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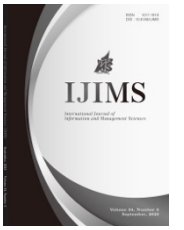

A Multi-Criteria Decision Framework for Identifying Key Enablers of Digital Transformation in Tourism SMEs : An Integrated Delphi-AHP Approach

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Keywords

Digital Transformation, SMEs, Tourism, AHP, Key Influencing Factors

Abstract

Digital transformation (DT) is currently a significant economic agenda in international organizations and forums. For small and medium enterprises (SMEs) in the tourism industry, digitalization has fundamentally changed customer demand and the supply model of products and services. Although previous studies have discussed the opportunities and challenges faced by SMEs in DT, tourism SMEs are still considered latecomers in this new digital era, lacking professional technical resources and research on key influencing factors. Therefore, this study conducts a comprehensive review of the literature related to DT. First, a large amount of literature is collected to identify possible influencing factors. Then, the Delphi method is used to invite experts to fill out questionnaires to screen out 21 influencing factors, which are categorized into five criteria. Using the Analytic Hierarchy Process (AHP) as the basic framework, these factors are analyzed and evaluated according to a comprehensive set of evaluation criteria to determine the key influencing factors for DT in tourism SMEs. These key influencing factors are provided as references for tourism SMEs to facilitate successful DT.

1. Introduction

Digital technologies have rapidly proliferated, bringing significant economic changes (Yoo, 2013). Technologies such as the Internet of Things (IoT), additive manufacturing (AM), big data, artificial intelligence (AI), cloud computing, augmented reality (AR), and virtual reality (VR) are fundamentally altering business processes, products, services, and customer relationships (Karimi & Walter, 2015). Effective integration of these technologies is critical and can be achieved through digital processes and collaboration tools, underscoring the growing importance of DT (White, 2012).

From a business perspective, DT encompasses three organizational dimensions (Hai et al., 2021):

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(1)External Dimension: Focuses on enhancing customer experience, which is the internal and subjective response customers have to any direct or indirect contact with a company (Meyer & Schwager, 2007; Hoyer et al., 2020). New digital technologies impact customer experience by creating new communication, interaction, and transaction platforms, leading to innovative e-commerce models (Verhoef et al., 2021). Mobile platforms also play a role in integrating information for various business applications and fostering social networks and user-generated content among consumers (Hoyer et al., 2020).

(2)Internal Dimension: Involves business goals and structural leadership models. DT leaders must optimize and upgrade business models during the transformation process (Stjepić & Vugec, 2020). Digital governance facilitates communication, business coordination, and employee training to adapt to evolving technologies and customer needs, providing a framework for continuous innovation and competitiveness (Baslyman, 2022).

(3)Decentralization: Refers to the degree of decision-making authority delegation within the organization (Hage & Aiken, 1967). Decentralization improves information flow and decision-making by leveraging employees' insights, which leaders may lack (Clark & Fujimoto, 1991). This approach increases team members' engagement, autonomy, and effectiveness (Kirkman & Rosen, 1999).

Because the tourism industry is currently considered one of the fastest-growing industries globally (UNWTO: European Union Tourism Trends, 2018). Its primary function is to provide services to travelers and deliver positive travel experiences for them. However, starting from the first quarter of 2020, the tourism industry worldwide has been significantly impacted by the effects of COVID-19. In the first quarter of 2020, international tourist arrivals declined by an average of 22%, with a staggering drop of around 55% in March alone. The first quarter saw a total loss of approximately 670 million international tourist arrivals and $800 billion in tourism revenue. In the context of the accommodation, there was a significant double-digit decline in room revenues across all regions globally, with Asia and Europe being the most severely affected. Room revenues in Asia decreased by 66.7%, while in Europe, the decline was around 61.6%. In Taiwan, the occupancy rate of tourist hotels in April 2020 was only 15.13%, representing a 75% decrease compared to January of the same year (Taiwan Visitors Association [TVA], 2019). Therefore, in times of challenges and instability, undertaking DT has become imperative to maintain competitiveness. The benefits of DT not only entail providing consumers with better services but also enable businesses to extract travel histories from customers, uncovering more customer value and potential business opportunities. Additionally, it can assist enterprises in enhancing operational efficiency, thereby elevating their business value.

However, the majority of digital technologies are currently developed by large enterprises, leading to a disconnect with the needs of SMEs (Imran et al., 2018), thus threatening their survival and sustainable development (Kim, 2021). While large enterprises may be better equipped for DT due to their substantial investment capital, existing talent pool, and organizational structure and operational strategies, SMEs possess advantages such as flexibility, decentralization, and customer proximity compared to large enterprises when undergoing DT (Moeuf et al., 2017).

AHP has been used to identify and evaluate the key influencing factors in technology transfer (Kumar et al., 2015), as well as the critical factors for port competitiveness based on stakeholders' perspectives (Rosa Pires da Cruz et al., 2013). Therefore, we are using the AHP methodology to calculate the key influencing factors for digital transformation in SMEs within the tourism industry.

2. Valuation Model

This study uses a modified Delphi method to gather expert opinions and determine the criteria for the evaluation model. Following this, the AHP is employed to calculate the weighted criteria and establish their ranking. The steps involved in the modified Delphi method and AHP procedures are as follows.

2.1 Modified Delphi method

The Modified Delphi method is a structured way of gathering input from a group of experts anonymously. It involves asking questions and providing feedback, with the aim of reaching a consensus on a particular topic. Experts contribute their insights, opinions, and expertise through written communication, often without knowing each other's identities. This process allows for diverse perspectives to be considered and assists in forecasting, decision-making, or problem-solving. (Sung, 2001). The Modified Delphi procedure is outlined as follows (Wu et al., 2007):

I. Select the anonymous experts.

II. Conduct the first round of the survey.

III. Conduct the second round of the questionnaire survey.

IV. Conduct the third round of the questionnaire survey.

V. Integrate expert opinions and reach a consensus.

Steps II and IV are usually repeated until a consensus is reached on a specific topic (Sung, 2001). Literature reviews and expert interviews findings can be used to identify shared perspectives expressed in the survey. Additionally, Step II is refined to replace the traditionally used open-style survey, a variation commonly known as the modified Delphi method (Sung, 2001). This research utilizes the modified Delphi method and interviews with anonymous experts to establish criteria for evaluating the optimal DT strategy and critical criteria for the tourism industry.

2.2 AHP method

Saaty (1980) introduced the Analytic Hierarchy Process (AHP) as a decision-making method designed to address complex decision problems. The AHP method involves breaking down a complex multi-criteria decision problem into a hierarchical structure. In simpler terms, the steps of the AHP method can be summarized as follows.

Creating the pairwise comparison matrix A involves these steps: Consider a set of elements represented as $C_1, C_2, \ldots, C_n$. Use a_{ij} to express the quantified judgment on a pair of elements C_i and C_j. Assess the relative importance between two elements on a scale of 1, 3, 5, 7, and 9.

In this context, a rating of 1 represents equal importance between elements, while a rating of 3 signifies slightly more importance for one element. A rating of 5 indicates a strong preference for one over the other, and a rating of 7 suggests demonstrably higher importance. Finally, a rating of 9 implies absolute superiority of one element over the other. This process results in an *n-by-n* matrix A, represented as follows:

$$A = [a_{ij}] = \begin{array}{c} \\ C_1 \\ C_2 \\ \vdots \\ C_n \end{array} \begin{array}{c} \begin{array}{cccc} C_1 & C_2 & \cdots & C_n \end{array} \\ \begin{bmatrix} 1 & a_{12} & \cdots & a_{1n} \\ 1/a_{12} & 1 & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ 1/a_{1n} & 1/a_{n2} & \cdots & 1 \end{bmatrix} \end{array} \tag{1}$$

where $a_{ij} = 1$ and $a_{ij} = 1/a_{ji}$, $i, j = 1, 2, \ldots, n$. In matrix A, the problem becomes one of assigning to the n elements $C_1, C_2, \ldots, C_n$ a set of numerical weights $W_1, W_2, \ldots, W_n$ that reflect the recorded judgments. If A is a consistency matrix, the relation between weights W_i and judgments a_{ij} are simply given by $W_i / W_j = a_{ij}$ (for $i, j = 1, 2, \ldots, n$) and

$$A = \begin{array}{c} \\ C_1 \\ C_2 \\ \vdots \\ C_n \end{array} \begin{array}{c} \begin{array}{cccc} C_1 & C_2 & \cdots & C_n \end{array} \\ \begin{bmatrix} w_1/w_1 & w_1/w_2 & \cdots & w_1/w_n \\ w_2/w_1 & w_2/w_2 & \cdots & w_2/w_n \\ \vdots & \vdots & \ddots & \vdots \\ w_n/w_1 & w_n/w_2 & \cdots & w_n/w_n \end{bmatrix} \end{array} \tag{2}$$

Saaty (1990) suggested that the largest eigenvalue λ max would be

$$\lambda_{\max} = \sum_{j=1}^{n} a_{ij} \frac{W_j}{Wi} \tag{3}$$

If A is a consistency matrix, eigenvector X can be calculated by

$$(A - \lambda_{\max} I)x = 0 \tag{4}$$

Saaty (1990) proposed utilizing Consistency Index (CI) and Consistency Ratio (CR) to verify the consistency of the comparison matrix. CI and Random Index (RI) are defined as follows:

$$CI = (\lambda_{\max} - n)/(n-1) \tag{5}$$

$$CR = CI / RI \tag{6}$$

where RI represents the average CI over numerous random entries of same order reciprocal matrices. If $CR \leq 0.1$, the estimate is accepted; otherwise, a new comparison matrix is solicited until $CR \leq 0.1$.

3. Empirical study

This study constructed indicators and a research framework to evaluate the key influencing factors for DT in tourism SMEs, as shown in Figure 1. An evaluation model was constructed based on the modified Delphi method, using Excel 2019 to screen variables for DT in tourism SMEs, and then employing AHP to assess the key influencing factors. The proposed model for evaluating the key variables influencing DT in the tourism industry comprises the following procedures.

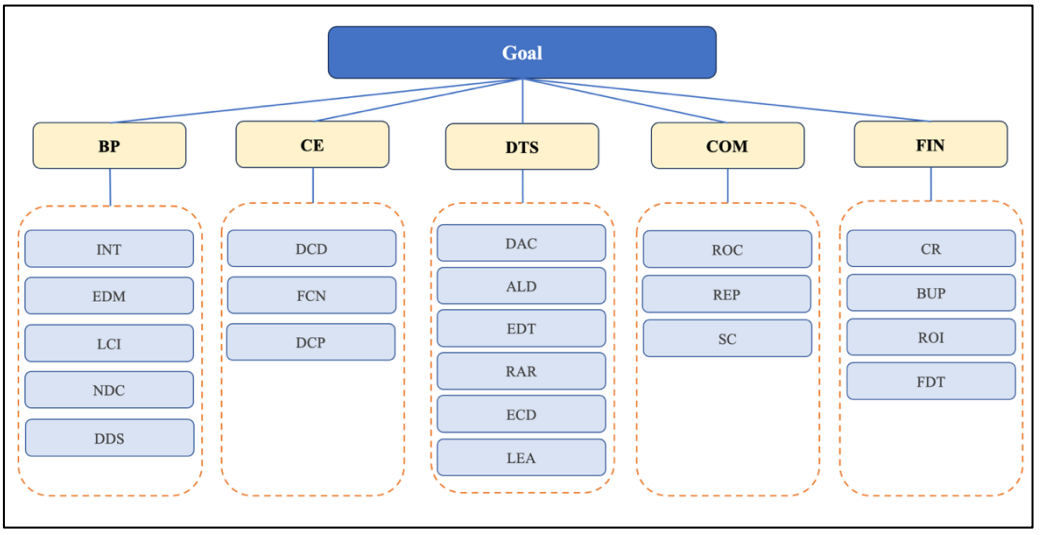

Fig. 1 *The Framework for Evaluating The Key Influencing Factors of DT*

Phase 1. Establish and outline the criteria for evaluation

According to the literatures review, a general consensus among experts must be reached to establish a research model. The final goal of evaluating the key influencing factors of DT in tourism industry can be achieved, followed by 5 evaluation criteria and 21 sub-criteria (see Fig.1).

The evaluation criteria and sub-criteria applied to determine the critical criteria for evaluating the key influencing factors in the tourism industry are as follows:

1. Business Processes (BP): (1) Integration (INT) (Ranganathan et al., 2003); (2) Establish digital mindsets (EDM) (Hansen et al., 2011); (3) New digital capabilities (NDC) (Hanelt et al., 2021); (4) Developing a digital business strategy (DDS) (Dhar and Sundararajan, 2007; Bharadwaj et al., 2013; Sia et al., 2016) and (5) The legal of a country business infrastructural (LCI) (Hanelt et al., 2021)

2. Customer Experience (CE): (1) Digital consumer demand (DCD) (Brynjolfsson et al., 2013; Benlian et al., 2018); (2) Forecasting customer needs (FCN) (Kraus et al., 2021) and (3) Digitalized customer preferences (DCP) (Hanelt et al., 2021; Rekettye & Rekettye Jr, 2019)

3. Digital Technology Skills (DTS): (1) Big data analytics capabilities (DAC) (Hausladen and Zipf, 2018; Pappas et al., 2018); (2) The accessibility of large volumes of data (ALD) (Hanelt et al., 2021); (3) Emerging digital technology (EDT) (Hanelt et al., 2021); (4) Resilient against risk (RAR) (Tian & Cheng, 2022); (5) Leadership (LEA) (Kraus et al., 2021; Sainger, G., 2018) and (6) The extent to which its core products can be digitized (ECD) (Matt et al.,2015)

4. Competitiveness (COM): (1)Recognizing opportunities to difference from competitors (ROC) (Kraus et al .,2021); (2)Reputation (REP) (Wessel et al., 2021) and (3)Staying competitive (SC) (Kraus et al., 2021)

5. Finance (FIN): (1) Cost reductions (CR) (Agarwal et al., 2010); (2) Ability to finance a DT (FDT) (Matt et al., 2015); (3) Budget planning (BUP) (Ivanova et al., 2022) and (4) Return on investment (ROI) (Ebert & Duarte, 2018)

Phase 2. Assess the eigenvectors

The pair-wise comparisons of levels 2 and 3 are determined for 6 individuals matching the above characteristics with each respondent making a pair-wise comparison of the decision elements and assigning those relative scores.

The experts' relative scores are combined using the geometric mean method. Given the extensive data in the pair-wise comparison matrix, an example at level 2 is presented in Table 1. The weights for the criteria and all sub-criteria are displayed in Table 7.

Table 1. *Pairwise Comparison Matrices and Eigenvectors at Level 2*

Goal	BP	CE	DTS	COM	FIN
BP	1.000	0.240	5.657	1.225	2.374
CE	4.167	1.000	8.485	5.292	4.973
DTS	0.177	0.118	1.000	0.357	0.362
COM	0.816	0.189	2.801	1.000	0.473
FIN	0.421	0.201	2.762	2.114	1.000

C.R.=0.063

Table 2. *BP Pairwise Comparison Matrix and Eigenvector at Level 3*

	INT	EDM	DDS	NDC	LCI
INT	1.000	5.283	6.438	3.382	6.382
EDM	0.189	1.000	0.372	0.367	0.292
DDS	0.155	2.688	1.000	1.011	1.414
NDC	0.296	2.725	0.989	1.000	0.493
LCI	0.157	3.425	0.707	2.028	1.000

C.R.=0.072

Table 3. *CE Pairwise Comparison Matrix and Eigenvector at Level 3*

	DCM	FCN	DCP
DCD	1.000	0.245	0.364
FCN	3.049	1.000	0.473
DCP	2.747	2.114	1.000
C.R.= 0.014			

Table 4. *DTS Pairwise Comparison Matrix and Eigenvector at Level 3*

	DAC	ALD	EDT	RAR	LEA	ECD
DAC	1.000	1.393	2.213	1.445	4.315	1.333
ALD	0.718	1.000	2.689	0.934	5.936	0.492
EDT	0.452	0.372	1.000	0.693	1.429	0.514
RAR	0.692	1.071	1.443	1.000	2.149	0.931
LEA	0.232	0.168	0.700	0.465	1.000	0.341
ECD	0.750	2.033	1.946	1.074	2.933	1.000
C.R.= 0.099						

Table 5. *COM Pairwise Comparison Matrix and Eigenvector at Level 3*

	ROC	REP	SC
ROC	1.000	0.991	0.766
REP	1.009	1.000	0.817
SC	1.305	1.225	1.000
C.R.= 0.000			

Table 6. *FIN Pairwise Comparison Matrix and Eigenvector at Level 3*

	CR	FDT	BP	ROI
CR	1.000	1.183	2.828	0.894
FDT	0.845	1.000	0.845	0.289
BUP	0.354	1.183	1.000	0.289
ROI	1.119	3.460	3.460	1.000
C.R.= 0.048				

Table 7. *The Weights of Criteria and All Sub-Criteria*

Goal	Criteria	Weights	Sub-criteria	Weights
	BP	0.192	INT	0.537
			EDM	0.058
			NDC	0.129
			DDS	0.126
			LCI	0.151
	CE	0.539	DCD	0.139
			FCN	0.335
			DCP	0.526
	DTS	0.056	DAC	0.250
			ALD	0.205
			EDT	0.099
			RAR	0.167
			LEA	0.062
			TCD	0.217
	COM	0.086	ROC	0.302
			REP	0.311
			SC	0.387
	FIN	0.127	CR	0.296
			FDT	0.156
			BUP	0.130
			ROI	0.419

Phase 3. Determining the consistency ratio

The results of the consistency test and the *CR* of the comparison matrix from each of the experts are all < 0.1, indicating 'consistency'. Furthermore, the *CR* of the aggregate matrix is also < 0.1, also indicating 'consistency'.

Phase 4. Prioritizing the critical criteria

The weights assigned to the criteria are shown in Table 7: BP (0.192), CE (0.539), DTS (0.056), COM (0.086), and FIN (0.127). Subsequently, the sub-criteria are detailed, with their overall weights and rankings presented in Table 8: INT (0.103), EDM (0.011), NDC (0.025), DDS (0.024), LCI (0.029), DCD (0.074), FCN (0.177), DCP (0.278), DAC (0.014), ALD (0.011), EDT (0.006), RAR (0.009), LEA (0.003), EDT (0.012), ROC (0.027), REP (0.027), SC (0.032), CR (0.038), FDT (0.020), BUP (0.017) and ROI (0.053). Therefore, can determine that the top three key influencing factors for digital transformation in tourism SMEs, ranked by weight, are "DCP," "FCN" and "INT".

Table 8. *Overall Weight and Ranking of All Sub-Criteria*

Sub-criteria	Overall, Weights	Rank
INT	0.103	3
EDM	0.011	18
NDC	0.025	11
DDS	0.024	12
LCI	0.029	8
DCD	0.075	4
FCN	0.181	2
DCP	0.284	1
DAC	0.014	15
ALD	0.011	17
EDT	0.006	20
RAR	0.009	19
LEA	0.003	21
TCD	0.012	16
ROC	0.026	10
REP	0.027	9
SC	0.033	7
CR	0.038	6
FDT	0.020	13
BUP	0.017	14
ROI	0.053	5

4. Conclusion

In the process of DT, SMEs in the tourism industry need to identify the key influencing factors affecting DT through an evaluation process to determine the goals and driving forces of DT. Therefore, this study, through the AHP, evaluated "DCP," "FCN," and "INT" as the top three key influencing factors in overall weight ranking.

From this, it can be understood that in the process of DT, SMEs in the tourism industry need to pay attention to the external aspects of "DCP " and "FCN" as important factors. Enterprises can reference these results to analyze and understand customer behaviors and preferences using data analytics and artificial intelligence techniques, extract valuable insights from customer data, and predict customer needs. Alternatively, through digital marketing channels such as social media or websites, interacting with customers and collecting feedback can help tailor products and services to individual or customized preferences.

Regarding the key influencing factor of "INT" integrating digital technologies, systems, and processes together to achieve more efficient business operations and enhance overall organizational performance is crucial. The goal is to effectively incorporate digital technologies into various aspects of the organization, driving DT. Establishing integration mechanisms can assist different sectors of the tourism industry in sharing databases, establishing cross-disciplinary workflows and communication channels, and leveraging collaborative tools and

platforms to seize more business opportunities. In the business sphere, this study provides clear key influencing factors for DT to SMEs in the tourism industry. It can help streamline the transformation process, increase efficiency, and improve the success rate, facilitating a smoother DT journey.

Reference

Agarwal, R., Gao, G., DesRoches, C., & Jha, A. K. (2010). Research commentary—The digital transformation of healthcare: Current status and the road ahead. *Information Systems Research, 21*(4), 796-809. https://doi.org/10.1287/isre.1100.0327

Baslyman, M. (2022). Digital transformation from the industry perspective: definitions, goals, conceptual model, and processes. *IEEE Access*, *10*, 42961-42970. DOI: 10.1109/ACCESS.2022.3166937.

Benlian, A., Kettinger, W. J., Sunyaev, A., Winkler, T. J., & Guest Editors. (2018). The transformative value of cloud computing: a decoupling, platformization, and recombination theoretical framework. *Journal of Management Information Systems, 35*(3), 719-739. https://doi.org/10.1080/07421222.2018.1481634

Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. V. (2013). Digital business strategy: toward a next generation of insights. *MIS Quarterly*, 471-482. https://doi.org/10.25300/MISQ/2013/37:2.3

Brynjolfsson, E., Hu, Y. J., & Rahman, M. S. (2013). Competing in the age of omnichannel retailing. MIT Sloan Management Review, 54(4), 23-29.

Clark, K. B., & Fujimoto, T. (1991). Heavyweight product managers. *McKinsey Quarterly*, (1), 42-60.

Dhar, V., & Sundararajan, A. (2007). Issues and Opinions—Information technologies in business: A blueprint for education and research. *Information Systems Research, 18*(2), 125-141. https://doi.org/10.1287/isre.1070.0126

Ebert, C., & Duarte, C. H. C. (2018). Digital transformation. *IEEE Softw, 35*(4), 16-21. DOI:10.1109/MS.2018.2801537

Hage, J., & Aiken, M. (1967). Relationship of centralization to other structural properties. *Administrative Science Quarterly*, 72-92. https://doi.org/10.2307/2391213

Hai, T. N., Van, Q. N., & Thi Tuyet, M. N. (2021). Digital transformation: Opportunities and challenges for leaders in the emerging countries in response to COVID-19 pandemic. *Emerging Science Journal*, *5*(1), 21-36. Doi:10.28991/esj-2021-SPER-03

Hanelt, A., Bohnsack, R., Marz, D., & Antunes Marante, C. (2021). A systematic review of the literature on digital transformation: Insights and implications for strategy and organizational change. *Journal of Management Studies, 58*(5), 1159-1197. https://doi.org/10.1111/joms.12639

Hansen, A. M., Kraemmergaard, P., & Mathiassen, L. (2011). Rapid adaptation in digital transformation: A participatory process for engaging IS and business leaders. *MIS Quarterly Executive, 10*(4).

Hausladen, I., & Zipf, T. (2018). Competitive differentiation versus commoditisation: The role of Big Data in the European payments industry. *Journal of Payments Strategy & Systems, 12*(3), 266-282. DOI:10.69554/NNRV3506

Hoyer, W. D., Kroschke, M., Schmitt, B., Kraume, K., & Shankar, V. (2020). Transforming the customer experience through new technologies. *Journal of Interactive Marketing*, *51*(1), 57-71. https://doi.org/10.1016/j.intmar.2020.04.001

Imran, M., Aziz, A., Hamid, S. N. B. A., Shabbir, M., Salman, R., & Jian, Z. (2018). Retracted: The mediating role of total quality management between entrepreneurial orientation and SMEs export performance. *Management Science Letters*, *8*(6), 519-532. DOI: 10.5267/j.msl.2018.5.003

Ivanova, N., Morunova, G., Fedosov, V., Kuzmina, S., & Kankulova, M. (2022). Long-Term Budget Planning Based on Simulation Models in the Context of Digital Transformation of Global Markets. *Economic Issues, Problems and Perspectives, 25.*

Karimi, J., & Walter, Z. (2015). The role of dynamic capabilities in responding to digital disruption: A factor-based study of the newspaper industry. *Journal of Management Information Systems, 32*(1), 39-81. https://doi.org/10.1080/07421222.2015.1029380

Kim, S. S. (2021). Sustainable growth variables by industry sectors and their influence on changes in business models of SMEs in the era of digital transformation. *Sustainability*, *13*(13), 7114. https://doi.org/10.3390/su13137114

Kirkman, B. L., & Rosen, B. (1999). Beyond self-management: Antecedents and consequences of team empowerment. *Academy of Management Journal*, *42*(1), 58-74. https://doi.org/10.5465/256874

Kraus, S., Jones, P., Kailer, N., Weinmann, A., Chaparro-Banegas, N., & Roig-Tierno, N. (2021). Digital transformation: An overview of the current state of the art of research. *Sage Open, 11*(3), 21582440211047576. https://doi.org/10.1177/21582440211047576

Kumar, S., Luthra, S., Haleem, A., Mangla, S. K., & Garg, D. (2015). Identification and evaluation of critical factors to technology transfer using AHP approach. *International Strategic Management Review*, *3*(1-2), 24-42. https://doi.org/10.1016/j.ism.2015.09.001

Matt, C., Hess, T., & Benlian, A. (2015). Digital transformation strategies. *Business & Information Systems Engineering, 57*, 339-343. https://doi.org/10.1007/s12599-015-0401-5

Meyer, C., & Schwager, A. (2007). Understanding customer experience. *Harvard Business Review*, *85*(2), 116.

Moeuf, A., Lamouri, S., Pellerin, R., Eburdy, R., & Tamayo, S. (2017). Industry 4.0 and the SME: a technology-focused review of the empirical literature. In *7th International Conference on Industrial Engineering and Systems Management IESM.*

Pappas, I. O., Mikalef, P., Giannakos, M. N., Krogstie, J., & Lekakos, G. (2018). Big data and business analytics ecosystems: paving the way towards digital transformation and sustainable societies. *Information Systems and E-Business Management, 16*(3), 479-491. https://doi.org/10.1007/s10257-018-0377-z

Ranganathan, S. J. C. S. (2003). Alloyed pleasures: Multimetallic cocktails. *Current Science, 85*(5), 1404-1406.

Rekettye, G., & Rekettye Jr, G. (2019). The effects of digitalization on customer experience. *ENTRENOVA-ENTerprise REsearch InNOVAtion, 5*(1), 340-346.

Rosa Pires da Cruz, M., Ferreira, J. J., & Garrido Azevedo, S. (2013). Key factors of seaport competitiveness based on the stakeholder perspective: An Analytic Hierarchy Process (AHP) model. *Maritime Economics & Logistics*, *15*, 416-443. https://doi.org/10.1057/mel.2013.14

Saaty, T. L. (1980). The analytic hierarchy process (AHP). *The Journal of the Operational Research Society, 41*(11), 1073-1076.

Sainger, G. (2018). Leadership in digital age: A study on the role of leader in this era of digital transformation. *International Journal on Leadership, 6*(1), 1.

Sia, S. K., Soh, C., & Weill, P. (2016). How DBS bank pursued a digital business strategy. *MIS Quarterly Executive, 15*(2).

Stjepić, A. M., Ivančić, L., & Vugec, D. S. (2020). Mastering digital transformation through business process management: Investigating alignments, goals, orchestration, and roles. *Journal of Entrepreneurship, Management and Innovation, 16*(1), 41-74.DOI: https://doi.org/10.7341/20201612

Sung, W. C. (2001). Application of Delphi Method, a Qualitative and Quantitative Analysis, to the Healthcare Management. *Journal of Healthcare Management, 2*(2):11-19.

Tian, G., Li, B., & Cheng, Y. (2022). Does digital transformation matter for corporate risk-taking? *Finance Research Letters, 49*, 103107. 103107.https://doi.org/10.1016/j.frl.2022.103107

Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research, 122*, 889-901. https://doi.org/10.1016/j.jbusres.2019.09.022

Wessel, L., Baiyere, A., Ologeanu-Taddei, R., Cha, J., & Blegind-Jensen, T. (2021). Unpacking the difference between digital transformation and IT-enabled organizational transformation. *Journal of the Association for Information Systems, 22*(1), 102-129. https://doi.org/10.17705/1jais.00655

White, M. (2012). Digital workplaces: Vision and reality. *Business Information Review*, *29*(4), 205-214. https://doi.org/10.1177/0266382112470412

World Tourism Organization (2018). European Union Tourism Trends. https://ec.europa.eu/growth/tools-databases/vto/content/2018-eu-tourism-trends-report. [Accessed 26.02.2024]

Wu, C. R., Chang, C. W., & Lin, H. L. (2007). An organisational performance measurement model based on AHP sensitivity analysis. *International Journal of Business Performance Management, 9*(1), 77-91. https://doi.org/10.1504/IJBPM.2007.011497

Yoo, Y. (2013). The Tables Have Turned: How Can the Information Systems Field Contribute to Technology and Innovation Management Research? *Journal of the Association for Information Systems, 14* (5), 227–236. Doi:10.17705/1jais.00334.

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