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Technology orientation as a strategic driver of SME export performance: evidence from Sri Lanka

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Abstract: The evolving global business landscape in the post-pandemic era has amplified the importance of technology-driven strategies for sustaining SME growth, particularly in export-oriented sectors. This study investigates how technology orientation (TO) directly shapes the export performance of SMEs in emerging markets, emphasising its role in fostering innovation, operational efficiency, and competitive positioning in an increasingly digitalised global economy. This research adopts a multidimensional perspective on technology orientation (TO), encompassing top management capability, technological capability, commitment to learning, and commitment to change, to provide a deeper understanding of its influence on firm performance. Using partial least squares structural equation modelling (PLS-SEM), data from 126 Sri Lankan export-oriented SMEs reveal that TO significantly enhances competitiveness by fostering adaptability, innovation, and strategic agility. These findings emphasise the need for SMEs to integrate TO as a core element of their long-term growth strategies. The study offers both theoretical insights and actionable recommendations for firms and policymakers seeking to strengthen SME resilience in uncertain market conditions.

Keywords: multidimensional TO; SME export performance; Sri Lanka; technology orientation.

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1 Introduction

The small and medium enterprises (SME) sector is the most significant and the largest contributor to the national economy of Sri Lanka, accounting for over 75% of all businesses, 52% of GDP and employing more than 45% of the labour force (Export Development Board of Sri Lanka, 2021; Friedrich Naumann Foundation for Freedom, 2024; Ministry of Industry and Commerce, 2016). Over the years, SMEs have played a pivotal role in fostering the socioeconomic development of the country by driving economic growth, generating employment, and supporting regional development. However, the sector has faced severe challenges in terms of survival and profitability, including declining revenues, increasing operational costs, disrupted supply chains, limited access to finance, and shrinking market demand, the recent economic turmoil exacerbated by the COVID-19 pandemic, political instability, and global market fluctuations (Friedrich Naumann Foundation for Freedom, 2024). As a result, many businesses were closed down. As of the end of 2022, 79.8% of operational SMEs in 2018 remained active, while 15.7% had permanently closed, and 4.5% were temporarily closed (Department of Census and Statistics, 2023). As further highlighted in this report, among closed-down SMEs, 8.3% were directly attributed to the economic crisis, and 45.3% of businesses revealed the COVID-19 pandemic as a primary reason for their withdrawal. On the other hand, export-oriented SMEs, critical for foreign exchange earnings, faced compounded difficulties, particularly due to export-import restrictions, increased raw material costs, high interest and exchange rates, and reduced access to international markets. The export SME sector indicates a significant recovery in export growth of 22.15% during 2021 post-pandemic, followed by a slowdown of 4.91% in 2022 and a contraction with –3.01% again in 2023 (Department of Census and Statistics, 2023), indicating the ongoing economic challenges and global market fluctuations. Despite these challenges, the number of export firms gradually recovered from the decline in 2020 (4,015 firms), reaching 4,426 in 2023, demonstrating resilience and adaptation in the face of persistent economic uncertainty.

The challenges faced by Sri Lankan SMEs during the post-pandemic period followed by the global economic crisis are not unique; they exhibit the broader struggles of the global SME sector. Globally, SMEs account for over 90% of businesses and 50–60% of employment and contribute up to 40% of GDP, exhibiting their indispensable contribution to economic growth, employment generation, and innovation (World Bank, 2019). The capacity of successful SMEs to innovate, adapt, and use technology – particularly during times of crisis – is frequently what makes them resilient (Changalima et al., 2025). During the COVID-19 pandemic, for instance, many global SMEs transitioned to digital operations, leading to a surge in e-commerce and remote work adoption. However, persistent issues such as financial constraints, technological barriers, and fierce competition from large firms have caused high failure rates, particularly in developing regions, where nearly 20% of SMEs were closed down permanently within three months of the COVID-19 pandemic (International Trade Centre, 2020). In coping with these challenges, SMEs demonstrated remarkable resilience and agility through technology adaptation, making the role of technology in SME performance particularly significant in the post-pandemic era (Changalima et al., 2025; Čović et al., 2023). While many SMEs were hit by the economic turmoil, those with a strong technology orientation managed to survive and, in some cases, thrive. In fact, the pandemic underscored the critical role of technology in enhancing business operations, improving customer

outreach, and ensuring resilience. Studies such as (Barragan and Becker, 2024; Saqib et al., 2018; Zamani, 2022) emphasise that the adaptation of technology is not merely a facilitator but a critical determinant of SME success, surpassing other factors such as capital, resources and even significant capabilities like strategic orientations.

Early research on SME success, particularly in the international market, emphasises that entrepreneurial capabilities and strategic orientations are critical to their success (Arshad et al., 2014; Gupta and Wales, 2017; Rauch et al., 2009; Wiklund and Shepherd, 2005; Čović et al., 2023). These factors are decisive in achieving superior performance, particularly for resource-constrained, small-scale SMEs to innovate, adapt, and capitalise on opportunities. Although the importance and relevance of these capabilities increased in the post-pandemic period, SMEs that effectively adopted and used technology exhibited resilience and were able to survive, even thrive, in challenging circumstances than others (Čović et al., 2023). Technology orientation (TO) or digital orientation (DO), often used interchangeably – a degree of a firm's capacity and readiness to acquire and integrate modern technologies into innovation (Gatignon and Xuereb, 1997) – in particular, has been acknowledged as a critical success factor for SMEs in the post-pandemic business environment (Barragan and Becker, 2024; Saqib et al., 2018; Zamani, 2022). Firms with a strong TO exhibit greater success in digitalising operations, pivoting business models, and maintaining customer engagement through online platforms than others (Fu et al., 2014; Odorici and Presutti, 2013; Rajala and Westerlund, 2012; Zamani, 2022). Confirming this, recent studies have found that TO plays a significant role in SMEs' survival and performance (Borodako et al., 2022; Barragan and Becker, 2024; Felicetti et al., 2024; Ramirez-Solis et al., 2022; Saqib et al., 2018; Yousaf et al., 2020), suppressing the influence of their capabilities and orientation during crises. It allows SMEs to enhance efficiency, reduce costs, and expand market reach, thereby positioning them for sustained success in an increasingly digital economy (Aisjah et al., 2023; Changalima et al., 2025; Barragan and Becker, 2024; Felicetti et al., 2024; Rotabi et al., 2024). Prior literature focusing on technology-related studies has extensively explored areas such as technology adaptation (Abou-Shouk et al., 2013; Asiaei and Rahim, 2019; Ramdani et al., 2013; Skafi et al., 2020), the challenges SMEs face in adapting to technology (Al-Tit, 2020; Eze et al., 2021; Li et al., 2019; Prause, 2019), digital transformation (Chen et al., 2016; Faridi and Malik, 2020; Garzoni et al., 2020), and the role of digital platforms and architectures (Abou-Shouk et al., 2013; Zamani, 2022). However, the adaption of new technologies such as enterprise resource planning (ERP), cloud computing, customer relationship management (CRM) and e-commerce has gained significant attention in recent literature; notable gaps remain in understanding how TO directly influences SME performance (Barragan and Becker, 2024; Felicetti et al., 2024; Halaç, 2019). These gaps are particularly pronounced for SMEs (Barragan and Becker, 2024; Li et al., 2018), given their unique resource constraints and operational challenges (Barragan and Becker, 2024), making the need for further investigation into TO's role even more pressing and impactful.

Thus, the dilemma of this study is to address whether TO is a significant determinant of SME success in the post-pandemic era and, if so, to what extent it influences performance. The COVID-19 pandemic has drastically altered the traditional way of doing business, disproportionately impacting SMEs due to their resource constraints and limited scalability. However, observations suggest that SMEs with a strong TO demonstrated higher resilience, adaptability, and survival rates compared to those

without. This raises critical questions about the precise role of TO in driving SME performance under such challenging conditions. In fact, the primary objective of this study is to investigate the role of TO in the performance of SMEs, focusing on its impact and extent of influence. Accordingly, this study has several significant contributions. First, it will expand existing knowledge by investigating the direct impact of TO on firm performance, particularly focusing on its degree of influence, addressing an important research gap. Second, this study pioneers the investigation of TO as a multidimensional construct, diverging from the predominant unidimensional perspective in existing literature. Finally, it is conducted in the emerging market context of Sri Lanka, focusing on export-oriented SMEs struggling with post-pandemic challenges and an ongoing economic crisis, thereby addressing a previously understudied area. These contributions provide novel insights into the role of TO in enhancing SME performance, particularly in resource-constrained and economically volatile environments.

The rest of the paper is organised as follows. The next section provides a comprehensive review of the literature, which serves as the basis for the development of the conceptual framework and hypotheses. This is followed by a section on research methods, with a rationale for their selection. The subsequent sections present the results and findings of the study, followed by a discussion of their implications. Finally, the paper concludes by highlighting the limitations of the study and offering directions for future research.

2 Literature review: conceptualisation and hypotheses development

2.1 Multidimensionality of technology orientation

As originally proposed by Gatignon and Xuereb (1997), TO is a critical strategic orientation that enhances a firm's ability to integrate and exploit technological resources to achieve a competitive advantage. Thus, TO enables firms to easily find their competitive advantage by differentiating themselves from competitors and capitalising on technological advancement (Changalima et al., 2025; Ramirez-Solis et al., 2022). TO was defined as the firm's ability to leverage technical knowledge to develop innovative solutions that meet emerging customer needs. Thus, it plays a critical role in enhancing firm performance by fostering innovation, improving operational efficiency, and strengthening market competitiveness (Adiguzel et al., 2025; Changalima et al., 2025; Gatignon and Xuereb, 1997; Grinstein, 2008; Hakala, 2011; Ramirez-Solis et al., 2022; Tariq et al., 2021; Wadho and Chaudhry, 2018; Yousaf et al., 2020). Consequently, firms that exhibit strong TO proactively adopt and integrate advanced technologies to develop innovative products enhance the efficiency in processes and adapt to dynamic market conditions, which leads to superior performance (Saqib et al., 2018; Yousaf et al., 2020).

TO was originally studied as a unidimensional construct, and it is associated primarily with R&D and manufacturing capabilities. However, recent literature, for example, Barragan and Becker (2024), Kindermann et al. (2024, 2021) and Halaç (2015, 2019), emphasises the importance of investigating TO as a multidimensional construct that reflects a broader range of organisational capabilities. In response, Halaç (2015) proposed a novel conceptualisation of the multidimensionality of TO, comprising four key dimensions: technological capability, top management capability, commitment to learning, and commitment to change. Subsequently, recent literature supports and extends

Halaç's multidimensional conceptualisation of TO. Notably, Kindermann et al. (2021, 2024) introduced a framework that aligns with and builds upon Halaç's perspective, emphasising dimensions such as digital technology scope, digital capabilities, digital ecosystem coordination, and digital architecture configuration. This framework underscores the multifaceted nature of TO, highlighting its critical role in organisational success. Additionally, Barragan and Becker (2024) explored the digital orientation of SMEs, further validating the importance of a multidimensional approach to TO in understanding firm performance. These studies affirm the relevance of Halaç's conceptualisation in contemporary research, particularly concerning the integration of technology into organisational strategies. This multidimensional perspective is consistent with RBV, suggesting that TO reflects rare, valuable, and difficult-to-imitate resources that drive superior firm performance. This study adopts Halaç's (2015, 2019) conceptualisation of TO, given that it provides a holistic framework for understanding the role of TO in SME success. Halaç's framework is particularly relevant for SMEs in emerging markets like Sri Lanka, where resource constraints and volatile environments demand a combination of technological adaptation, leadership commitment, and organisational agility. Furthermore, this conceptualisation aligns with the resource-based view (RBV), positioning TO as a valuable and inimitable resource that drives competitive advantage. Its focus on organisational learning and adaptability ensures practical relevance, enabling SME managers to strategically harness TO for sustained performance and resilience.

The multidimensionality of TO reflects a broader cultural and strategic orientation at the firm level, incorporating both tangible and intangible elements. The first dimension – top management capability (TMC) – reflects the leadership's strategic support in integrating technology within business operations, which is essential to maintaining a proper balance between internal technological development and external acquisitions (Halaç, 2019). These include the matters of leadership, vision and planning, which play a critical role in a firm's competitive advantage and performance (Acar and Zehir, 2009). Technological capability (TC), the second dimension, signifies the firm's functional expertise in developing, adopting, and utilising technology effectively to sustain competitive advantages (Halaç, 2019). The third, commitment to learning (CL), reflects the degree of organisational learning which is critical in transforming technological resources into unique and inimitable competencies, fostering innovation and growth (Baker and Sinkula, 1999; Halaç, 2019). Thus, organisational learning enables firms to adapt proactively to changing environments, exploit opportunities, and transform knowledge into competitive advantages through continuous improvement and innovation (Acar and Zehir, 2009; Teece, 2007). Finally, commitment to change (CC) highlights the firm's readiness to adapt by unlearning outdated processes and embracing new technologies, ensuring agility and responsiveness in dynamic environments (Cegarra et al., 2010; Halaç, 2019). Collectively, these dimensions enable firms to utilise technology with full potential to drive innovation, efficiency, and competitiveness, which leads to enhanced firm performance.

2.2 Technology orientation and firm performance

The role of TO in firm performance is both critical and multifaceted. It not only drives innovation and operational efficiency but also increases competitiveness and resilience in

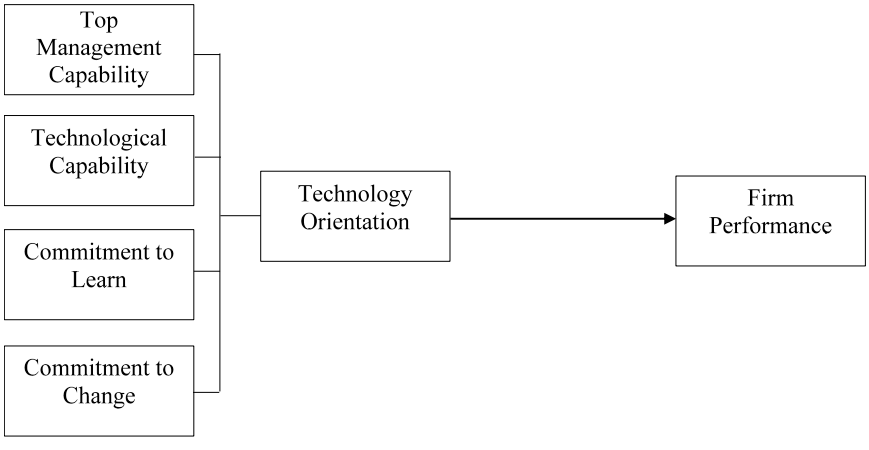
challenging circumstances, resulting in increased and sustained firm performance. Thus, by incorporating into their strategic framework, firms can leverage technology as a cornerstone for sustainable growth and competitive success (Adiguzel et al., 2025; Barragan and Becker, 2024; Nakola et al., 2015; Tariq et al., 2021).

Existing literature has extensively explored the influences of TO on firm performance, e.g., Al-Ansaari et al. (2015), Al-Ansari et al. (2013), Aloulou (2019), Gao et al. (2007), Ibrahim and Shariff (2016), Hakala and Kohtamäki (2011, 2010), Mutlu and Sürer (2015), Nakola et al. (2015), Saqib et al. (2018) and Zhou et al. (2005). While these studies collectively highlight TO's importance, they predominantly treat it as a unidimensional construct, resulting in mixed findings. Notably, several studies, including Borodako et al. (2022), Barragan and Becker (2024), Gao et al. (2007), Lee et al. (2014), Nakola et al. (2015) and Ramirez-Solis et al. (2022), have consistently found a significant positive relationship between TO and firm performance. These findings emphasise TO's potential to drive innovation, operational efficiency, and competitive advantage, yet underscore the need for a more nuanced understanding of its multidimensional nature to address contextual and methodological gaps in the existing body of research. In contrast, some studies, such as Al-Ansari et al. (2013) and Al-Ansaari (2015), Aloulou (2019) and Ibrahim and Shariff (2016), found that the relationship between TO and FP is insignificant, while Saqib et al. (2018) found a negative relationship between the two.

In this vein, this study proposes that;

H1 Technology orientation has a positive impact on firm performance.

Figure 1 Research model



3 Research methods

3.1 Research design and sample

In testing the main hypothesis, the study was designed as a survey-based quantitative research, and data was collected from a sample of 126 export-oriented SMEs in Sri Lanka. An online questionnaire was used for the data collection and was analysed at the firm level. Due to the unavailability of an official and complete single database, the

study relied the exporters' directory of the Export Development Board (EDB), the government authority for exporters of Sri Lanka. This directory, as of 2024, comprised over 3,000 exporters. A random sample of 341 was selected as recommended by the Krejcie and Morgan's (1970) sample size determination table. However, out of the targeted sample, only 126 responses were received, representing a 37.2% response rate, which is considered acceptable for online survey questionnaires (Wu et al., 2022).

Further to address the potential risk of non-response bias, the study followed the recommendation of Collier and Bienstock (2007) by conducting independent sample t-tests to compare early and late respondents. The results indicated no statistically significant differences between the two groups, suggesting a minimal likelihood of systematic non-response bias. Both early and late respondents accounted for 10% of the total sample, ensuring a balanced comparison.

3.2 Measurements

A subjective approach was used to measure the endogenous latent variable of the study – SME firm performance. This is consistent with similar studies conducted on internationalised firms, such as those by Knight and Cavusgil (2004), Lee et al. (2014) and Narver and Slater (1990). The subjective approach was particularly suitable for assessing SME performance in developing country contexts, where objective measures often discourage responses due to contextual barriers. The firm performance of export-oriented SMEs in Sri Lanka was assessed using the scale developed by Lee et al. (2014). The construct was measured using four items on a five-point Likert scale.

For TO construct, the scale developed by Halaç (2015) was employed. A total of 35 items were used to measure the multidimensional TO construct, distributed across its dimensions: 12 items for TC, eight items for TMC, nine items for CL, and six items for CC. All items were measured on a five-point Likert scale.

All questionnaire items are listed in Table 1.

3.3 Data collection and analysis

The survey questionnaire was developed with the help of Google Forms. The questionnaire included two main sections. The first section included six questions in the form of categorical questions relating to the demographics of the sampled firms. Section two included the Likert scale questions measuring the primary variables of the research model – TO and FP. Respondents were asked to provide their level of agreement with each statement.

The data collection process involved multiple stages. Initially, the online survey link was sent via email to the 341 randomly selected SMEs, accompanied by an invitation explaining the study's purpose, the significance of their participation, and assurance of confidentially. Two reminder emails were sent at weekly intervals, followed by telephone reminders in the third week to boost the response rate.

For data analysis, partial least squares structural modelling (PLS_SEM) was used to test the study's hypothesis alongside general descriptive analysis. PLS-SEM was chosen due to its robustness in analysing complex models with latent constructs, its ability to handle small sample sizes, and its suitability for exploratory research (Hair et al., 2022). This method allowed the study to simultaneously assess the relationship between TO and

firm performance while accounting for measurement errors, making it ideal for testing the main hypothesis of the study.

Table 1 Measurement scales

Construct	*Item*	*Source*
	Technological capability (TC)	
TC1*	Our firm makes required investment in R&D activities.	Halaç (2015)
TC2*	Our firm has strong technological skills in various fields.	
TC3*	Our firm improves technical skills of employees by frequently held training programs.	
TC4	Our firm is qualified to attract and motivate talented experts.	
TC5	Our firm has the ability to accurately predict future technological trends.	
TC6	Our firm is skillful in applying new technologies to problem-solving.	
TC7	Our firm is one of the leaders in our industry to establish technology standards.	
TC8*	Our firm is one of the leaders in our industry to upgrade technology standards.	
TC9*	Our firm leads technology innovation in our industry.	
TC10*	Our firm has competitive and powerful technology strategy.	
TC11*	Our firm has strong capabilities to integrate external technological resources with in-house resources.	
TC12	Our firm monitors up-to-date technological changes and developments closely.	
	Top management capability (TMC)	
TMC1	Our firm's upper management team has proper leadership capabilities.	Halaç (2015)
TMC2	Our firm's upper management team shares firm's vision.	
TMC3	Our firm's upper management team has strategic planning abilities.	
TMC4*	Our firm's upper management team has understanding capabilities to change environment.	
TMC5	Our firm's upper management team has required technical capabilities for the industry in which we operate.	
TMC6*	Our firm's upper management team is in good relations with employees.	
TMC7	Our firm's upper management team is in good relations with customers and suppliers.	
TMC8*	Our firm's upper management team has knowledge about the firm's principle field of operation.	

Note: *These items were removed in the final analysis due to poor model fit.

Table 1 Measurement scales (continued)

Construct	*Item*	*Source*
	Commitment to learning (CL)	
CL1*	Our firm values information sharing/flows within the organisation.	Halaç (2015)
CL2*	In light of the new knowledge, our firm questioned the old ones.	
CL3	In light of the new knowledge, our firm questioned the effectiveness of current routines and producers.	
CL4	Our firm shares new information if it is considered to have a high potential to apply.	
CL5	In light of the new knowledge, if necessary, our firm revises current tools in working approaches.	
CL6	In light of the new knowledge, if necessary, our firm revises routines and procedures.	
CL7	In light of the new knowledge, if necessary, our firm revises current technical infrastructure elements (e.g., storage or assembly line).	
CL8	In light of the new knowledge, if necessary, our firm revises current practices to reach better working approaches.	
CL9	In light of the new knowledge, if it is considered more effective, implement new working approaches into practice immediately.	
	Commitment to change (CC)	
CC1	In light of the new knowledge, employees adopt themselves to change easily.	Halaç (2015)
CC2	In light of the new knowledge, employees do not resist to change.	
CC3	In light of the new knowledge, employees do not regret that we change the working approaches.	
CC4	In light of the new knowledge, employees have positive opinions about changes.	
CC5	In light of the new knowledge, employees do not hesitate to implement changes ideas.	
CC6	In light of the new knowledge, employees accept revised routines and procedures easily concerning change.	
	Firm performance (FP)	
FP1	In comparison with our major competitors over the past three years, our firm has more market share.	Lee et al. (2014)
FP2	In comparison with our major competitors over the past three years, our firm has a higher growth rate.	
FP3	In comparison with our major competitors over the past three years, our firm has higher profitability.	

Note: *These items were removed in the final analysis due to poor model fit.

4 Results and findings

4.1 Sample characteristics

The demographic characteristics of the SMEs in the study reveal that the majority (60%) operate in the manufacturing sector, followed by services (34%) and a small proportion in other industries (6%). In terms of workforce size, 42% of the SMEs employ more than 100 individuals, while 21% have fewer than 10 employees. Regarding export activity, 38% of the SMEs derive 10–50% of their revenue from exports, with 18% being fully export-oriented. Annual turnover data indicates that 32% of the SMEs generate LKR 10–50 million, while 29% exceed LKR 50 million, demonstrating a significant diversity in firm size and export dependency within the sample.

4.2 Assessment of measurement model

In the first stage of the SEM, the measurement model was assessed to confirm the goodness of fit of the dataset before proceeding with the structural path analysis, as recommended by Hair et al. (2022). Thus, the reliability and validity were evaluated. The measurement model is presented in Figure 2.

- *Reliability:* construct reliability ensures that the items used to measure a latent variable are reliable and yield consistent results (Hair, 2010). Indicator reliability and internal consistency reliability were used to assess the reliability of constructs, and Cronbach's alpha and composite reliability (CR) were performed, respectively. All factor loadings, Cronbach's alpha, and CR (rho_a and rho_c) values that are above the threshold value of 0.7 assure the construct reliability (Hair et al., 2022). However, during the model fit and validation process, several items of the latent TO construct were removed, although they were above the threshold value of 0.7, due to the poor fit of the measurement model. Accordingly, 7, 3, and 2 items were removed, respectively, from TC, TMC, and CL, resulting in the absence of re-validating the Halaç's (2015) scale in other study contexts.
- *Validity:* construct validity refers to the extent to which a measurement instrument accurately captures the theoretical construct it is intended to measure (Hair, 2010). In this study, the validity of constructs was evaluated using convergent validity and discriminant validity. Convergent validity was assessed using the average variance extracted (AVE), and the AVE value above 0.5 ensures the convergent validity of a construct (Hair et al., 2022). Discriminant validity was evaluated using both the Fornell-Larcker criterion and the heterotrait-monotrait (HTMT) ratio, as recommended by Hair et al. (2022). In line with the guidelines by Fornell and Larcker (1981), the correlation values for each construct were lower than the square root of the AVE (displayed as the diagonal value). Additionally, the HTMT ratios adhered to the recommended threshold of below 0.9, as suggested by Henseler et al. (2015).

Figure 2 Construct reliability and convergent validity for first-order constructs (see online version for colours)

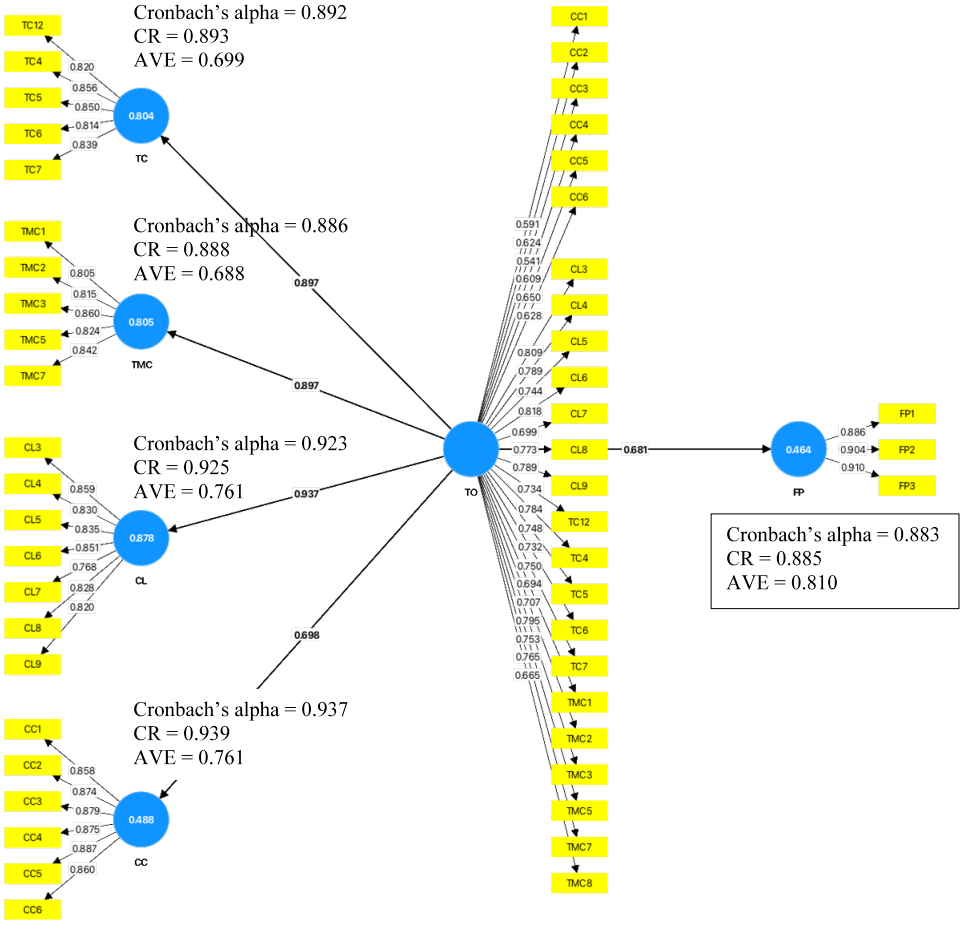
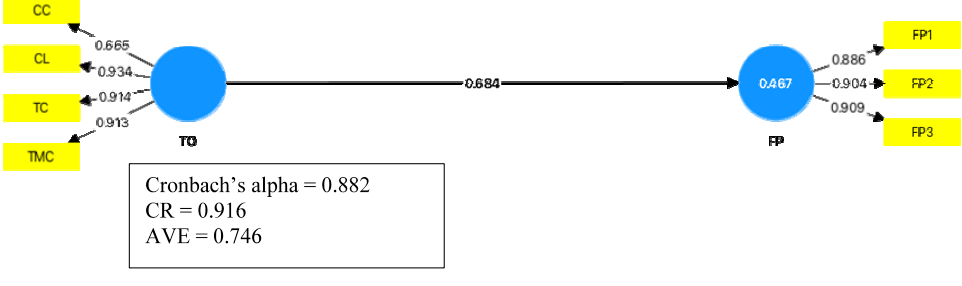


Figure 3 Construct reliability and convergent validity for higher-order constructs (see online version for colours)



Accordingly, the construct reliability and validity of the study were satisfied. Construct reliability and convergent validity results for first-order constructs (TC, TMC, CL, CC,

and FP) were reported in Figure 2 and discriminant validity results are presented in Table 2.

Table 2 Discriminant validity for first-order constructs

	CC	*CL*	*FP*	*TC*	*TMC*	*TO*
			Fornell-Larcker criterion			
CC	*0.872*					
CL	0.530	*0.828*				
FP	0.400	0.664	*0.900*			
TC	0.483	0.813	0.626	*0.836*		
TMC	0.471	0.816	0.629	0.791	*0.829*	
TO	0.698	0.937	0.681	0.897	0.897	*0.720*
			Heterotrait-monotrait (HTMT) ratio			
CC						
CL	0.566					
FP	0.436	0.735				
TC	0.525	0.894	0.704			
TMC	0.514	0.898	0.707	0.889		
TO	0.771	0.983	0.731	0.957	0.960	

Accordingly, for the higher-order TO construct, the results of the construct reliability and convergent validity are illustrated in Figure 3 and discriminant validity in Table 3.

Table 3 Discriminant validity for higher-order construct

	FP	*TO*
	Fornell-Larcker criterion	
FP	*0.900*	
TO	0.684	*0.863*
	Heterotrait-monotrait (HTMT) ratio	
FP		
TO	0.763	

4.3 Assessment of structural model

As the measurement model demonstrated satisfactory construct reliability and validity, the subsequent step involved analysing the structural model to primarily test the research hypothesis of the study. Bootstrapping with 5,000 re-samples was then performed to assess the significance of the structural path and to evaluate the model fit of the structural model. Additionally, a blindfolding procedure was performed to assess the predictive relevance of the model. First, the problem of multicollinearity was assessed using the variance inflator factor (VIF) and a VIF value below 5 confirms no multicollinearity problem in the model (Hair et al., 2022). As shown in Table 4, the VIF value for the relationship between TO and FP was 1.000, indicating no multicollinearity issue.

Table 4 Assessment of collinearity (VIF value)

	VIF
TO → FP	1.000

As Figure 2 illustrates, the explanatory power of the structural model, R^2, is 46.7%. It explains that the exogenous variable of TO explains 46.7% of the variation in the endogenous variable of FP, a relatively good explanatory power for a single exogenous variable. In addition to the explanatory power, the predictive power of the model was assessed using Q^2 prediction, with results showing a Q^2 prediction value of 0.450. It indicates a strong predictive relevance of the model. The RMSE and MAE values also support the model's predictive strength, as shown in Table 5.

Table 5 Predictive relevance (Q^2) of the model

	Q^2 predict	*RMSE*	*MAE*
FP	0.450	0.754	0.569

The model fit was evaluated using several indices, including the standardised root mean square residual (SRMR), d_ULS, d_G, chi-square and normed fit index (NFI). The results in Table 6 indicate a good model fit, with an SRMR value of 0.061, which is within the acceptable threshold of <0.08 (Hair et al., 2022). The NFI value of 0.918, which is above the recommended threshold value of 0.9 (Hair et al., 2022), also suggests a satisfactory fit. However, the effect size (f^2) was not assessed as the model includes only a single exogenous variable.

Table 6 Model fit indices

	Saturated model	*Estimated model*
SRMR	0.061	0.061
d_ULS	0.103	0.103
d_G	0.068	0.068
Chi-square	52.181	52.181
NFI	0.918	0.918

4.4 Hypothesis testing

Based on the hypothesis testing results, H1, which posits that technology orientation (TO) has a positive and significant effect on firm performance (FP), is supported. As shown in Table 7, the path coefficient for this relationship is 0.684, indicating a strong positive impact. The t-value of 12.971 exceeds the critical threshold, and the associated p-value of 0.026 is below the 0.05 significance level, confirming statistical significance. These results strongly support the hypothesis, demonstrating that TO is a critical determinant of SME firm performance.

Table 7 Results of structural model analysis

Hypothesis	*Path coefficient*	*t-value*	*P values*	*Decision*
H1: TO → FP	0.684	12.971	0.026	Supported

5 Discussion and conclusions

The findings of this study provide strong empirical evidence that TO is a critical determinant of firm performance among export-oriented SMEs in Sri Lanka. The statistically significant and positive relationship observed between TO and firm performance underscores the strategic importance of TO in driving the performance outcomes of SMEs. These results strongly support the hypothesis, demonstrating that TO is a critical determinant of SME firm performance and consistent with the existing findings such as Barragan and Becker, 2024, Gao et al. (2007), Kindermann et al., 2021, 2024, Lee et al. (2014), Nakola et al. (2015) and Ramirez-Solis et al. (2022) which have similarly highlighted the pivotal role of TO in fostering superior organisational performance, innovation, and market competitiveness. In particular, Gao et al. (2007) reveal that firms should integrate advanced technologies into their operations, thereby improving performance, efficiency, and adaptability. Lee et al. (2014) further emphasise this view, finding that TO enables firms to innovate and respond dynamically to market demand, contributing to superior performance. Similarly, Nakola et al. (2015) emphasise that TO not only drives operational efficiency but also provides customer-centric solutions, enabling firms to achieve a competitive advantage.

Notably, our research adopts a multidimensional conceptualisation of TO, incorporating firm-level capabilities such as top management capabilities, technological capabilities, commitment to learning and commitment to change. This novelty contributes to theoretical advancement, addressing the gap in prior literature that primarily treated TO as a unidimensional construct. The multidimensional approach provides a more holistic understanding of how TO relates to various levels and situations of a firm. This approach provides novel insights into how SMEs, particularly in emerging markets, can leverage TO to navigate technological disruptions and enhance export competitiveness.

These findings are particularly relevant in the context of export-oriented SMEs in emerging economies in Sri Lanka. In such economically and politically vulnerable contexts, resource constraints and market uncertainties often hinder firm performance. However, this study demonstrates that firms with strong TO can combat these challenges by enabling firms to adopt innovative practices, streamline processes, and better meet customer needs. The results also emphasise the importance of fostering greater TO as a strategic priority for SMEs, particularly in the post-pandemic period, where technology integration has become a key driver of resilience and sustainability.

In conclusion, the study contributes to the growing body of literature on TO and SME performance by providing empirical evidence from an under-researched context. It reinforces the notion that TO is not just an enabler but a critical success factor for SMEs, particularly in challenging and resource-constrained environments. This underscores the need for policymakers and practitioners to support the adoption of technology-driven strategies for SME development.

6 Implications for theory and practice

From a theoretical perspective, this study contributes to the existing literature on TO by demonstrating its critical role in determining SME performance, particularly in an

under-researched emerging market context. By investigating TO as a multidimensional construct and its direct impact on firm performance, the study extends prior research that often viewed TO as a unidimensional concept. Furthermore, it validates the RBV by highlighting TO as a key tangible resource that drives competitive advantage and performance, even in resource-constrained settings like export-oriented SMEs in Sri Lanka.

From a practical perspective, the findings emphasise the importance of adopting TO as a strategic priority for SMEs. Managers, therefore, should focus on integrating advanced technologies into business operations, training employees in digital tools, and leveraging technology to meet customer needs and improve operational efficiency. Policymakers, in turn, should support these SMEs to enhance their TO capabilities by offering financial incentives, providing access to digital infrastructure, and developing capacity-building programs for those firms. These efforts are particularly relevant in the post-pandemic era, where technology adoption has become crucial for resilience and competitiveness, especially for export-oriented SMEs navigating global markets.

7 Limitations and future research direction

This study, while offering significant insights, is not without limitations. First, the research is based on a cross-sectional design, which captures data at a single point in time and limits the ability to establish causal relationships between TO and SME FP. Future research could adopt a longitudinal approach to better understand the dynamic relationship between TO and FP over time. Second, the focus exclusively on export-oriented SMEs in Sri Lanka, which, while valuable, limits the generalisability of the findings to other sectors or regions. Expanding the scope to inclined SMEs in different industries or countries can provide a more comprehensive understanding of TO's impact. Additionally, this study examined TO as a direct determinant of firm performance, without considering potential mediators or moderators, such as market conditions, firm innovativeness, organisational culture, or resource availability, which may influence this relationship. Future research could explore these mediating or moderating factors to provide a deeper understanding of the mechanism through which it impacts performance. These directions could help advance the theoretical and practical understanding of TO in various SME contexts.

Declarations

Written informed consent was obtained from all participants prior to their involvement in the study.

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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