (Mr. Bardoni).

In today's fast changing environment, industry boundaries are fading which may cause organizations' strategies to rapidly become absolute. Enhancing the organization's collaborative environment is crucial for the development of dynamic competitiveness. This requires leaders to encourage diversity and promote multidisciplinary teams. Within those teams' skills, knowledge and competences must be complementary to each other.

Mr. Brignoli and Mr. Bardoni debated the IoT era demands organizations to simplify their structure, leverage internal synergy and adopt learning-by-doing tactic. They agreed that adopting such an approach undeniably leads to higher degree of failure; however, it is important to recognize that failing is an inherent cost of the digital transformation race for leadership. In fact, driving a digital transformation means constantly experimenting with new strategies, projects and technologies that repeatedly would lead to failure but, if people are able to learn from their mistakes, the success will be achieved earlier and the transformation will be sustainable.

"...everyone within an organization wants to learn and develop, personally and professionally. Simply, people want to truly understand what they are doing and how they can contribute to the digital success" (Mr. Brignoli).

C. Building Unique Customer Experiences

The majority of the interviewees affirmed that the customer experience must be the core element that links projects, teams and departments. Affirming that leaders who want to effectively drive a digital transformation should understand that it is not the technology that changes what organizations do. Instead, what essentially makes the change is the organizations' ability to understand the needs and wants of its customers

Mr. Gelmetti further stated that close relationships between users and producers have to be the cornerstone of the digital transition and, even though internal collaborations are vital, developing the ability to strategically collaborate with the end-user must be the focal point of the digitization. This point was further explored by Mr. Bardoni who also argued that strategically linking internal and external stakeholders will enable organizations to co-innovate, co-ideate and co-create together with their customers and thereby achieve higher customer satisfaction.

Critically, Mr. Gelmetti highlighted the fact that even though being able to capture knowledge from customers is critical, only by systematically integrating customer-related

knowledge into their daily operational activities can organizations attain the digital transformation.

"If an organization is able to capture knowledge from customers it will create a system that co-evolve with the external requirements. With IoT, it is the customer that gives the input of what he wants. If we are not able to process this knowledge and we simply ignore this information, we haven't transformed our organization" (Mr. Gelmetti).

V. SUMMARY AND CONCLUSIONS

A. The Digital Ladder Framework

The dramatic proliferation of smart technologies and their inner pervasive nature has permanently disrupted established value chains and business models. To compete in today's constantly shifting market environment, organizations need to manage data at speed and scale, and use the insights generated to redefine their strategies and processes. Yet, executives are not ready to fully embrace this challenge and often consider the digital transition as an upgrade of their IT infrastructure. Instead the digital transformation is a holistic business transformation process where organizations leverage products' connectivity to reinvent their business model and build customer intimacy.

To guide leaders towards the digital journey authors have identified four critical layers: Capabilities, Organization, People and Process, which altogether create the Digital Ladder Framework. Each layer is a building block and represents the basis for integrating technology into organizations' core processes.

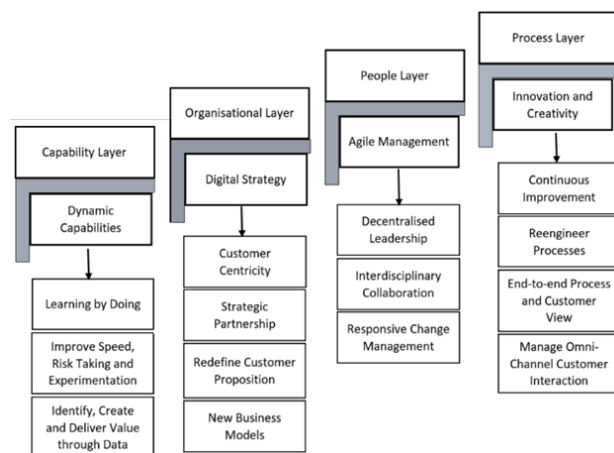


Fig. 1 The Digital Ladder Framework

B. Capability Layer

The aim of any digital strategy, process and operation has to be at enabling the Capability Layer. Developing new dynamic capabilities enables organizations to continuously identify new opportunities, enhance customer experiences, streamline internal processes and facilitate collaborations across businesses and/or industries. Dynamic capabilities facilitate organizations to strategically orchestrate its tangible and

intangible assets, to increase firms' responsiveness to market needs and ultimately make sense of the digital transition.

Instead of waiting for perfect market conditions, mature digital organizations quickly deliver new products into the market then, based on customers' feedbacks learn and pursue for incremental changes. Although, such approach leads to a certain degree of failure, it allows to leverage customer-related knowledge, foster the learning process and eventually develop extra internal agility. In fact, developing dynamic capabilities organizations can constantly re-inform their strategy in response to the rapidly changing business environment and consequently to develop long-term competitive advantages.

Building a dynamic organization able to iteratively improve its core operations to strengthen its competitiveness, innovativeness and profitability is the aim of the digital journey. To achieve the digital migration, leaders should embrace the idea that driving the digital transformation means constantly experimenting new strategies, projects and technologies that often would lead to failure. However, through experimentations and failures, organization capabilities evolve bringing firms to an earlier accomplishment. In fact, the success in the digital era is underpinned from the firm ability to constantly identify, create and deliver value for customers and firms.

C. Organizational Layer

The key characteristic of the organizational layer is that it considers the digitization from a strategic point of view. It highlights the digital transformation as a revolutionary program, hence calls for radical changes. More specifically, the focus here is not on promoting actions aimed at revamping the organization but on profoundly re-strategizing the business structure, operating model and customer proposition.

Because digital technology has profoundly changed customers' behaviours, expectations, and interactions, tailoring a best fitting customer-centric strategy is a critical step towards the digital journey. In fact, by developing the key strategic objectives around the customer experience, leaders can create an organization able to promptly and consistently adapt itself to ever-shifting customer requirements. In the digital age, where technologies evolve rapidly and strategies can quickly become outdated, the real competitive advantage comes from the organizational ability to constantly adjust and redefine itself to deliver new value to the customer. Moreover, to foster the digital migration, organizations should be open to strategic partnerships that can speed up the digital process. On one hand, making partnerships allows faster acquisition of knowledge and reduces the cost of investments. On the other hand, collaborating on a smaller scale with customers and suppliers encourages the organization to learn, allowing the development of in-house capabilities.

IoT technology has the potential to blur industry boundaries and to alter the equilibrium of the entire industrial landscape. This forces leaders to develop an overreaching digital strategy aimed at delivering extra flexibility, customized and differentiated customer experiences and consequently to break down internal silos. Evidently, this suggests that to keep pace

in the digital era, executives need to shift their strategies towards being agile, extra collaborative and customer centric.

D. People Layer

The people layer calls for an urgent reassessment of the organizational architecture where roles, responsibilities and priorities are redefined around the customer-centric strategy to support one shared goal. Reconfiguring the organizational structure around the customer journey triggers profound changes which enable leaders to orchestrate the entire organization fluidly. Critically, to reframe the entire organization and put in place an integrated strategy across people, processes and operations require the adoption of agile management. Hence, shared leadership strategy is vital for leading this transition. In fact, on one hand a decentralized leadership approach empowers employees to play an active role in the digital transformation, while a centralized leadership approach enables leaders to effectively develop a digital strategy that is aligned with the organization's core competences and facilitate structural and cultural changes.

Promoting cross-collaborations and horizontal coordination are key actions that should be endorsed for achieving a high degree of internal dynamism. In fact, this allows the workforce to move from an individual standpoint to a more shared perspective, enabling leaders to lay the foundation for an agile and a customer-centric culture. Furthermore, by promoting such a collaborative environment, the workforce will be spurred on to cooperatively and innovatively experiment new ways of working and indeed actively participate in changing the organization.

E. Process Layer

Digitally reinventing organizational strategies and simplifying business structures by focusing on the organizational and people layers is critical for the long-term success of any digital program. However, innovatively and creatively digitizing processes and operations is crucial for promoting operational efficiency and redefining the customer journey. In fact, this enables leaders to develop an enterprise-wide view which allows making informed decisions that are aligned with the overall business. Hence, organizations can lower costs, succeed earlier and foster their ability to learn and innovate. Accordingly, in the digital world, what separates winners from losers is the organizational ability to constantly reinvent its processes, structures and operating models. Clearly, achieving this high level of adaptability implies constantly pushing for creativity and innovation. In fact, the digital transformation should be seen as a long-term goal that demands the development of a continuous improvement mindset, which represents a prerequisite for iteratively monitoring, reviewing and improving processes and strategies.

Combining technical capabilities with a continuous improvement approach, leaders can put in place their end-to-end digitization plan which ensure the development of a cross-enterprise perspective aimed at consistently orienting processes, employees and technologies around their digital strategy.

VI. CONCLUSION

Digital technologies have impacted business strategy and operation in various ways, from automation of the value chain to integration, and recently through smart connected products that transform businesses interactions with the external environment. The impact is massive, leading to constant and rapid shift in consumer needs and requirements, and consequently, challenging traditional strategies to stand as an effective proposition. This puts pressure on organizational leadership.

Leaders need to recognize the impact of IoT on the competition but equally on their value proposition by constructing a vision of the possible disruption on the entire business's functions and how it links to customers' values. Hence, executives have to primarily focus their efforts on building organizations able to deliver innovative solutions by aligning technology, processes and people to digital strategy.

The transformational change requires leaders to critically evaluate their competitive advantages and understand how it could be developed or enhanced to deliver on their digital strategy. Furthermore, how the competition affects competitive advantages constantly stimulating the necessity for dynamic ones.

Organizations will achieve a high level of internal dynamism through leaders who drive transformational changes by turning strategy into actions where people empowered internal synergies are leveraged and various processes are fully aligned with 21st century customer expectations.

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