
| RESEARCH ARTICLE

The Impact of the Digital Economy on the Competitive Advantage of Small and Medium-Sized Enterprises in Jordan

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| ABSTRACT

This study aims to examine the effect of the digital economy on the competitive advantage of small and medium-sized enterprises (SMEs) in Jordan on a quantitative basis by applying the partial least squares structural equation modelling (PLS-SEM) method, which was used to collect and analyze survey data from 309 SMEs. Key areas of the digital economy studied were digital infrastructure, e-commerce adoption, digital payment systems, digital transformation and advanced digital technologies. The results show that digital infrastructure, advanced digital technologies, e-commerce adoption, and digital transformation are positively associated with competitive advantage with the highest positive coefficient being for digital infrastructure ($\beta = 0.519$, $p < 0.001$), followed by advanced digital technologies ($\beta = 0.158$, $p = 0.004$), e-commerce adoption ($\beta = 0.142$, $p = 0.045$), and digital transformation ($\beta = 0.128$, $p = 0.007$). Digital payment systems, on the other hand, failed to show a statistically significant impact ($\beta = 0.014$, $p = 0.706$). The structural model had an acceptable level of variance for competitive advantage ($R^2 = 0.682$) and had excellent predictive relevance ($Q^2 = 0.667$). The results support the Resource Based View (RBV) and Dynamic Capabilities Theory (DCT) in that digital capabilities are indeed valuable strategic resources to improve the competitiveness of SMEs. The study comes at a time of great need for empirical evidence when it comes to the relative contribution of different dimensions of the digital economy toward generating competitive advantage, as this topic is missing from the literature on SME digitalization in the Jordanian context. The conclusions provide implications for both policy makers and SME managers, with the policy implications being to focus on investments in digital infrastructure and the managerial to strategically use advanced digital technologies to enhance innovation, operation efficiency, and market responsiveness. This study methods bring together several aspects of the digital economy in the context of a developing economy, adding to the existing digital transformation literature and offering practical recommendations to improve the competitiveness of SMEs.

| KEYWORDS

Digital economy, competitive advantage, small and medium-sized enterprises, digital transformation, Jordan.

| ARTICLE INFORMATION

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1. Introduction

In recent years, the world of business has been changing dramatically, and the sector is making a transition to the digital economy, largely due to the rapid development of information and communication technologies (ICTs). The digital economy has become one of the main sources of economic growth, innovation, productivity and competitiveness in developing and developed countries. Digital technologies, including cloud computing, artificial

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intelligence, big data analytics, digital payment systems, e-commerce platforms and mobile technologies, have transformed the way organizations generate value, engage with customers, and operate (Tapscott, 1996). As a result, there has been a growing trend toward the implementation of digital solutions in organizations to ensure efficiency, cut down on operational costs, boost customer satisfaction, and bolster the competitive edge in today's rapidly changing markets.

According to Bukht & Heeks (2017), the digital economy is defined as activities that are tightly connected with digital technologies, digital infrastructure and digital-based processes, which are essential for production and distribution, as well as consumption, of goods and services. The digital economy, in contrast, allows companies to be more agile, to engage in new business models, market access and global reach, and to out-compete their rivals. With digitalization transforming industries around the globe, companies that can embed digital technologies into their business models are more likely to gain sustainable competitive advantages and excel in organizational performance (Fang et al., 2024).

Small and medium-sized enterprises (SMEs) play a pivotal role in national economies, providing a significant share of employment, economic growth, innovation and reducing poverty. SMEs in Jordan make up a large share of the registered enterprises and are the backbone of the economy and private sector in the country. Although SMEs are significant to the Jordanian economy, they are confronted with various barriers, such as financial barriers, scarcity of access to international markets, growing competition, and technological barriers. The increase in these challenges has further pushed SMEs to embrace digital technologies, and to take full advantage of digital opportunities to boost efficiency and enhance the market position. The escalation of these challenges has amplified SMEs' interest in digital technologies and the opportunities they offer to boost efficiency and strengthen their market position (Alharafsheh & Ezmigna, 2023).

Digital economy practices offer substantial possibilities for SMEs to increase their market responsiveness, boost innovation and make the operations more flexible. Digital technologies help businesses to streamline operations, streamline supply chain, communicate with stakeholders and deliver customized products and services to customers. Also, e-commerce and online marketing channels are cost-effective options for SMEs to reach larger and wider audiences, and to be able to compete with larger firms on equal terms (Alkhalwaldeh et al., 2026).

One of the most crucial factors affecting the success and sustainability of an organization is still competitive advantage. The key to gaining competitive advantage is for organizations to create valuable, rare, inimitable and non-substitutable resources and capabilities (Barney, 1991), according to the resource-based view (RBV). In today's digital age, digital skills are a key asset for any organization to outcompete their rivals by innovating, being more cost effective, delivering better service, and being more agile in responding to requests. Empirical research within the past year suggests that digitalization plays a significant role in enhancing competitive advantage by boosting organization's capabilities and enabling business model innovation (Saputra et al., 2024).

As part of Jordan's Economic Modernization Vision and national digital strategies, the Government has been making digital transformation a top priority. There have been major investments in the development of digital infrastructure, in making the Internet more accessible and in the development of digital payment systems and digital entrepreneurship. However, financial constraints, digital literacy, cybersecurity, and organizational change are still major obstacles for many SMEs to successfully leverage digital transformation efforts (Al-Satel, 2026).

Some research in other countries in the world has explored the link between digital transformation and organizational performance, but the relationship between the digital economy and the competitive advantage of Jordanian SMEs is still a little studied. However, existing studies have tended to examine business strategy, technological adoption or organizational performance separately, rather than examining the direct effect of the dimensions of the digital economy on the competitive advantage of businesses in the Jordanian business environment (Alharafsheh & Ezmigna, 2023). This gap creates an unmet need to conduct more empirical research to gain insight into the effect of practices in the digital economy on the competitive position of SMEs in Jordan.

Thus, this study aims to investigate the impact of the digital economy on the SME competitive advantage in Jordan by adopting a quantitative research method that involve the survey method and rely on information gathered from

the owners and managers of the SMEs. This study will likely help advance the current knowledge base on digital transformation and competitiveness in emerging markets, and offer practical insights for policymakers, business leaders and entrepreneurs in Jordan interested in speeding up digital adoption and enhancing the competitiveness of Jordanian SMEs in a digital global economy.

1.1 Research Problem

Digital technologies have revolutionized the global business landscape and are providing unprecedented opportunities for businesses to be more efficient, innovative and competitive. The digital economy, defined by the widespread adoption of information and communication technologies, digital platforms, ecommerce, artificial intelligence and electronic payment systems, has become a key factor in business's success and sustainability in today's markets (Tapscott, 1996). In this regard, the use of digital technologies is becoming more imperative for organizations to maintain the pace and dynamism of a highly globalized context, and its incorporation in their strategic and operational activities (Alkhalaf et al., 2026).

Small and medium enterprises (SMEs) play a key role in employment creation, economic growth and the private sector development and their contribution in the Jordanian economy is significant. Even though they contribute greatly to the economy of Jordan, SMEs have several challenges to overcome, including financial difficulties, strong competition, not having access to foreign markets and changing customer preferences. These challenges have made it more important than ever for SMEs to take advantage of digital opportunities and invest in digital transformation to enhance their operations and maintain their competitiveness (Alharafsheh & Ezmigna, 2023).

Jordan has made strides in enhancing digital infrastructure and the economic modernization vision as a digital nation, but digital adoption is still uneven, especially among many of the SMEs. Some enterprises still face some challenges such as deficient technological capacity, digital skill deficiency, financial limitations, security concerns, and unwillingness to change their organizations, which could prevent the enterprises from adopting the digital economy tools and technologies (Al-Satel, 2026). Consequently, a lot of SMEs lack the ability to translate investments in digital technologies into actual gains for their businesses like cost reduction, innovation, improved service quality, market expansion, and customer responsiveness.

In addition, most of the previous research has been concentrated on digital transformation or technological adoption and there is a lack of empirical research investigating the link between the digital economy and competitive advantage in the context of Jordanian SMEs (Bukht & Heeks, 2017). This is more pronounced in the developing economies where the institutional, technological, and market environment is very different from those in developed economies.

Hence, the problem of the current study is that of few empirical studies that address the extent to which the digital economy contributes to small and medium enterprises competitive advantage in Jordan. Hence, this study aims to examine the dimensions of digital economy and its impact on enhancing the competitive advantage of Jordanian SMEs and to obtain empirical evidence that could help policy makers and business leaders in designing strategies that would pave the way for digital transformation and sustainability of competitiveness.

1.2 Research Questions

The study aims to provide an answer to the following main research questions:

How does the digital economy impact SMEs' competitive advantage in Jordan?

The following sub-questions are proposed to answer this main question:

1. What is the effect of digital infrastructure on the competitive advantage of SMEs in Jordan?
2. How does the use of e-commerce affect the competitive advantage of SMEs in Jordan?
3. What impact do the digital payment systems have on the competitiveness of SMEs in Jordan?
4. How have digital transformation of business processes impacted SMEs' competitive advantage in Jordan?
5. What is the effect of advanced digital technologies on the competitive advantage of SMEs in Jordan?

1.3 Research Objectives

The main objective of this study is:

To investigate how digital economy affects the Competitive Advantage of SMEs in Jordan.

The study is aimed at achieving the following specific objectives:

1. To explore the impact of Digital Infrastructure on the Competitive advantage of Jordanian SMEs.
2. To explore the impact of e-commerce adoption on SMEs' competitive advantage in Jordan.
3. To examine how digital payment system affects the competitive advantage of SMEs in Jordan.
4. To assess the effect of the digital transformation of business processes on the competitive advantage of SMEs in Jordan.
5. To examine how the use of advanced digital technologies have affected the competitive advantage of SMEs in Jordan.

1.4 Research Hypotheses

H01: At the significance level ($\alpha \leq 0.05$), there is no statistically significant effect of the digital economy on the competitive advantage of the SMEs in Jordan.

H01-1: At the significance level ($\alpha \leq 0.05$), there is no statistically significant effect of digital infrastructure on the competitive advantage of SMEs in Jordan.

H01-2: At the significance level ($\alpha \leq 0.05$), the adopted of ecommerce has no statistically significant effect on the competitive advantage of SMEs in Jordan.

H01-3: At the significance level ($\alpha \leq 0.05$), there is no statistically significant difference between digital payment systems and the competitive advantage of SMEs in Jordan.

H01-4: At the significance level ($\alpha \leq 0.05$), it was concluded that digital transformation for business processes does not positively affect the competitive advantage of SMEs in Jordan.

H01-5: There is no statistically significant difference between the effect of advanced digital technologies on the competitive advantage of SMEs in Jordan at the significance level ($\alpha \leq 0.05$).

2. Conceptual Model

This study is based on the conceptual model that examines the relationship between the digital economy and the competitive advantage of small and medium-sized enterprises (SMEs) in Jordan. The digital economy is treated as the independent variable, and the concept of the digital economy is articulated under five pillars: digital infrastructure, e-commerce adoption, digital transformation, digital payment systems and artificial intelligence and data analytics. These dimensions are the basic building blocks for organizations to use digital technologies and incorporate them into business processes and strategic initiatives. Cost efficiency, innovation, service quality, responsiveness and market positioning are likely to influence the competitive advantage, which is the dependent variable indicating the ability of SMEs to perform in an exceptional manner compared to their competitors. The underlying concept is that with increased adoption of digital economy practices, SMEs' competitive capacities can be improved by increasing operational efficiency, supporting innovation, improving customer relationship and broadening market access. Based on this, the model suggests that the dimensions of the digital economy have a direct positive effect on the competitive advantage of SMEs in Jordan, which will be tested in this study using survey data from owners and managers of SMEs.

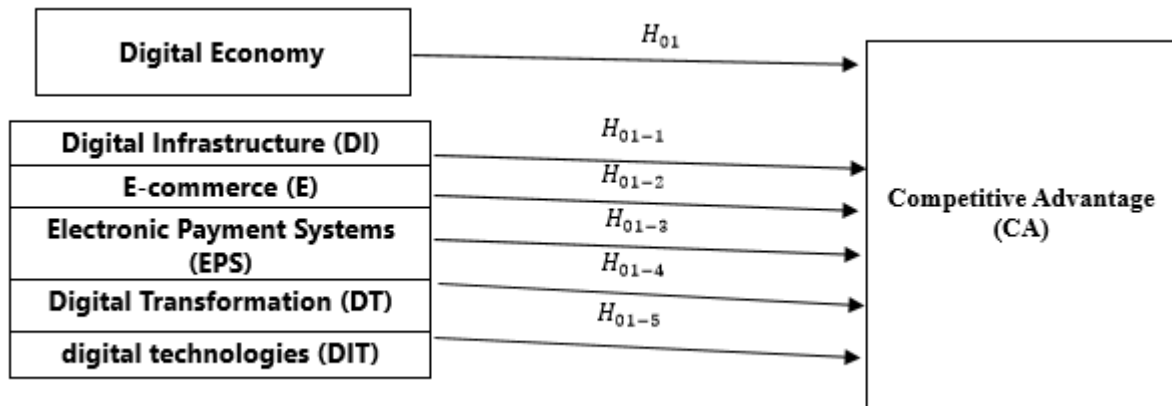


Figure 1 Conceptual Framework

2.1 Theoretical Foundation

The research is mainly based on Barney's (1991) Resource Based View (RBV) theory. According to the Resource-Based View (RBV) theory, organizations can attain sustainable competitive advantage by possessing and effectively utilizing valuable, rare, inimitable and non-substitutable resources and capabilities. From this viewpoint, resources that are hard for rivals to imitate are central to outperform and sustain outperform.

Digital capabilities in the context of the digital economy may be viewed as strategic organizational resources such as Digital infrastructure, e-commerce systems, Digital payment technologies, Digital transformation initiatives and Artificial intelligence applications, which can facilitate the creation of competitive advantage. By investing and integrating these digital resources into their business processes, SMEs can achieve benefits, such as improved operational efficiency, cost reduction, innovation, customer satisfaction, and quicker reaction to market changes, that will bolster their competitive edge (Barney, 1991).

Moreover, this study is based on the Dynamic Capabilities Theory proposed by Teece et al., (1997) that focuses on the dynamic capacities of an organization that enables the company to integrate, build, and reconfigure internal and external competencies to adapt to the fast-changing business environment. The sustainability of SMEs' adaptation to technological changes and constant update of their digital capabilities is now a key element of the success and competitiveness of the organization in the digital transformation era. Digital technologies allow companies to detect opportunities in the market, capitalize on trends, and leverage business resources to create new products, services, and business models.

The merging of the RBV and DC theory offers a solid theoretical framework to support the analysis of digital economy dimensions in enhancing competitive advantage for SMEs in Jordan. Dynamic Capabilities Theory is related to the RBV on the one hand, but it also builds on the concepts of leveraging resources and continuous adaptation to meet challenges in dynamic markets. Thus, the present study assumes that the dimensions of digital economy dimensions when adopted and used effectively, enhance the competitive advantage of Jordanian SMEs.

2.2 Empirical Literature Review

The digital economy has brought a lot of attention to researchers, policymakers and business practitioners by its transformative effect on organizational competitiveness and economic development. Digital technologies have become integral to the value creation processes, the customer interaction, the supply chain management and the generation of new products and services within companies, changing the business landscape in fundamental ways. As a result, a considerable amount of empirical research has been conducted considering the impact of digitalization on organizational performance and competitive advantage, especially for small and medium-sized enterprises (SMEs).

Competitive advantage is regarded as one of the key goals of strategic management research for a long time. Barney (1991) states that a firm can gain a sustainable competitive advantage if it has valuable, rare, inimitable, and non-substitutable resources and capabilities. Digital technologies have become vital tools in recent years which allow companies to increase efficiency, foster innovation, lower expenses and be responsive to the changing environment. Consequently, digital skills are now a key factor in determining organizational competitiveness in the digital context.

Tapscott (1996) focused on the economic impact of digitalization in one of the first studies to this effect, in which he defines the digital economy as a new economic paradigm that relies on the widespread use of digital networks, information technologies and knowledge-based activities. The study highlighted that companies with the ability to use digital technologies will have significant benefits in productivity, market access and innovation. The study was mainly conceptual in nature, but it served as the basis for further empirical studies of the link between digitalization and organizational performance.

Bukht and Heeks (2017) also contributed to the concept of the digital economy by offering a broad definition and metrics for digital economic activities. Their work shed light on the multi-dimensionality of the digital economy, including digital infrastructure, digital platforms, e-commerce, electronic transactions and digital innovation. The authors suggested that companies in digitally advanced workplaces are better equipped to access information, communicate and have more efficient business processes and, therefore, they are more productive and more competitive.

Digital has always been one of the top enablers of digital transformation and organizational competitiveness. A strong digital infrastructure allows businesses to be efficient in accessing information, integrate business functions and communicate with customers and suppliers. OECD (2021) highlighted that SMEs that have a good digital infrastructure are more productive and more innovative than SMEs that lack a digital infrastructure. The research also found that companies that invest in broadband, cloud computing, and digital communication technologies have a high level of business resilience and operational efficiency.

Likewise, Bianchini and Lasheras Sancho (2025) carried out an in-depth study of SMEs in the OECD countries and concluded that firms that had a more advanced digital infrastructure had a higher probability of implementing sophisticated digital solutions, expanding trade activities, and gaining greater competitiveness and performance. The authors suggested that digital infrastructure is the underpinning for digital capabilities to be built and used.

One of the key aspects of digital economy is e-commerce adoption. Online marketplaces and digital sales channels have transformed business models, and have empowered SMEs to access new markets and enable them to reduce transactions costs in ways that are unprecedented. Almtiri et al., (2021) studied the relationship between the use of e-commerce and the performance of SMEs and concluded that companies that entered e-commerce channels experienced a growth in the number of customers, size of the market, and the volume of sales. The study highlights the potential of ecommerce as a tool to break geographical barriers and offer SMEs a competitive edge when battling with big companies.

In an applicable field, OECD (2021) found that all SMEs active in e-commerce activities have been more resilient in economic crisis situations, such as during COVID-19. Digital sales channels helped companies stay up and running and maintain customer relationships even with the disruption in physical markets. The results show that the use of e-commerce is not only important for the immediate improvement of the business's performance, but it is also beneficial in the long-term for the competitiveness and sustainability of the company.

Another key element in the digital economy is digital payment systems. The rise of the use of electronic payment technologies has brought various benefits, such as the enhancement of transaction efficiency, the reduction of administrative expenses and the promotion of financial inclusion. The World Bank (2022) says that digital payment technologies are a key element in the formalisation of businesses, transparency, and convenience to customers, particularly SMEs in the developing economies. Electronic payment solutions also assist with cash flow management and reduce the danger of dealing with cash payments.

According to empirical evidence, the implementation of digital payment technologies is recommended to positively affect the satisfaction level of customers and also the purchasing behavior of consumers. Firms with multiple digital payment channels are more likely to improve customer retention, and are also more likely to have positive net business outcomes. In emerging markets, digital financial services are key assets to enhance the productivity and promote entrepreneurship in business. Digital payment systems are increasingly seen as drivers of competitive advantage, thus the latter is being discussed more.

There was also a lot of empirical research on the digital transformation of business processes in recent years. Digital transformation is the integration of digital technology in the organizational processes, structures and decision-making to optimize the performance and value. According to Verhoef et al. (2021) digital transformation is not only the change of technology; it is also the adaptation of the organization as well as strategic renewal. Digital transformation projects have a higher chance of being a successful project by organizations that can adjust to the changing landscape of the market and customer needs.

Several empirical studies have shown that the positive impact of digital transformation on organizational performance has been observed. For instance, Khan et al. (2019) found that digital mature companies had higher innovation potential, better customer engagement and better operational efficiency. The research pointed out that digital transformation makes the organizations more agile, and helps them to adapt to the uncertainty of the environment.

In the context of SMEs, Gonzalez-Varona et al. (2024) explored how SMEs are acquiring digital skills and their effect on SMEs' flexibility and strategic responsiveness. The researchers stated that the digital use of SMEs could be beneficial for improving their skills to optimize their internal processes and new market opportunities.

Artificial intelligence (AI) and data analytics are one of the most cutting-edge areas of the digital economy. With data and analytical technologies becoming more available, organizations can make evidence-based decisions, have more accurate forecasts, and provide a personalized customer experience. AI technologies support automation, predictive analytics, and intelligent decision-making, helping to enhance operational efficiency and foster innovation (Alkhawaldeh et al., 2024).

The research carried out by Dwivedi et al., (2021) found that the implementation of AI has a positive effect on the performance of organizations, as it increases productivity, lowers costs, and improves decision making. The study also revealed that companies that leverage AI applications are more likely to be competitive differentiators and develop new business models.

Likewise, the study by Raisch and Krakowski (2021) on the role of AI in the organizational capacity highlighted that AI technologies augment human decision-making processes and bolster firms' capacity to process complex information and react to environmental shifts. The study found that AI usage is a strategic skill that is directly linked to competitive advantage.

Empirical research regarding the link between digital skills and competitive advantage of SMEs has been growing in recent years. In their study on enhancing the competitiveness of SMEs, Fang et al. (2024) focused on digital capability and digital business model innovation. The study, based on survey responses from SMEs, found that digital capabilities have direct and indirect impacts on competitive advantage, mediated by business model innovation. If an organization had more digital capabilities, they could be more adaptable, innovative and market responsive.

Similarly, Saputra et al. (2024) examined the impact of dynamic capabilities on competitive advantage and the role of digitalization in the link between dynamic capabilities and competitive advantage in SMEs. The results indicated that digitalization has a significant effect on improving the innovation power and operational flexibility of the companies that are part of the competitive performance. The research highlighted the importance of digital technologies in organizational strategies towards sustainable competitive advantage.

Although digital transformation initiatives have increased, there is still relatively little empirical evidence in relation to the Middle Eastern context. Alharafsheh and Ezmigna (2023) found that strategic orientation, organizational capabilities and innovation are factors that significantly affect the performance of SMEs in Jordan. No direct research of the digital economy dimensions, but the study indicated the necessity to search for new management techniques to increase the competitiveness of the economy.

Similarly, Al-Satel (2026) explored the level of digital transformation of Jordanian SMEs and the opportunities and challenges arising from digital transformation. The study identified the efficiency, satisfaction and market access as the gains from the use of digital technologies in SMEs. Despite this, there are still major challenges in the area of financial constraints, lack of digital skills, cyber security, and change resistance that still impede digital transformation efforts.

In recent years, the Jordanian Government has been increasingly focusing on promoting the implementation of digital transformation and entrepreneurship through various initiatives based on national strategies and development programs. Digital technologies are central to the Economic Modernization Vision and national digital strategies, which highlight the need for digital technologies to enhance business competitiveness and investment interest. However, the digital transformation of SMEs is still uneven, and many businesses are still using traditional business methods.

The empirical literature also suggests that contextual factors are important in shaping the effectiveness of digital economy initiatives. Digital opportunities can only be taken up successfully by organizations, which are supported by institutional support, regulatory frameworks, technological readiness, and human capital availability. This means that the results of developed countries might not always be applicable to developing countries because of differences in infrastructure, market maturity, and the institutional setting.

While there is a body of literature on digital transformation and competitiveness, there are several gaps in the literature. First, there have been many previous studies, which have been limited to individual aspects of digitalization, e.g. e-commerce or digital infrastructure, and failed to consider the multidimensionality of the digital economy. Second, empirical research on the synergistic effect of digital infrastructure, e-commerce usage, digital payment systems, digital transformation, and artificial intelligence on competitive advantage is still limited. Third, little research has been done in the Jordanian context, which is very different from that of developed economies regarding institutional and market conditions.

Thus, the present study aimed to investigate the joint effect of the dimensions of digital economy on the competitive advantage of Jordanian SMEs, which makes it a contribution to the previous studies. The study aims to offer empirical evidence about the degree of contribution of digital economy practices to the organizational competitiveness by means of a survey-based quantitative methodology and focusing on the Jordanian business environment. The results are expected to add to the existing body of knowledge regarding digital transformation in emerging markets and offer practical implications for policy makers, business leaders and entrepreneurs in improving the competitiveness of SMEs via digitalizing the business.

3. Research Methodology

The method used in this study is a quantitative method that is used to examine the influence of the digital economy on the competitive advantage of small and medium-sized enterprises (SMEs) in Jordan. The quantitative approach is deemed suitable since it enables one to empirically examine relationships among variables, test the hypotheses and come up with results that could be generalized to the target population (Creswell & Creswell, 2017). In detail, the study uses a cross-sectional survey design which involves survey investigation of the respondents at one time with a structured questionnaire (Saunders et al., 2019). It is a design that is widely used in business and management research because it is effective in the study of perceptions, attitudes and organizational practices (Sekaran & Bougie, 2016). The target population is defined as all SMEs in Jordan with a total of about 98,000 SMEs registered by the Companies Control Department and the Ministry of Industry, Trade and Supply (Department of Statistics, 2023). SMEs are an essential component of the Jordanian economy, accounting for more than 50% of the employment opportunities and about 30% of the country's GDP, in addition to their role in supporting the

innovation sector and the development of the private sector (Alharafsheh & Ezmigna, 2023). In the era of digital transformation, which has become a key factor in giving competitiveness to organizations, SMEs are an appropriate context to consider the role of the digital economy in the improvement of the competitive advantage (Al-Satel, 2026). The respondents selected in this study are a group of owners, chief executive officers, general managers, information technology managers, and senior managers who have enough knowledge about their companies' digital practices and strategic activities (Fang et al., 2024).

The study employs purposive sampling as the sampling technique due to the large number and geographical distribution of SMEs in the twelve governorates in Jordan (Etikan et al., 2016). This non-probability method allows the researcher to choose a sample of people who are directly participating in decision making processes and who can offer accurate information about the use of digital technologies in their organisations (Patton, 2015). Using the Krejcie and Morgan's sample size determination table, the number of the respondents required for the population ($n = 98,000$) is 384. To ensure that enough valid responses for analysis would be returned, a total of 450 questionnaires were sent out, but this was done with the assumption that there will be some non-response and some questionnaires will be incomplete. To achieve statistical power greater than 80% as recommended by Hair et al. (2019) and Kock & Hadaya (2018) for PLS-SEM analysis, a minimum of ten observations per indicator were needed and 309 valid responses were collected.

Primary data are gathered by means of a structured questionnaire that was developed based on previously validated measurement scales reported in the literature on digital economy and competitive advantage (Bukht & Heeks, 2017; Barney, 1991). The questionnaire has three major sections (DeVellis, 2021). The first section collects demographic data about the respondents and their organizations, such as gender, age, education, managerial role, business sector, size of the company and length of time it has been operating (Cooper & Schindler, 2014). The second section measures the independent variable, the digital economy, operationalized into five dimensions: digital infrastructure (OECD, 2021), e-commerce adoption (Almtiri et al., 2021), digital payment systems (World Bank, 2022), digital transformation of business processes (Verhoef et al., 2021), and artificial intelligence and data analytics (Dwivedi et al., 2021). The third section is the measurement of the dependent variable, namely competitive advantage, which is the performance of the organization compared to the organization's competitors (Saputra et al., 2024).

Items of the measurement include the questionnaire that uses the five-point Likert scale ranging from strongly disagree to strongly agree (Likert, 1932). The use of Likert scale is suitable for measuring respondents' perceptions and is widely used in empirical research in the field of management and business research (Joshi et al., 2015). Furthermore, the scale allows for statistical analysis and comparison of variables and dimensions (Boone & Boone, 2012). The questionnaire is then reviewed by experts in the field of business administration, digital transformation and strategic management, ensuring the validity of the measurement instrument (Devellis, 2021). Their responses are used to refine the wording, relevance and comprehensiveness of the measurement items (Munn et al., 2018). Construct validity is also tested by conducting convergent and discriminant validity analysis, and reliability is tested by Cronbach's Alpha and Composite Reliability (CR) coefficient (Hair, Alamer, 2022). Nunnally and Bernstein (1994) suggest that internal consistency of items in measurement is acceptable if the reliability values are 0.70 or above.

The data obtained are analysed with software of Statistical Package for Social Sciences (SPSS) version 26 and SMARTPLS version 4 by Ringle et al. (2022). Descriptive statistical techniques are used to summarize the demographic characteristics and describe the distribution of the study variables of the respondents (Pallant, 2020). Reliability and validity analysis are then used to evaluate the quality of the measurement model (Fornell & Larcker, 1981). Lastly, Partial Least Squares (PLS-SEM) is used to test hypotheses and measure the direct influence of the digital economy dimensions on the competitive advantage of SMEs in Jordan (Hair et al., 2019). A level of significance of $\alpha \leq 0.05$ (Field, 2024) is used to assess statistical significance. Last, ethical standards for research were followed throughout the data collection/analysis process (Resnik, 2015). The survey is anonymous and voluntary, and the participants are told the aims of the study before filling in the questionnaire (British Educational Research Association, 2018). Confidentiality and anonymity of participants is ensured and information gathered is only used for academic and research purposes (American Psychological Association, 2020).

4. Results of the Study

Cronbach's alpha values for all constructs were also found to be good with scores above the recommended level of 0.70 (Hair, Alamer, 2022) as shown in Table 1. The results of the Cronbach's alpha test for Competitive Advantage showed high internal consistency ($\alpha=0.891$) and the factor loading ranged from (0.783 to 0.886), which indicates that Jordanian SMEs consider competitive advantage in several aspects (innovation and cost efficiency). Digital infrastructure (DI) had the highest reliability ($\alpha=0.899$) and loadings ranging from 0.774-0.890, which is due to the significant investments Jordan has made in digital connectivity in the context of the Economic Modernization Vision. However, the lowest, but acceptable, reliability ($\alpha=0.754$) was obtained for e-commerce adoption (E), where the loading for each item in this domain was 0.615, which indicate that Jordanian SMEs still have some obstacles to fully utilize e-commerce platforms (Al-Satel, 2026). The AVE values for all constructs exceeded 0.50, thus supporting the convergent validity, and the highest AVE value was for DIT (0.756), suggesting that the adoption of artificial intelligence and analytics plays more role in influencing SME competitiveness in the changing digital environment in Jordan.

Table 1 Measurement Model

Constructs	Factor Loadings	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
CA		0.891	0.894	0.920	0.699
CA1	0.783				
CA2	0.886				
CA3	0.877				
CA4	0.831				
CA5	0.797				
DI		0.899	0.903	0.926	0.714
DI1	0.843				
DI2	0.881				
DI3	0.890				
DI4	0.832				
DI5	0.774				
DIT		0.919	0.922	0.939	0.756
DIT1	0.851				
DIT2	0.881				
DIT3	0.882				
DIT4	0.833				
DIT5	0.898				
DT		0.900	0.908	0.926	0.715
DT1	0.880				
DT2	0.882				
DT3	0.762				
DT4	0.838				
DT5	0.858				
E		0.754	0.756	0.837	0.508
E1	0.668				
E2	0.754				
E3	0.758				
E4	0.755				
E5	0.615				
ESP		0.883	0.901	0.913	0.678
EPS1	0.790				
EPS2	0.825				
EPS3	0.844				
EPS4	0.849				
EPS5	0.807				

Table 2 shows the Heterotrait-monotrait (HTMT) ratio for assessing discriminant validity. Each of the constructs was empirically different because all the HTMT values were below the conservative level of 0.85 (Hair, Alamer, 2022). The highest HTMT value resulted between digital transformation (DT) and e-commerce (E) with a value of 0.715, which indicates that these dimensions are still highly interrelated in Jordanian SME operations; in fact, using digital transformation to transform business processes often requires the use of an e-commerce platform (Alharafsheh & Ezmigna, 2023). Digital infrastructure (DI) and competitive advantage (CA) had an HTMT of 0.762, which indicated that Jordan's investments in digital connectivity have been significant at the national level and are part of its Economic Modernization Vision. The lowest value was found between electronic payment systems (EPS) and CA at 0.421, suggesting that although the Government is promoting the use of digital financial services, Jordanian SMEs still perceive payment systems as somewhat independent from their overall competitiveness plans, which may be attributed to the preference for cash-based transactions among the country's customers.

Table 2 Heterotrait-monotrait (HTMT) ratio Discriminant Validity

Constructs	CA	DI	DIT	DT	E	EPS
CA						
DI	0.762					
DIT	0.690	0.588				
DT	0.653	0.554	0.736			
E	0.552	0.471	0.607	0.715		
EPS	0.421	0.356	0.534	0.567	0.509	

Table 3 displays Variance Inflation Factor (VIF) values ranging from 1.427 to 2.805, all below the conservative threshold of 3.0 (Hair, Alamer, 2022), confirming the absence of multicollinearity among independent variables. The results showed a moderate correlation in the case of E-commerce (E), with the highest VIF, indicating that Jordanian SMEs were more integrated with all the other dimensions of the digital. The VIF for electronic payment systems was the lowest (1.427), suggesting that Jordanian firms' implementation patterns were relatively independent, which aligns with Al-Satel's (2026) study, which found that adoption of digital financial services (DFS) in the Jordanian SME sector varied across firms.

Table 3 Variance Inflation Factor

Constructs	CA
DI	2.123
DIT	2.390
DT	2.111
E	2.805
EPS	1.427

According to Table 4 and Figure 2, digital infrastructure (DI) has the highest positive influence on competitive advantage ($\beta=0.519$, $p<0.001$ and $f^2=0.400$) with this result supporting H1. This major impact is consistent with the Resource-Based View (RBV) (Barney 1991) which considers digital infrastructure as a valuable and scarce organizational resource. This study finds that both strong infrastructure and productivity and advanced infrastructure and innovation contribute to SME productivity and innovation (OECD 2021), and international trade engagement is made easier by advanced infrastructure (Bianchini and Lasheras Sancho 2025). Kane et al. (2019) highlighted the critical role of infrastructure in fostering digital capabilities, while Fang et al. (2024) demonstrated that infrastructure has a direct effect on SME competitiveness by improving operational efficiency. There is significant support for H2 in that e-commerce adoption (E) significantly influences competitive advantage ($\beta=0.142$, $p=0.045$, $f^2=0.108$). Almtiri et al (2021) have reported that ecommerce is a way to expand the market and make money. OECD (2021) revealed that e-commerce-engaging SMEs were more resilient in periods of economic uncertainty. Gonzalez-Varona et al. (2024) further confirmed that digital transformation has a positive effect on organizational flexibility, and Saputra et al. (2024) found that digitalization is a mediating factor between dynamic

capabilities and competitiveness. Tapscott (1996) claimed that digital networks are transforming the way value is created.

The results showed that the digital transformation has a significant positive impact on competitive advantage (H4) with $\beta=0.128$, $p=0.007$, $f^2=0.094$, which indicates a strong relationship between the two. The results revealed that digital transformation ($\beta=0.128$; $p=0.007$; $f^2=0.094$) positively influenced the competitive advantage, supporting H4. Strategic renewal is one aspect of transformation (Verhoef et al., 2021) and reconfiguring internal competencies is another (Teece et al., 1997). The study by Kane et al. (2019) confirmed that digitally mature firms have better innovation. Gonzalez-Varona et al. (2024) showed that transformation is a way to enhance strategic responsiveness, and Fang et al. (2024) demonstrated that the use of digital capabilities can be a means of innovation in business models. Advanced digital technologies (DIT) significantly affect competitive advantage ($\beta=0.158$, $p=0.004$, $f^2=0.123$), which helps to support H5. Dwivedi et al. (2021) proved that AI helps enhance productivity and decision-makers' performance. Raisch and Krakowski (2021) determined that AI enhances information processing abilities. Saputra et al. (2024) found that the digitalization process is found to increase innovation capability. OECD (2021) concluded that technology-adopting SMEs are more competitive and Bianchini and Lasheras Sancho (2025) found technology to be a competitiveness driver. Electronic payment systems (EPS) did not have a significant effect ($\beta=0.014$, $p=0.706$) and were not a support for H3. While digital payments contribute to financial inclusion (World Bank, 2022), Jordanian SMEs could be hindered by factors such as lack of digital literacy and customers' preference for cash payments (Al-Satel, 2026). The model accounted for 68.2% of variance ($R^2=0.682$) and had good predictive relevance ($Q^2=0.667$).

Table 4 Path Coefficients Results

Hypothesis	Path Analysis	Beta	Standard deviation	T statistics	f^2	P values	Decision
H1	DI -> CA	0.519	0.060	8.719	0.400	0.000	Supported
H2	E -> CA	0.142	0.071	2.001	0.108	0.045	Supported
H3	EPS -> CA	0.014	0.037	0.377	0.010	0.706	Not Supported
H4	DT -> CA	0.128	0.047	2.713	0.094	0.007	Supported
H5	DIT -> CA	0.158	0.054	2.907	0.123	0.004	Supported
CA	R-square	$Q^2_{predict}$					
	0.682	0.667					

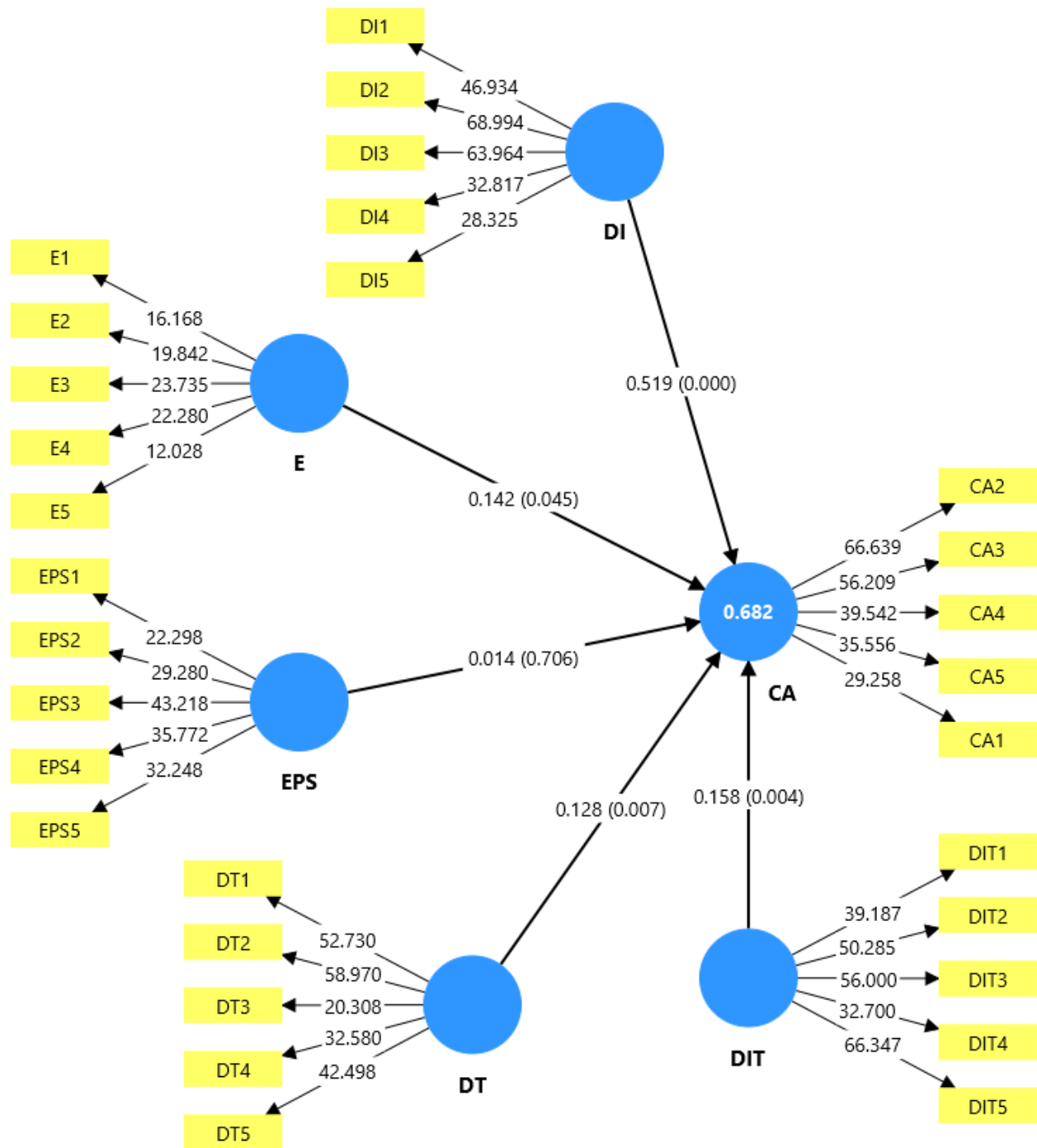


Table 2 Graphical Results of Path Coefficients

5. Discussion of the Study

Table 4 shows that the most powerful predictor of competitive advantage among Jordanian SMEs is digital infrastructure, which has a significant effect size while supporting H1. This is consistent with the Resource Based View (Barney, 1991), which suggests that a valuable and inimitable resource is a key factor in achieving sustainable competitive advantage. Digital infrastructure is a strategic asset that holds the potential to greatly boost Jordanian companies' geographic reach and drive them to international markets with efficiency. The OECD (2021) showed that good infrastructure boosts productivity and innovation potential of SMEs, Bianchini and Lasheras Sancho (2025) proved that infrastructure supports international trade engagement. Kane et al. (2019) highlighted infrastructure as the bedrock of digital capabilities, which allows organizations to make informed decisions based on data and to fine-tune their operations. Fang et al. (2024) found that the direct impact of infrastructure on SME competitiveness

is through improved operation efficiency and cost reduction. The results show a significant size effect, meaning that the investments that Jordan made in digital connectivity under the Economic Modernization Vision have a meaningful impact in terms of firm-level competitive results.

The evidence for the positive impact of e-commerce adoption on competitive advantage is significant, and the effect is stronger than for infrastructure, but this effect is still comparatively small, supporting H2. Dynamic Capabilities Theory (Teece et al., 1997) provides an explanation of this. Firms are able to sense the market opportunities and take advantage of emerging market trends via digital channels. According to Almtiri et al. (2021) e-commerce offers opportunities for SMEs to expand the market and generate revenue, to enter equal competition with larger companies. OECD (2021) revealed that SMEs that were shopping online were more resilient during economic downturn, as they continued to run their businesses despite physical market disruption. The digital transformation was found to enhance organizational flexibility by Gonzalez-Varona et al. (2024), and digitalization was also found to mediate between dynamic abilities and competitiveness by Saputra et al. (2024). Tapscott (1996) believes that digital networks make a dramatic transformation in value creation and market access. The limited impact indicates that Jordanian SMEs could be missing the potential of ecommerce, likely because of logistical issues and a lack of digital marketing skills.

The benefits of advanced digital technologies such as artificial intelligence and data analytics to competitive advantage are moderate, with a significant effect size for H5. This discovery is consistent with RBV theory and Dynamic Capabilities Theory because they are sophisticated and difficult-to-imitate technologies that increase the firm's sensing and seizing capabilities. Dwivedi et al. (2021) showed that AI can be used to boost information processing and thus organizational productivity and decision quality. Raisch and Krakowski (2021) discovered that AI helps firms make sense of complex information and respond to changes in their environment – all while supporting human decision-making. A study by Saputra et al. (2024) showed that digitalization contributes to improving the innovation capabilities and operational flexibility. OECD (2021) found that technology adopting SMEs have higher levels of competitiveness, and Bianchini and Lasheras Sancho (2025) set the technology adoption as a competitiveness driver in emerging economies. The moderate impact indicates that Jordanian SMEs are in the early adoption phase, and there is tremendous potential yet to be realized.

Digital transformation of business processes has a relatively large impact on the competitive advantage, which is among the few significant predictors with the smallest effect size. Even though transformation is widely accepted to be the process of strategic renewal and organizational adaptation, it involves more than just implementing technology, as argued by Verhoef et al. (2021). In innovation, Kane et al. (2019) showed that digitally mature organizations have better capabilities and customer engagement. Gonzalez-Varona et al. (2024) validated that transformation is beneficial for strategic responsiveness and optimization of internal processes. Teece et al. (1997) highlighted the need to rethink internal capacities in the face of evolving contexts, and Fang et al. (2024) demonstrated the role of digital capabilities in business model innovation. The low impact indicates that Jordanian SMEs are experiencing high organization barriers for implementing a whole transformation agenda.

There is no significant impact on electronic payment systems on competitive advantage, which is not supported by H3. According to World Bank (2022), while digital payment is beneficial for financial inclusion and operational transparency, it might be difficult for Jordanian SMEs to drive the competitive benefits. Three obstacles were identified by Al-Satel (2026) including lack of digital skills, cyber security issues and consumer cash preferences. Payment systems were also highlighted as an important component of the digital economy by Tapscott (1996), but the competition they can bring to the table is dependent on the maturity of the ecosystem. OECD (2021) noted that in addition to payments capabilities, complementary capabilities are also needed for payments uptake, including digital literacy and payments trust infrastructure. Alharafsheh and Ezmigna (2023) found the following: In the field of technology and performance, the relationships between the two are dependent on the organizational capabilities, as payment systems are not always associated with competitive advantage if there is no corresponding organizational change. Kane et al. (2019) maintained that there is a limited competitive advantage to investing in technology without strategic purposes. Explanatory value of the model was very good ($R^2=0.682$), and the model predictive value was good ($Q^2=0.667$), thus proving the applicability of the theoretical model for Jordanian SMEs.

6. Conclusion of the Study

Consequently, the study showed that the overall impact of the digital economy on SMEs competitiveness is positive and that the Digital infrastructure has become the primary factor affecting the competitiveness of SMEs in Jordan. The facts show that there is a high correlation between the competitive position of SMEs and investment in digital infrastructure in the Jordanian context. The findings clearly demonstrate that the competitive position of the SMEs has a strong relationship with their investment in digital infrastructure in the context of Jordan, which can be explained in terms of operational efficiency, access to markets and the capacity to innovate. The extent to which the conceptual model explains the phenomenon is used to test the theoretical validity of the approach based on the Resource Based View and Dynamic Capabilities theory to explain digital transformation in developing economy contexts where digital capabilities are organizational resources and resistant to be replicated by competitors. The results clearly indicated that the use of e-commerce, digital transformation of business processes, and advanced digital technologies could positively affect the competitive advantage of SMEs, although in varying magnitudes, depending on the nature of the digital technologies and digital maturity of the enterprises in Jordan. The results indicate that there is no significant relationship between electronic payment systems and competitive advantage, which implies contextual boundaries: even if the introduction of a technology is not enough to guarantee the creation of competitive value, it should be combined with other organizational resources, digital skills, and digital ecosystem conditions. Digital investments have a positive impact on Jordanian SMEs, though several persistent challenges including financial constraints, low digital skills, cybersecurity issues and organizational inertia offset the positive impacts, leading to a varying impact of the key dimensions of the digital economy. The study offers strong evidence that Jordan's national digital transformation efforts, especially those included in the Economic Modernization Vision, need to focus on infrastructure investments, and they also need to prioritize firms' capability needs. A holistic approach is needed with all components such as digital literacy programs, funding options, cybersecurity and technology systems to accelerate the digitalisation of SMEs. To be able to integrate the digital era into business, it's important to take strategic steps that bring the technology in line with the organization's capacities and market opportunities, making digital resources an effective competitive asset. This study stands out for its comprehensive approach that covers different aspects of digital economy within the institutional framework in the Kingdom of Jordan, which also provides empirical evidence for evidence-based policies and intelligent decisions to accelerate digital transformation in the SME sector in Jordan and provides lessons for other emerging economies that may be following a similar trajectory of digital development.

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