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The Survival Trap: A Behavioural Typology of SME Digitalization and the Human Capital Paradox in Poland

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Abstract: This study challenges the size-based determinism of traditional digital maturity models by proposing a behavioural typology of SME digitalization. It investigates whether "strategic intent" and "resource complementarity" are stronger predictors of digital maturity than firm size alone. A quantitative survey was conducted with 392 Polish SMEs using K-Means clustering analysis. The study identifies distinct behavioural profiles based on strategic mindset, digital adoption, and performance outcomes. The analysis reveals three distinct clusters: 'The Survivalists' (Cluster 0), who are trapped in a low-maturity equilibrium due to a lack of absorptive capacity; 'The Strategic Innovators' (Cluster 1), who leverage dynamic capabilities for growth; and 'The Transients' (Cluster 2), a transitionary group. The findings confirm that digital maturity is driven by behavioural factors (mindset, skills) rather than firm demographics. The study contributes to the Resource-Based View (RBV) by identifying the "Human Capital Paradox", where funds are available but skills are not, and introduces a non-linear typology that explains why some SMEs stagnate despite having access to technology.

Keywords: SME; digitalization; human capital; Poland

1. Introduction

The Small and Medium-sized Enterprise (SME) sector serves as a foundation of both the Polish and broader European economies, acting as a principal driver of employment and social stability. In Poland, micro-enterprises represent 95.8% of all businesses and employ 37.1% of the workforce, a proportion significantly exceeding the EU-27 average of 30.1 (Zakrzewsk et al., 2024). Nevertheless, the SME sector exhibits considerable heterogeneity. In contrast to large enterprises that benefit from economies of scale and established innovation strategies, SMEs typically maintain streamlined organizational structures and reduced bureaucracy, but face constraints in research capabilities and financial resources (Łobacz & Tylżanowski, 2022). International benchmarks, such as the Digital Economy and Society Index (DESI), offer high-level insights but frequently depict a discouraging scenario. Poland consistently ranks among the lowest EU countries in digital integration, highlighting a "two-speed" digital economy. Large enterprises rapidly adopt artificial intelligence and cloud

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computing, whereas only 3.6% of small businesses attain high digital intensity (Statistics Poland & Statistical Office in Szczecin, 2024). The strategic orientation of Polish SMEs remains largely reactive. Evidence suggests that digitalization is frequently perceived as a survival mechanism, prompted by external shocks such as the COVID-19 pandemic or geopolitical instability, rather than as a proactive strategy for growth (Jaciow et al., 2025). This defensive approach leads to the adoption of ad hoc solutions that do not significantly improve operational efficiency or scalability. Despite these observations, prevailing research methodologies frequently overlook the complexity of SME digital adaptation. Current literature assumes digital maturity is a linear function of resource accumulation. Article challenges this by introducing 'Strategic Intent' as a distinguishing variable. This perspective overlooks the behavioural heterogeneity within the sector, where a micro-enterprise may be highly digital and globalized, while a medium-sized firm remains analogue and local. There is limited research identifying distinct typologies of digital adaptation based on strategic intent and performance outcomes rather than firm size alone. This study seeks to address this gap by applying K-Means cluster analysis to answer the primary research question: What is the overall level of digitalization among Polish SMEs, and what distinct digitalization profiles can be identified within the sector?

2. Literature Review

While the theoretical framework of Industry 4.0 promises enhanced efficiency through automation and data exchange, practical adoption rates among Polish SMEs reveal a significant utilization gap. Recent industry reports indicate that although basic digital tools are widespread, advanced technologies remain underutilized. For example, only 13% of Polish SMEs use Enterprise Resource Planning (ERP) systems, and just 14% have adopted cloud solutions (Union of Entrepreneurs and Employers and Symfonia, 2023). Additionally, confusion persists firms conflate basic cloud file storage with the broader capabilities of cloud computing, leading to an overestimation of their digital maturity (Pawełoszek et al., 2022). Barriers to adopting Industry 4.0 are multifaceted. These include the high cost of robotization and the diverse nature of SME product portfolios, which complicate the standardization necessary for automation (Ingaldi & Ulewicz, 2020). As a result, although 67% of entrepreneurs can identify Industry 4.0 solutions, only about 6% of businesses operate as highly digitalized entities (Jankowska et al., 2023). The trajectory of digitalization in Poland was fundamentally altered by external shocks, most notably the COVID-19 pandemic, which served as a catalyst for technological adoption. Empirical studies confirm that the pandemic accelerated the use of digital tools among 80% of SMEs, primarily to facilitate remote work and online communication (Mieszajkina & Myśliwiecka, 2022). However, this rapid shift was primarily defensive rather than strategic. A significant proportion of businesses (40%) made modest investments focused on cost savings, while nearly a quarter postponed transformation entirely due to financial uncertainty (digitalpoland & symfonia, 2022). Mieszajkina and Myśliwiecka (2022) categorize this landscape into distinct groups. While 47% of "advanced" businesses actively leveraged the crisis to enhance performance, an "insecure" segment comprising 11% struggled to adapt. This distinction highlights that crisis-driven digitalization does not necessarily result in sustained digital maturity (Mieszajkina & Myśliwiecka, 2022). Current benchmarks classify Polish enterprises as having "Moderate Digital Advancement," a designation that conceals significant structural disparities (Jaciow et al., 2025). The economy is characterized by a pronounced gap between large enterprises and SMEs. Recent data from Statistics Poland show that only 3.6% of small businesses have achieved high digital maturity,

compared to 36.8% of large enterprises. The literature often identifies financial constraints as the primary barrier to closing the digitalization gap. However, the Resource-Based View (RBV) offers a more nuanced explanation. RBV suggests that competitive advantage is derived not from tradable resources (like software or hardware, which are easily acquired), but from rare and non-substitutable internal capabilities (Barney, 1991). In this context, purchasing technology is a necessary condition but not a sufficient one. The effective utilization of these tools requires complementary resources, primarily human capital. As noted by Warner & Wäger (2019), the 'absorptive capacity' of a firm, its ability to apply new technology, is strictly limited by its employee skill set. However, recent findings reveal a more complex "Human Capital Paradox." While financial capital is necessary, national statistics show that the absorptive capacity of funds is severely limited by a deficit in intellectual capital. Kolisnichenko (2025) reports that only 43% of the Polish population possesses basic digital skills, which is significantly below the EU average of 55.6%. Additionally, the shortage of ICT specialists in the labor market presents a barrier that funding alone cannot overcome (Kolisnichenko, 2025). This skills gap is further impaired by the demographic profile of SME owners, who are often middle-aged or older and may be sceptical about the cost-effectiveness of digital investments (Orłowska & Żołądkiewicz, 2018). As a result, even when financial resources are available, the lack of internal competencies and strategic leadership hinders the effective implementation of digital tools. Despite a literature analysing the digital state of the economy, existing frameworks for evaluating SMEs remain limited in explanatory power. The prevailing approach in current research is to classify enterprises primarily by size, segregating data into micro, small, and medium categories, or to assess digitalization as a uniform phenomenon across the sector (Union of Entrepreneurs and Employers and Symfonia, 2023). Although these size-based classifications provide descriptive statistics, they do not capture the behavioural and strategic diversity within the SME sector. There is limited research that moves beyond traditional demographic boundaries to identify distinct typologies of digital adaptation. To address this limitation, this study adopts the Dynamic Capabilities Framework. This framework distinguishes between 'ordinary capabilities' (operational efficiency) and 'dynamic capabilities' (sensing, seizing, and transforming) (Teece, 2007). Standard maturity models often measure ordinary capabilities such as the possession of ERP systems. However, they fail to capture the strategic intent behind these tools. This article argue that digital maturity is not a linear function of firm size, but a reflection of a firm's dynamic capability to sense market shifts and transform their business model accordingly. By shifting the analytical focus from static, size-based categorization to a multidimensional evaluation of strategic intent and resource capability, this study addresses a critical gap in the literature. It moves beyond the technological question ('What tools do they have?') to the behavioural question ('How do they utilize these tools to navigate the tension between survival and opportunity?').

3. Methodology

This study surveyed 392 Polish SMEs between July and October 2025. The sampling frame comprised approximately 2.35 million enterprises, as identified by the Polish Agency for Enterprise Development (PARP, 2024). The analysis focused on organizations as the unit of study. Given the exploratory nature of the behavioral clusters, a non-probabilistic, purposive sampling strategy was employed. This approach prioritized maximizing the heterogeneity of the sample to ensure representation across varying levels of digital maturity (from analogue micro-firms to digitalized growth enterprises). The final sample size (n=392) exceeds the recommended threshold for K-Means clustering stability, which

typically requires a minimum of 2^k cases per cluster, ensuring sufficient density for pattern recognition. The study's inferences are thus concentrated on broader national trends. Strict exclusion criteria ensured relevance to the Polish economic context. The following entities were excluded: large enterprises (>249 employees), government and public sector organizations, non-polish origin companies or subsidiaries of international corporations. To ensure data reliability, respondents were required to meet specific criteria: active employment at the surveyed company, a minimum tenure of 6 months, and no restrictions on job title; eligibility was based on tenure and the capacity to provide informed responses. To ensure eligibility, purposive and convenience sampling were employed: LinkedIn direct outreach targeting Polish SMEs (1–249 employees), recruitment at industry events in Warsaw and Krakow. The survey instrument, developed from literature review and DESI/PARP reports, was administered via Microsoft Forms. Data were exported to Excel for initial processing and subsequent analysis in Python. The questionnaire was designed in English and translated into Polish using AI tools and manual review to ensure semantic equivalence. Construct reliability was assessed using Cronbach's alpha. All sub-scales (Strategic Mindset, Digital Adoption) exceeded the 0.70 threshold recommended for exploratory research, confirming internal consistency. Respondents could choose the language; data were consolidated in English. Of 937 LinkedIn contacts, 348 responded; from 150 event recruits, 44 completed the survey. Digitalization levels were grouped (1-2: low, 3-4: mid, 5: high). Data pre-processing included standardization (Z-score normalization) of continuous variables to prevent scalar bias during clustering. Categorical features were one-hot encoded, and minor missing data (<2%) were handled using median imputation to preserve distribution skewness. The optimal number of clusters was assessed via the Elbow Method and Silhouette Score, suggesting k=3 or k=4 as reasonable starting points. K-means clustering (k=3) was ultimately applied. Cluster profiles were analysed based on the mean values of original features. To mitigate Common Method Bias (CMB), procedural remedies were applied during data collection, including ensuring respondent anonymity and separating the measurement of predictor (strategic mindset) and criterion variables (performance) within the survey flow. While online recruitment introduces potential bias, the identification of a significant 'low maturity' cluster (Cluster 0) indicates that the sampling method did not exclude non-digitalized firms. Furthermore, offline recruitment at industry events was used to diversify the sample.

4. Cluster Analysis

The K-Means clustering analysis revealed three distinct behavioral typologies, which we label as 'The Survivalists' (Cluster 0), 'The Transients' (Cluster 2), and 'The Strategic Innovators' (Cluster 1). These profiles validate our central hypothesis: digital maturity is less a function of firm demographics (size/age) and more a function of 'Strategic Intent' and 'Resource Complementarity' (RBV). As shown in Table 10, while firm age varies minimally across groups (2.09 vs. 2.00), performance outcomes diverge significantly, driven by the underlying strategic mindset.

4.1. Cluster 0: The 'Survivalists' (Necessity-Driven Adopters)

The group of Polish SMEs that face the biggest challenges to digital adaptation is represented by this cluster. These companies, which are primarily made up of micro-enterprises (average size score: 1.26), have a survivalist strategic approach. This cluster's average firm age is 2.09, usually between 6 and 10 years, suggesting that these are well-established businesses rather than recent starts. Despite being

established businesses (avg. age > 6 years), these firms remain trapped in a low-maturity equilibrium. Consistent with the 'Human Capital Paradox,' their stagnation is not due to a lack of technology access, but a lack of absorptive capacity. With the lowest Primary Mindset score (1.49), they exhibit a 'digital resistance,' viewing technology merely as a cost centre rather than a value driver. With the lowest average score (1.44), these businesses largely see digitalization as a necessity and use technology for survival rather than for growth or innovation. This sector is distinguished by its strategic approach. This reactive attitude is reflected in their Digitalization Score (1.49), which is the lowest of all clusters. Low Market Response Change (2.71) and Revenue Change (3.25), which imply stasis or slow response to market changes, are indicative of poor performance outcomes. Notably, this group also has the lowest average scores for Process Scalability and Organizational Agility (3.0–3.2), which supports H2 and shows a link between decreased agility and scalability and poor digital maturity. Furthermore, the Time to ROI is the lowest (1.59), suggesting that ad hoc deployment is probably the reason why digital expenditures seldom provide quick or positive outcomes. Employee resistance and skill gaps are common, which highlights how important human capital shortfalls are in impeding digital advancement. This confirms the RBV argument that without complementary human resources, digital tools fail to generate a return on investment (Time to ROI: 1.59). Additionally, 76% of enterprises report having no access to new markets, which further supports their survival-oriented operational style.

4.2. Cluster 1: The 'Strategic Innovators' (Dynamic Capability Leaders)

Despite having identical demographic features to Cluster 0, Cluster 1 is the "gold standard" of digital maturity in the sample. Despite being micro-enterprises with an average size of 1.19 and an average age of 2.00, these businesses take a very different approach to strategy. This cluster exemplifies strong 'Dynamic Capabilities.' Their high Primary Mindset score (2.24) indicates an organizational ability to sense market opportunities and seize them through rapid technological deployment. Unlike the Survivalists, who react to external pressure, these firms proactively shape their environment. Cluster 1 attains the highest Digitalization Score (4.32), along with notable gains in Market Response Change (4.22) and Revenue Change (4.29). Highly digitalized companies often get the highest Organizational Agility and Process Scalability scores (4.3–4.5). When compared to other clusters, they exhibit quick error detection, efficient data use, and notable productivity increases. The highest Time to ROI (2.08), which represents quicker and larger returns on investment, demonstrates the financial benefits of intentional digitization. With the largest participation in new regions within Poland and other EU nations (26.9% each) and the lowest percentage of market stagnation (5.7%), these enterprises aggressively seek expansion and export, in contrast to laggards. Interestingly, they report fewer budgetary constraints not necessarily because they have more capital, but because their clear strategic intent allows for more efficient resource allocation, overcoming the 'resource constraints' typically associated with SMEs. Overall, the results show that the main factors influencing digital maturity are human capital capabilities and strategic leadership rather than firm size.

4.3. Cluster 2: The 'Transients' (Opportunity-Driven but Resource-Constrained)

A "middle ground" or transitional segment is represented by Cluster 2. These companies, which include both micro and small enterprises, are the youngest group with an average age of 1.80 (less than five years in existence) and are slightly larger on average (1.38). A balanced approach that

alternates between opportunity and necessity is seen in the Primary Mindset score of 1.96. Digital maturity and performance outcomes are moderate in this segment (Digitalization Score: 3.74). The measurements for Revenue Change and Market Response Change (3.74–3.77) show consistent, but slow, increase. This group represents a 'transitional' state. While they possess the strategic intent (Mindset: 1.96) to modernize, they often lack the full suite of operational routines to scale effectively. They risk falling back into the 'Survival Trap' if they cannot bridge the skills gap identified as their primary barrier.

Table 10. Comparative Summary of Clusters

Indicators	**Cluster 0**	**Cluster 1**	**Cluster 2**
Company Size	1.3	1.2	1.4
Company Age	2.1	2.0	1.8
Primary Mindset	1.4	2.2	2.0
Digitalization Score	1.5	4.3	3.7
Revenue Change	3.3	4.3	3.7
Market Response Change	2.7	4.2	3.8
Process Scalability (Avg)	3.1	4.4	4.0
Organizational Agility (Avg)	3.1	4.4	4.0
Time to ROI	1.6	2.1	1.8
Market Reach (No New Markets)	0.8	0.1	0.2

Source: Author's own elaboration based on K-Means clustering analysis (n=3)

This clustering can be used in the identifying how the company digitalized. But the academic and business literature offers a diverse range of models designed to measure organizational progress. These include the rigorous Capability Maturity Model Integration (CMMI), which focuses on process optimization; the Gartner Digital Maturity Model, which emphasizes technological integration; and the Digital Intensity Index (DII) used by Eurostat, which quantifies the adoption of specific tools. These frameworks generally share a common logic, assuming that organizations move sequentially from basic ad-hoc processes to optimized, data-driven ecosystems. Among established frameworks, the model most structurally similar to the findings of this artcle is the MIT Sloan and Deloitte "Digital Maturity Model" (2017) (Kane, Palmer, Phillips, Kiron & Buckley, 2017). Standard models, such as MIT/Deloitte, are inherently linear and progressive, implying that an "Early" stage firm is merely a younger or less experienced version of a "Maturing" firm, expected to advance naturally with additional resources and time. In contrast, this this introduces a behavioural typology. The analysis demonstrates that Cluster 0 is not simply beginners; rather, they are established firms (with an average age of more than 2 years) constrained by a psychological state. These firms are not necessarily progressing toward maturity; instead, they are confined within a "Survival Trap." This finding indicates that, without a shift in mindset, the passage of time alone will not facilitate advancement to subsequent stages. Traditional frameworks measure digital maturity as a passive state, such as what technology a firm has. This article introduces strategic intent as an active classification variable. The

novelty of this approach lies in classifying firms not by what they have, but by why they do it. Existing theory classifies a firm as "Low Maturity" due to a lack of technological tools. The proposed theory, however, categorizes a firm as "necessity-driven" when it employs technology solely to maintain its current position for survival, in contrast to "strategic innovator," who leverage technology to pursue new market opportunities.

5. Discussion

This study challenges size-based determinism in digital maturity models by introducing a behavioural typology of SME digitalization. The identification of three clusters Survivalists, Transients, and Strategic Innovators supports the hypothesis that digital maturity in transition economies is shaped primarily by strategic intent and resource complementarity, not firm demographics. The key finding is the Survivalists (Cluster 0), who remain in a low-maturity equilibrium despite being established (average age >6 years). Unlike linear models that assume firms mature over time (Kane et al., 2017), our results indicate that time does not correct digital stagnation. The Survival Trap describes firms treating digitalization as a defensive necessity rather than a growth driver. According to the Resource-Based View (RBV), although financial resources may be available, Survivalists lack absorptive capacity—the ability to recognize and apply new knowledge—needed to gain a competitive advantage (Cohen & Levinthal, 1990). Their low Primary Mindset score (1.49) reflects a perception of technology as a cost. In the absence of strategic leadership, digital tools fail to deliver ROI, as shown by this cluster's lower Time to ROI (1.59) compared to innovators. This highlights the Human Capital Paradox: in transition economies such as Poland, barriers to digitalization are now cognitive and skill-based, not only infrastructural or financial. While funding is more accessible, limited digital skills and strategic vision restrict the effective use of resources. The Transients (Cluster 2) illustrate this paradox, showing strategic intent to modernize (Mindset: 1.96) but lacking operational routines and skilled personnel to scale, thereby falling into a digital middle-income trap. This is consistent with findings that shortages of ICT specialists and low digital literacy (43% in Poland) are greater constraints than capital (Kolisnichenko, 2025). In contrast, the Strategic Innovators (Cluster 1) exemplify Teece's (2007) Dynamic Capabilities Framework. Despite similar demographics to laggards, these firms achieve superior outcomes, including higher revenue change (4.29) and market agility (4.22). Dynamic capability—the ability to sense and seize opportunities—is independent of firm size. These firms combine strategic logic with effective use of digital tools, decoupling digital maturity from physical size and advancing from digitizing for survival to digitizing for expansion in new EU markets.

6. Conclusion

This study challenges the linear progression assumption in traditional digital maturity models (e.g., CMMI, DESI). Using K-Means clustering on Polish SMEs, article shows digital maturity is non-linear and divided by behavioural intent. This article propose a typology Survivalists, Transients, and Innovators to explain why some SMEs stagnate despite technological access. Theoretically, this article extend the Resource-Based View (RBV) by identifying "Strategic Intent" as a rare, non-substitutable resource, more predictive of maturity than financial capital. Additionally, document the "Survival Trap," showing that while external shocks (e.g., COVID-19) may prompt digital adoption, without a mindset shift, such adoption remains defensive and does not deliver sustained performance gains. For

SME managers, the findings warn that acquiring technology without developing human capital leads to the Survival Trap. Managers should treat IT as a strategic enabler and invest in digital literacy to build absorptive capacity. For policymakers, the study indicates that a "one-size-fits-all" subsidy approach is inefficient. Grants to Survivalists (Cluster 0) are likely to yield low ROI due to insufficient strategic readiness. Policy should prioritize "soft" transformation leadership training, digital strategy consulting, and skills development over solely hardware or software funding. Support should be segmented: Survivalists require digital literacy and mindset change, while Transients need help with scaling and internationalization to achieve maturity. Limitations include the focus on Polish SMEs, which may limit generalizability to mature or developing economies, and the cross-sectional design, which captures only a single time point. Longitudinal research is needed to track whether Transients progress to Innovators or fall back into the Survival Trap. Future studies should also examine how AI and automation affect the trajectories of these behavioural clusters.

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