

## DIGITAL TRANSFORMATION AND PRODUCTIVITY

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**Abstract:** Due to the impact of the digital revolution, there has been a notable elevation in standards across the board. Furthermore, the recent challenges posed by the pandemic have further complicated the intricate landscape of the business world. This realm gives rise to a multitude of diverse discussions, yet remains a topic commonly deliberated among scholars with a focus on productivity perspectives. While research papers on Digital Transformation have undergone progressive development over time, their quantity has witnessed a significant surge only recently. This scholarly article makes reference to pertinent scientific contributions spanning various tiers, accentuating and immersing within the context of North Macedonia. The research delves into the components of digital transformation, encompassing facets pertaining to the magnitude of information and communication, nuances of business modeling, and enhancements of business processes. Notably, the success of Digital Transformation is heavily contingent upon modifications in process and operations management. It is crucial to recognize that merely incorporating information technology is insufficient for effecting IT-enabled changes. The empirical analysis embraced a dual-phase approach involving consecutive rounds of questionnaires. The initial phase centered around closed-ended questions, while the subsequent phase involved interviews featuring open-ended inquiries. The results were subject to both quantitative and qualitative assessment, drawing insights from a diverse array of industries. These insights pertained to their digital transformation processes, predominantly aligning with respondents' perceptions of productivity. In this vein, the research endeavor seeks to make a geographical contribution by identifying variables associated with the digitalization or digital transformation processes within companies situated in North Macedonia. The findings imply that there is a biased response from various stakeholders, indicating a modest correlation between the process of change and productivity. As the process of digitalization necessitates a certain degree of change, it can be inferred that digitalization potentially exerts specific effects on productivity.

**Keywords:** Digital transformation, Productivity, Management, Organization

### 1. INTRODUCTION

The contemporary business landscape finds itself enmeshed in a profound phase of organizational metamorphosis, a transformation catalyzed by the tides of technological advancements and paradigm shifts in technology deployment. The advent of the new digital epoch has ushered in a palpable elevation of benchmarks across the spectrum, concurrently accentuated by the compounding intricacies introduced by the recent pandemic disruptions. Central to this milieu is the formidable endeavor of assimilating the ethos of "digital" within the very DNA of business models and the fabric of organizational existence. While a plethora of discursive avenues sprout within this domain, scholars persist in frequent and fervent deliberations, fervently scrutinizing the multifaceted prism of productivity paradigms. Curiously, it wasn't until the year 2014 that the corpus of literature pertaining to Digital Transformation exhibited a noteworthy escalation, despite its evolutionary trajectory across temporal dimensions as evidenced by Reis, Amorim, Melão, and Matos (2018). The scholarly treatise herein is a touchstone, enmeshing itself within the annals of scientific discourse spanning variegated tiers, thereby casting luminance upon the contextual contours of North Macedonia. Within the precincts of this research endeavor, the constituents of digital transformation undergo rigorous scrutiny, enshrouding aspects intrinsically linked to the dimensions of information and communication magnitude, nuances of business modeling, and the optimization of operational processes. It remains an irrefutable challenge to seamlessly integrate the digital essence into the very DNA of business models, a challenge that emerges as a linchpin to the triumph of organizational endeavors. A sentiment affirmed by Horlacher and Hess (2016) posits the criticality of this integration, akin to an operational imperative of profound magnitude. The underpinning success of Digital Transformation pivots resolutely on the fulcrum of metamorphic shifts in process and operations management. It is pivotal to underscore that the introduction of information technology per se is but a rudimentary gesture in effecting transformative IT-mediated modifications, as articulated by Dremel et al. (2017). The trajectory of this scholarly expedition is meticulously calibrated to contribute to the domain, engendering interrogatives and

proffering potential answers, all situated within the precincts of digital transformation as manifest within the landscape of North Macedonia. The surge in the discourse of digital transformation, while emblematic of widespread proliferation, is not without its upward trajectory, an ascent invigorated by the exigencies of the recent pandemic. Cognizant voices, such as Caballero and Hammour (2009), contend that economic downturns can be conceptualized as propitious junctures for the purging of antiquated or relatively unfruitful methodologies and products from the productive ecosystem. Implicit within this metamorphosis is the expeditious transition of individuals, entities, and societies toward a more digitally enfranchised modality, a transition that resounds across diverse spheres, particularly in the realm of commerce. Akin to a crucible of transformation, organizations have contended with and assimilated "new" practices at an accelerated pace, an impetus galvanized by the imperatives of the contemporary milieu.

The expansive corpus of literature engendered by digital transformation paradoxically remains ensnared in a state of ontological ambiguity, as evidenced by the incongruence of perceptions across divergent interpretations, notably articulated by Waeger and Weber (2019). Consequently, a spectrum of discussions emerges, invariably tethered to the ramifications borne by organizational operations. Foremost among the inquisitive endeavors that have crystallized from this scholarly odyssey is the tenacious exploration of facets entwining productivity, metamorphic management, and the architectural schema of business models. This resolute pursuit is inherently emblematic of the study's focal orientation. In this vein, the overarching research inquiry seeks to decipher the intricate nexus between the semblance of digital transformation and the corollary perceptions of productivity. Consequently, the ambit of inquiry extends to the cultivation of strategies for amplifying overall organizational performance within the crucible of digitization. The purview of digital capabilities assumes an elemental role, casting digitalization in the dual roles of both a nascent business model and a transformative force reshaping established paradigms. In essence, the crux lies not only in the digital accretions themselves but rather in their perceived value within the organizational calculus. This paradigm engenders an overarching question that unfurls in a dualistic trajectory concerning the relationship between the perceived value of digitalization and its palpable, empirically measurable outcomes. The research methodology, as exhibited through the prism of two iterative rounds of questionnaire dissections, fashions a cogent discourse. The initial phase, characterized by structured inquiries, culminates in a dialectic continuum wherein interviews unfold with a tenor of open-ended dialogues. The resultant corpus of data, suffused with both quantitative and qualitative richness, congeals into a mosaic. This mosaic, refracted through the lens of diverse industries, forms a vivid tapestry of digital transformation, a tapestry meticulously embroidered by the contextual nuances of North Macedonia. Concurrently, the *longue durée* repercussions of the pandemic, specifically in relation to digital transformation, are manifesting in incremental waves, setting the stage for future research excursions to decipher their entwined tapestry. Importantly, the locus of research encapsulated herein, while concluded prior to the pandemic's emergence, proffers a panoramic vista into the ethos that envelops Macedonian enterprises as they navigate the uncharted terrain of the nascent digital epoch.

## **2. PRODUCTIVITY VS. DIGITAL TRANSFORMATION**

Information is generated, processed, shared, and transferred through digital technology, which is known as digital transformation (Aly, 2018). There has been offered a very wide set of definitions but most of the considered aspects of including digital technologies in line of business. Hence it can be widely accepted that the development of various technologies such as telecommunications networks, computer technologies, software engineering as well as spillovers arising from their use has been the grounding base for these discussions.

The so-called intangible assets have been studied for years to assess their impact on firm, industry, and national productivity (Damanpour, 1996), which often have been referred to be related to software and databases. It has been also even considered that in highly developed environments investments have surpassed tangible ones in certain markets (Hanelt, et al. 2021). This clearly marks the tendency around raising the bar when it comes to discussing the strong relationship between productivity and digital transformation. Additionally, as noted by Acemoglu and Restrepo (2018), automation and artificial intelligence in the manufacturing sector have been cited as contributing factors to technology change and digital transformation that are positively affecting productivity.

However, research has been diverse so have been results. Nowadays still as suggested by Nobel Prize winner Robert Solow that the computer age is everywhere but not in the productivity statistics (Tabrizi, et al., 2019), there is again a paradox of rapid technological change and slow productivity growth. This has been implicated in various research efforts due to different reasoning. However, it is also important to recognize that there are still many differences between industries when it comes to digital transformation, and therefore its effects on productivity (Micic, 2017). As well, the slow dispersion of digital technologies and the associated the processes across companies and industries in OECD countries propose that its effects on productivity are expected to appear in the years to come, as digital power in companies and sectors rises more (Van de Ven, Poole, 1995). OECD often reports that digital technologies

are altering our economies and seem to offer a immense capacity to boost the productivity of organizations. gains from digitalization did not spread evenly across companies. Companies having better access to key technical, managerial, and organizational skills have benefitted more than other companies. These companies already tended to be more productive than average, and digitalization has contributed to increase their lead. This clearly implicates that the things vary strongly across industries and also among countries considering the level of economic development. North Macedonia being an emerging economy or as categorized by the World Bank as an upper-middle-income country is still struggling to cope to discussions related to productivity.

### 3. METHODOLOGY

The work of Polák (2017) stands as a pivotal benchmark, wherein an exhaustive meta-analysis, encompassing over 800 estimates of IT returns, lays a firm foundation for contextualizing the contours of our research inquiry. Given the relatively muted regional predilection for research delving into corporate productivity within the tapestry of North Macedonia, a formidable challenge presents itself on this academic endeavor's trajectory. A cohort of 200 Macedonian enterprises, spanning diverse morphologies, dimensions, and contexts, has been engaged as the subjects of scrutiny. The data aggregation process unfolds through a dual-phased methodology, where the initial phase exhibits a predilection towards quantitative dispositions, while the subsequent phase gravitates towards qualitative dimensions. In the inaugural round of data aggregation, 295 potential respondents—representing companies—received the first tranche of questionnaires, culminating in substantive responses from representatives of 97 enterprises and institutions, constituting approximately 33.8% of the targeted cohort. Subsequently, in the second round of inquiry, 267 potential respondents—largely encompassing those who had previously participated—were entrusted with the second tranche of questionnaires. In this iteration, 78 respondents participated, accounting for 28.4% of the aforementioned prospective sample. The primary data acquisition phase took the form of a bifurcated questionnaire structure. The first questionnaire, a hybrid amalgamation of closed and open-ended queries, encompassed 22 multiple-choice queries, interwoven with the provision for additional commentary on 8 questions, and a solitary fully descriptive question. The survey was administered via SurveyMonkey, with personalized email invitations ferrying respondents to the questionnaires. This questionnaire traversed topics encompassing the duration of Internet utilization, the embrace of Internet technologies, the nexus between organizational investments in ICT and the deployment of Internet/intranet technologies, investment cycles' chronology, and the quantum of investments in Internet technologies vis-à-vis income. Conversely, the second questionnaire embodied a quintessential archetype of closed queries, comprising 9 questions. Notably, the respondents were precluded from furnishing supplementary qualitative insights in this phase of inquiry.

Furthermore, to augment the analytical arsenal, a correlation analysis was engendered, seeking to uncover latent interrelationships amongst various facets. The Pearson correlation coefficient was leveraged as an analytical tool, facilitating an assessment of the linear interplay between productivity, change dynamics, innovation propensities, and the matrix of investments undertaken. This calculated endeavor effectively augments the analytical resonance of the undertaken research.

### 4. RESULTS

The culmination of the dual-questionnaire methodology has yielded a trove of insights that, while partly anticipated, have also unveiled a panorama of unexpected revelations. The questionnaire instrumentation, designed with meticulous deliberation, traversed diverse realms, delving into temporal trajectories of Internet utilization (in terms of years), the embrace of Internet technologies, the interlinkage of organizational investments with the ICT landscape, the chronology of investment cycles, and the quantum of investments channeled into Internet technologies vis-à-vis revenue.

Conspicuous among the rubric of inquiries are the perspectives that intersect with the transformative impact of the Internet upon productivity, coupled with the corresponding shift in productivity dynamics that burgeon from the utilization of Internet technologies and applications. This exploration was accentuated by an attempt to delineate the temporal frame within which such impacts were perceptible within organizational milieus.

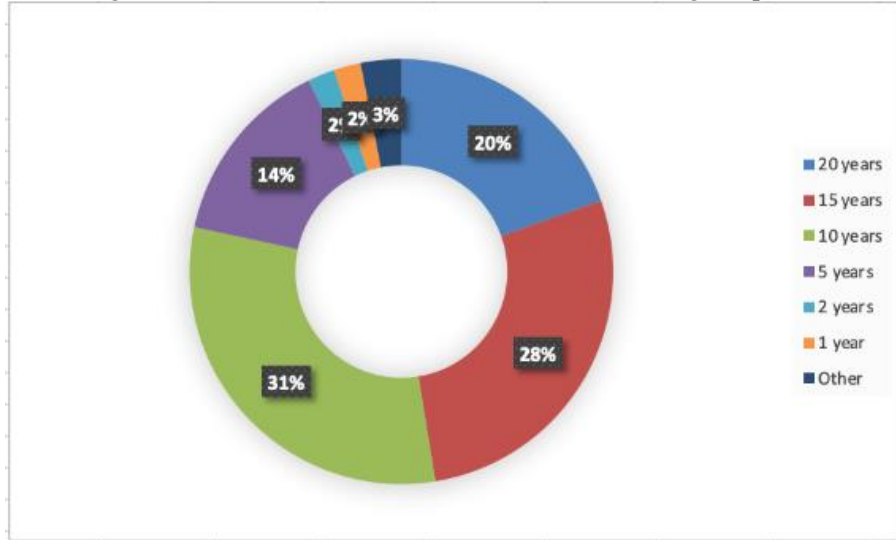
Furthermore, the inquiry ventured into the broader terrain of organizational innovation, unraveling the contours of changes fomented within entities by the pervasive embrace of digital technologies. This canvas also extended to contemplate the potential implications for employees, alongside the concomitant metamorphosis in the organizational demand for distinct typologies of human capital.

The synthesis of results, while affirming and concurring with certain established conjectures, nonetheless embarked on a trajectory of unexpected revelations. By way of illustration, a staggering 98.96% of respondents attested to their engagement with broadband Internet. Parallely, an overwhelming 92% of participants affirmed their extensive reliance on broadband Internet for over half a decade, with a noteworthy segment—19.59%—acceding to a digital

engagement spanning two decades, while 27.84% and 30.93% exhibited digital tenures of 15 and 10 years, respectively (see Fig.1).

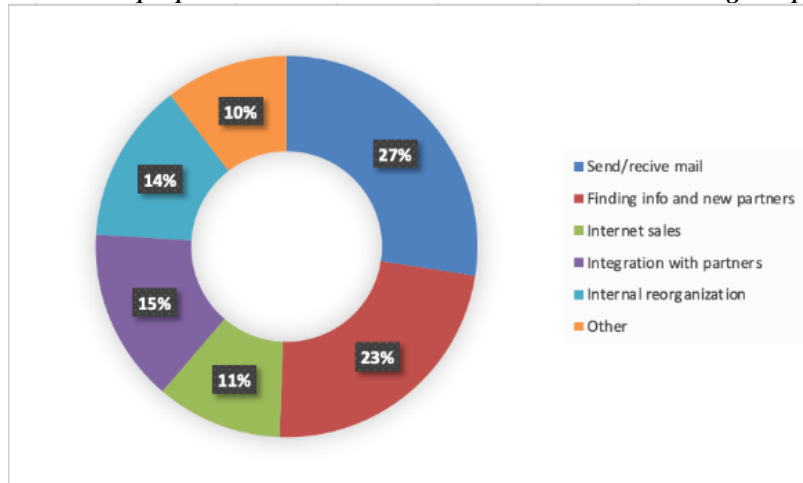
The anticipated dimension of the inquiry witnessed more than 97% of respondents conceding their utilization of the Internet for electronic mail transactions, while an impressive 82.47% harnessed this technology for information retrieval and partner exploration. However, the inquiry dexterously unearthed an unexpected facet—52.58% of participants leveraged the Internet as a conduit for seamless integration with partners, thereby orchestrating transactions such as product orders and quantity requisitions through Internet/intranet applications. This enunciates a paradigm shift in the landscape of collaborative commerce. Further unexpected insights emerged as 48.45% of respondents indicated a proclivity for utilizing the Internet as a pivot for internal reorganization, unfurling a distinctive layer of Internet-mediated operational enhancement (see Fig. 2).

**Fig 1. Structure how Broadband Internet is used among companies**



The results shed light on how the impact of digital technologies on company productivity evolves over time. A considerable majority, around 77.78% of respondents, believe that this impact persists for more than a year or even two. However, it's worth noting that 13.68% of participants express a different perspective. They suggest that there might not be a specific time period for this impact, as they haven't observed any tangible effect of digital technologies on their company's productivity. This observation is quite significant, highlighting that a notable portion of companies either don't perceive or don't experience a positive impact from digital transformation on their productivity.

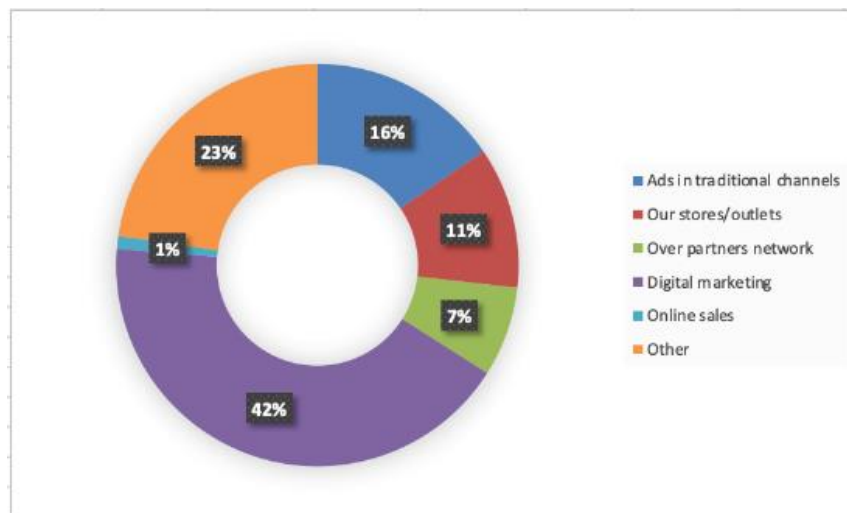
**Fig 2. For what purposes were used Broadband Internet is used among companies**



The feedback from respondents underscores a strong trend in recent years. A significant majority, about 91.75% of participants, have observed shifts in communication patterns with users and partners within the last five years, directly attributed to the utilization of the Internet, Internet applications, portals, intranet applications, and social networks (as depicted in Fig 3). This trend speaks to a dynamic transformation in engagement strategies.

Moreover, a striking consensus emerges where a substantial 96.91% of respondents posit that integrating the Internet within their company has yielded a favorable impact on their productivity. This statistic is illustrative of a prevalent conviction that the Internet's incorporation translates to tangible efficiency enhancements, resonating throughout operational processes and exerting a salient influence on employee performance. Contrary to the perception of Internet use as a frivolous endeavor, an overwhelming 95.83% attested to its efficacy in augmenting process efficiency and boosting employee output, debunking any notion of idle web-surfing or indulgence in online gaming. The narrative of positivity extends to the realm of innovation, wherein 91.75% of participants affirm the Internet's catalytic role in fostering innovation within their organizations. This encompasses the introduction of fresh, creative services and products, as well as the cultivation of efficient customer service mechanisms. The confluence of perspectives endorses the Internet's transformative potential in reshaping and invigorating the innovative contours of organizational landscapes.

*Fig 3. How companies communicate with partners/clients*



Approximately 71.58% of respondents within various companies perceive the utilization of the Internet and related Internet and intranet applications as exerting an influence on the evolution of their business models. This observation implies a transformative potential embedded within the digital realm, resonating through the strategic and structural foundations of their enterprises. Furthermore, an appreciable 79.38% of participants assert the Internet's role in steering the process of organizational transformation. This encompasses the gamut of change dynamics, spanning the alteration, elimination, or introduction of diverse operational processes. This viewpoint underscores the Internet's stature as a catalyst for organizational metamorphosis, underscoring its potency in reshaping core operational dimensions.

There has been a modest positive association established between the variables related to change and productivity. There was a positive correlation between the two variables,  $r(75) = .35$ ,  $p = .001$ . Which implicates and again provide valuable insights into the relationship of change and productivity. Once again managing the process of changes is essential for processing any transformation. There has been discovered a positive relationship among the processes related to change as well as to productivity, the explanation should subject for further research. At this point we are not able to claim any additional aspect for the explaining the relationships among change and productivity. Still as widely elaborated in various studies (Bellantuono, Nuzzi, Pontrandolfo & Scozzi, 2021) change is necessary as a process for facilitating digital transformation, hence results once again prove that even in context providing a well established digital transformation models is a must.

## 5. CONCLUSION

Research examining the digital transformation phenomenon highlights a rich body of literature that contributes to our understanding of the benefits and challenges associated with digital transformation. According to our findings,



the environment in which firms operate is becoming increasingly complex. The proliferation of digital technologies has enabled distributed networks of diversified actors to collaborate in new ways as a result of more information, computing, communication, and connectivity available. Innovation and performance in organizations are boosted by this new reality, which affects individuals, industries, and society beyond the firm's boundaries. Digital transformation impacts economies and societies in complex and interrelated ways, demanding more strategic approaches (Pilat, Criscuolo, 2018). The analysis provided implication that digital transformation involved profound changes importance of the process of digital transformation with respect to some perceptions of productivity, hence it is central to understand how initiating the digital transformation is long-term structuring for the company. In terms of methodology, case studies and action research are popular methods. The relationship between productivity and digital transformation is complex and this has been greatly proven by literature. The 'productivity paradox' has often reinstated that the relationship among productivity and digital transformation is not linear. Inducing digital transformation is imposed to numerous factors and the benefits of doing so are multilayered. However, the aim of this research is to unveil these intricate associations from diverse yet interconnected perspectives. In essence, companies predominantly perceive internet-induced changes as opportunities to enhance communication with stakeholders and to restructure processes for greater efficiency and medium-term productivity gains. Significantly, a statistically robust correlation has been established between productivity metrics and the dynamics of transformative change. This reinforces the imperative for well-structured digital transformation models that integrate adept change management and adeptly address resistance to change. Despite a rich corpus of literature enhancing our comprehension of digital transformation's impact on productivity, uncertainties persist regarding the precise mechanisms affecting organizations' productivity within the ambit of digital transformation processes. Progress in these realms necessitates interdisciplinary research to transcend singular perspectives and illuminate diverse dimensions of analysis. Such endeavors promise to enhance insights and enrich our understanding beyond restricted viewpoints. However, we aimed to describe the very wide and complex perspectives, hence we project how established theoretical lenses can be exploited to better understand the phenomenon and the need for advancement of the explicit characteristics of digital transformations. In this context agenda for future research as well as important managerial implications for organizations should arise.

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