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RESEARCH ARTICLE

Kaizen and Productivity: The Mediating Effect of the Customer-supplier Relationship Using Smart-PLS

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ABSTRACT
As the global market has shifted rapidly in recent years, the debate over whether kaizen is a prerequisite to organizational effectiveness for continuously identifying new opportunities and gaining competitive advantages has increased. In addition, the effect of the customer-supplier relationship on organizational culture and productivity has gained substantial attention in recent studies, largely due to the expanding gap and misunderstanding of the benefits of continuous improvement (kaizen). The current study examines the mediating effect of customer-supplier relationships on organizational culture, continuous improvement, and productivity. Target respondents consisted of 240 Ethiopian manufacturing companies located in multiple industrial parks and used to collect the required data. Partial least squares-based structural equation modeling (PLS-SEM) was used to examine the mediating effect of customer-supplier relationship on kaizen and productivity. The outcome suggested that the customer-supplier relationship mediates kaizen and productivity. It also indicated that, in order to maintain organizational productivity, firms must differentiate themselves through cultivation of organizational culture and customer-supplier relationships.

Keywords: Continuous improvement, customer-supplier relationship, organizational culture, PLS-SEM

JEL Code: M10, M19

Introduction

Market competition is closely related to the productive function, which necessitates the development of reliable, solid customer-supplier relationships, organizational culture, and the capacity to produce products without defects by implementing continuous system and structural improvement in any organization (Hong, Guo, Chen, & Li, 2022; Anand, Ward, Tatikonda, & Schilling, 2009; Aurel, Andreea, & Simina, 2015; Boer & Gertsen, 2003; Hashim, Zubir, Conding, Jaya, & Habidin, 2012; Lee, Woo, & Joshi, 2017) . The development of a competitive edge is encouraged by the development of reliable, solid customer-supplier relationships and organizational culture conditions Carvalho & Pereira, 2015).

Recent studies, e.g., Danese, Romano, & Boscari (2017), Hartini & Ciptomulyono (2015) and Pearce and Pons (2017), emphasize the need for businesses to determine continuous improvement on organizational system and structure that improve firm productivity and support organizational culture. The relationship between continuous improvement and supplier-customer relationship, organizational culture, and firms' productivity was studied independently to examine the effects on efficiency and effectiveness. The result indicated that continuous improvement (kaizen) is a precondition for organizational effectiveness (Lendzion, 2015; Asaad, Rohaizah, & Yusoff, 2015; Carvalho & Pereira, 2015; Zarinah, Farhana, & Nadiah, 2017; Mishra & Gupta, 2010). Kaizen philosophy has its roots in post-World War II Japan and is derived from the words kai (change) and zen (for the better) (Palmer, 2001; Asaad, Rohaizah, & Yusoff, 2015).

The continual improvement strategy known as kaizen can be applied to all facets of work and social life (Imai, 1997; Carvalho & Pereira, 2015). It was seen as a strategy for resolving issues and boosting business efficiency (Imai, 1997; Asaad, Rohaizah, & Yusoff, 2015). (Zarinah, Farhana, & Nadiah, 2017). Numerous studies have revealed that continuous improvement has a favorable and significant impact on firm productivity and enhances employee performance. When there is a positive organizational culture, organizational innovation and performance will improve, and businesses will be able to continue competitiveness over the long term (Asaad, Rohaizah, & Yusoff, 2015; Garcia, Maldonado, Alvarado, & Rivera, 2014; Aurel, Andreea, & Simina, 2015; Shah, Ganji, & Coutroubis, 2017; Zarinah, Farhana, & Nadiah, 2017).

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According to Farris, Van Aken, Doolen, and Worley (2008) and Poksinska, Fialkowska-Filipek, and Engström (2016), continuous improvement of system and structure is an organized project within a set timescale carried out by a team with the goal of achieving improvements in a particular process or work area. Continual system and structural improvement not only help to improve the working environment, but also help people to build their problem-solving skills and attitudes in a particular business (Danese, Romano, & Boscari, 2017; Sobek II & Smalley, 2011). Continuous improvement (kaizen) is regarded as a viable strategy for building organizational culture and fostering positive employee experiences. (Hashim, Zubir, Conding, Jaya, & Habidin, 2012; Venkataiah & Sagi, 2012).

According to earlier research, there is a connection between organizational culture and productivity (Schein, 1983; Oki, 2012; Mishra & Gupta, 2010). Moreover, early research indicates that companies that encourage kaizen programs will increase organizational productivity (Imai, 1997; Boer & Gertsen, 2003; Anand, Ward, Tatikonda, & Schilling, 2009; Lee, Woo, & Joshi, 2017; Suarez-Barraza & Smith, 2012; Satsomboon & Pruetipibultham, 2014; Sondakh, Christiananta, & Ellitan, 2017; Stock, Six, & Zacharias, 2013). Additional research demonstrates the beneficial effects of organizational culture on productivity in automotive and other industries (Asaad, Rohaizah, & Yusoff, 2015; Garcia, Maldonado, Alvarado, & Rivera, 2014; Hartini & Ciptomulyono, 2015). According to Coelho, Mojtahedi, Kabirifar, and Yazdani (2022) and McDermott, Antony, Sony, and Healy (2022), organizational culture, which is described as a set of beliefs, expectations, and practices that guide and inform the activities of all team members, affects total quality management.

Although a manufacturing system requires a broader vision to succeed through the development of corporate culture, customer-supplier relationships, and continuous improvement, these elements alone are insufficient (Fullerton, Kennedy, & Widener, 2013). The kaizen philosophy requires constant changes at all levels and in a variety of ways, including encouraging employees to be innovative, to demonstrate their skills, abilities, and experience, to reduce waste and eliminate obstacles that prevent them from performing their jobs effectively, and to improve the process and quality control that maximizes production value (Pearce & Pons, 2017; J. de Haan & Overboom, 2012). Notwithstanding the obstacles, there are manufacturing success stories in less developed nations on the implementation of lean systems as a strategy for creating a wining competitive business environment (Barton, 2013; Garcia, Maldonado, Alvarado, & Rivera, 2014; J. de Haan & Overboom, 2012).

In Sub-Saharan Africa, the service and agricultural industries are typically more economically prominent than the manufacturing sector. The same is true for Ethiopia. Ethiopia's manufacturing sector contributed 24.77 percent to GDP in 2019, compared to 33.88 percent and 36.87 percent for the agricultural and service sectors, respectively (UNID, 2019; Plecher, 2020). According to AACCSA & DAB DRT (2014) and UNIDO (2018), Ethiopia has 2,610 manufacturing establishments units, the majority of which have been applying kaizen in their businesses. Kaizen was introduced to Ethiopia by the Japan International Cooperation Agency (JICA) in 2009; since then, it has been a vital tool for change in the country's public and private sectors (Otsuka, Jin, & Sonobe, 2018). Notwithstanding the hurdles, numerous businesses have adopted and implemented the kaizen principle (Getachew, 2017; Assefa G., 2016; Otsuka, Jin, & Sonobe, 2018). Questions remain about the applicability of kaizen in developing nations such as Ethiopia and others in Africa (Tadesse, 2018; Asayehgn, 2011).

Insufficient research has been undertaken on kaizen, particularly considering the connection between continuous improvement and organizational culture, customer-supplier interaction, and business efficiency (Hartini & Ciptomulyono, 2015; Sanchez-Ruiz, Gomez-Lopez, & Rojo, 2022). In Ethiopia, despite the presence of a significant study on the implementation of kaizen, no empirical data have been collected about the influence of customer-supplier relations on productivity and kaizen (Getachew, 2017; Assefa G. , 2016; Girma, 2016; Ephraim, 2014; Assefa, 2011).

Based on a review of early research in local contexts (such as Getachew (2017), Assefa G., (2016), Girma (2016), Ephraim, (2014), and Assefa (2011)) it is possible to conclude that there is no research that has been done on how continuous improvement (kaizen) relates to organizational culture, supplier-customer relationships, and productivity in the Ethiopian context. In this vein, academics note that comprehension of the socio-technical system is necessary for an effective transformation in the kaizen implementation process (Yadav, Nepal, Rahaman, & Lal, 2017). Therefore, the overall continuous improvement of the system and structure of the organization, customer-supplier relationships, organizational culture, and productivity of Ethiopia's manufacturing sector were the main area of this study, which covers the socio-technical systems of the kaizen philosophy in detail.

Literature review

Kaizen is a method for solving problems that is focused on people and helps businesses grow continuously and gradually (Asaad, Rohaizah, & Yusoff, 2015). It has been described as any process of continuous improvement in any aspect of life, including personal, social, domestic, and professional, especially when used in the workplace (Imai, 1997; Pearce & Pons, 2017). Kaizen refers to continuous improvement, brought about by both managers and employees, for a successful outcome (Imai, 1997; Aurel, Andreea, & Simina, 2015; Carvalho & Pereira, 2015). It is a two-word combination that refers to a Japanese notion that is described as long-term improvement (Zehir, Ertosunb, Zehir, & Müceldilli, 2012; Asaad, Rohaizah, & Yusoff, 2015).

The kaizen philosophy looks at any improvement or modification that is believed to be ongoing and will increase organizational productivity rather than looking for rapid or dramatic adjustments to progress the organization (Bolatan, Gozlu, Alpkan, & Zaim, 2016). Thus, industry and service sectors have embraced kaizen as CIPs to increase productivity and performance (Gonzalez-Aleu & Van Aken, 2016). There is, however, a dearth of research that specifically examines how organizational culture, customer-supplier relationships, and continuous improvement relate to company productivity. The lack of research is a result of the majority of kaizen implementation studies placing a heavy emphasis on technical systems (Barton, 2013; Gonzalez-Aleu & Van Aken, 2016; Carvalho & Pereira, 2015; Dombrowski, Mielke, & Engel, 2012; Glover, Farris, Aken, Van, & Doolen, 2011).

Few studies have taken into account the effects of the social system, and the most of them have focused on improving employee attitudes, knowledge, and skills while ignoring SCR, organizational culture, and businesses' overall productivity (Farris, 2006; Glover, Farris, Aken, Van, & Doolen, 2011; Carvalho & Pereira, 2015). According to literature, many businesses struggle to implement a sustainable lean production system if they see the manufacturing sector as a purely technical system and fail to recognize that kaizen events result in improvements to both the technical (improved cycle times) and social systems (Farris, 2006; Anand, Ward, Tatikonda, & Schilling, 2009).

As a method for continuous improvement, kaizen enables firms to make their business processes adaptable to changes in both economic and social contexts (Radnor, 2010). Despite its alleged efficacy as a method for continuous improvement, kaizen implementation in the public sector is limited (Suárez-Barraza, Ramis-Pujol, & Estrada-Robles, 2012), especially in the context of policing, and it lacks empirical evidence (Antony, Rodgers, & Cudney, 2017). Even when implemented, it is done on a small scale and has only temporary success (Barton, 2013).

Kaizen and firms' productivity

Kaizen is a method of continual improvement that may be applied to all facets of business and social life (Imai, 1997). According to Imai (1997), Danish, Munir, and Butt (2012), and Alexandra Jancikova (2009), kaizen is a method for resolving issues and increasing a company's productivity (Zarinah, Farhana, & Nadiah, 2017). Numerous studies found that continuous improvement had a favorable and significant impact on firm productivity, enhanced the performance of the organization's members, and reinforced the performance of the organization as a whole, all of which contributed to the creation and maintenance of competitive advantage (Asaad, Rohaizah, & Yusoff, 2015; Garcia, Maldonado, Alvarado, & Rivera, 2014; Aurel, Andreea, & Simina, 2015; Shah, Ganji, & Coutroubis, 2017; Zarinah, Farhana, & Nadiah, 2017).

Continuous improvements and firms' productivity

According to Farris, Van Aken, Doolen, and Worley (2008) and Poksinska, Fialkowska-Filipek, and Engström (2016), continuous improvement of system and structure is an organized project carried out by a team within a set time frame, with the goal of improving a particular process or work area. Continuous system and structure improvement not only helps to improve the working environment but also helps to build employees' problem-solving skills and mindset inside a particular firm (Danese, Romano, & Boscari, 2017; Sobek II & Smalley, 2011; Ahmed, Loh, & Zairi, 1999; Jager, et al., 2004). Additionally, it is viewed as a useful strategy for implementing adjustments to company culture and the experiences of employees (Hashim, Zubir, Conding, Jaya, & Habidin, 2012; Venkataiah & Sagi, 2012; Huang, Rode, & Schroeder, 2011; Nguyen & Robinson, 2015).

Organizational culture and continuous improvement

There is a link between corporate culture and productivity, according to studies (Schein, *The role of the founder in creating organizational culture*, 1983; Oki, 2012; Mishra & Gupta, 2010). Findings from various studies show that a culture that encourages kaizen activities will result in effective organizational productivity (Imai, 1997; Boer & Gertsen, 2003; Anand, Ward, Tatikonda, & Schilling, 2009; Lee, Woo, & Joshi, 2017; Suarez-Barraza & Smith, 2012; Satsomboon & Pruetipibultham, 2014; Sondakh, Christiananta, & Ellitan, 2017). They demonstrate how organizational culture and production are positively correlated.

Customer-supplier relationship and productivity

Most manufacturing industries are undergoing significant changes as they attempt to maintain long-term, sustainable partnerships with their customers in the face of fierce global competition (Boulding, Staelin, Ehret, & Johnson, 2005; Fahed & Maged, 2013). In addition, manufacturing firms are realizing the necessity of implementing customer-centered strategies in order to obtain a competitive edge and satisfy needs of their customers at the global level (Ko, Kim, Kim, & Woo, 2008; Lien & Li, 2013). According to studies (Ko, Lee, & Woo, 2004; Lindgreen, Palmer, Vanhamme, & Wouters, 2006; Kang, 2004; O'Leary, Rao, &

Perry, 2004), CRM improves management efficiency, lowers costs, enhances customer services, increases instances of customer repurchase, and increases the organization's sales and profits, all of which lead to greater customer loyalty and retention. Despite this, businesses spend a lot of money on CRM implementation, which is scarcely worth the money spent because of the harm that shoddy planning and communication cause to the organization's relationships with its clients (Rigby, Reichheld, & Schefter, 2002; Zablah, Bellenger, & Johnston, 2004; Lindgreen, Palmer, Vanhamme, & Wouters, 2006).

Organizational culture and customer relationship

A strategic and cultural shift from a culture that is centered on products or processes to one that is customer-oriented is necessary for customer relationship management (Christopher, Payne, & Ballantyne, 1991; Roh, Ahn, & Han, 2005; Stein & Smith, 2009). The generation and transmission of customer knowledge must be done in a way that prioritizes the needs of the customer (Tzokas & Saren, 2004; Schein, 2004; Fahed & Maged, 2013). Customer connection orientation has an impact on company culture, according to Stein and Smith (2009). According to another study, there is a connection between CRM and organizational information and knowledge sharing, cross-functional teams, performance-based rewards, encouraging relationships, adaptable and responsive attitudes toward change, and a higher level of risk-taking and innovativeness of an organization system (Iriana & Buttle, 2006; Iriana, Buttle, & Ang, 2013).

Imran, Ismail, Arshad, Zeb, and Zahid (2022) indicated innovation mediates organizational culture and performance in the banking sector. Shuaib and He (2022), Franco, Benitez, de Sousa, Neto, and Frank (2022), Wahab (2022), Rizzi, Gigliotti, and Annunziata (2022), and Inuwa, Islam, and Male (2022) examined the mediating effect of organizational learning and the moderating role of organizational culture on the relationship between total quality management and innovation among manufacturing companies. The result indicated that TQM does affect the interlinkage among the study variables (organizational learning, organizational culture, TQM and innovation). (Shuaib & He, 2022; Franco, Benitez, de Sousa, Neto, & Frank, 2022; Wahab, 2022; Rizzi, Gigliotti, & Annunziata, 2022; Inuwa,Islam, & Male, 2022).

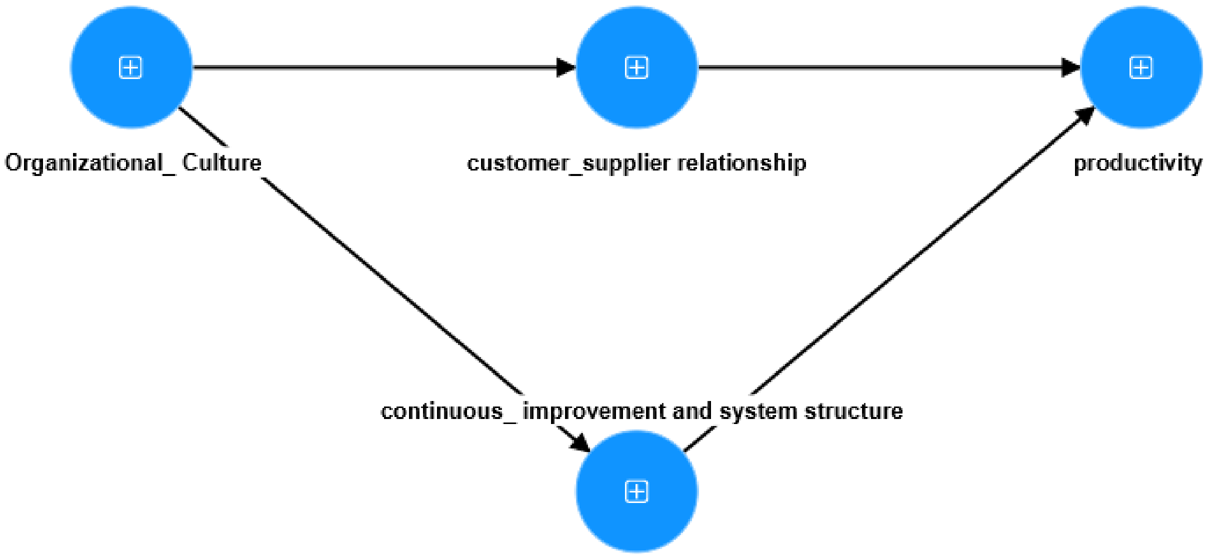

Figure 1. Conceptual Framework

Material and method

A questionnaire survey was used to gather the data for the current investigation. The study uses the identified organizations as a whole as its unit of analysis. The survey's target audience was Ethiopian manufacturing companies that were registered with the country's ministry of industry and targeted Ethiopian industrial parks. Cold calls were made to these 500 firms to inquire on the status of their kaizen applications, and a total of 340 firms located in the industrial parks of Hawassa, Dire Dawa, Yirgalem, Combolcha, Debire Birhan, and Bole Lemi were responded. 280 companies asserted that they were employing kaizen effectively.

To determine the ideal sample size, G power software was utilized (Hair, Hult, Ringle, & Sarstedt, 2016; Cohen, 1992). The minimum sample size needed for the study's design is 120 because Cohen (1992) advised a large effect size of 80 percent for social science research and the maximum number of predictors on a single construct of six (Cohen, 1992). 280 questions were distributed through an email survey, and 240 of them—or 67 percent—were returned. According to Saldivar, a 40% response rate for an email-based survey would be considered ordinary, 50% would be good, and 60% would be extremely good (Saldivar, 2012; Fowler, 2002; Morgan & Krejcie, 1970). In this study, the response rate was significantly higher than the necessary sample size of 120. The measurement tool used to operationalize the theoretical framework's constructs was a multi-item measure that was validated and adopted from the literature. Each item was evaluated using a "five-point" standardized Likert-type scale that ranged from 1 to 5.

An analysis of the link between observable factors and their latent components on productivity was carried out in smart-PLS (Ringle, Wende, & Becker, 2015). PLS-SEM is mostly used in exploratory research for the creation of theories (Bamgbade, Kamaruddeen, Nawi, Yusoff, & Bin, 2018). A multivariate analysis using PLS-SEM is currently accepted and favored in social science research (Hair, Ringle, & Sarstedt, 2013; Peng & Lai, 2012; Hinton, Brownlow, & McMurray, 2004). SEM can be used to do path analysis, confirmatory factor analysis, second-order factor analysis, regression models, covariance structure models, and correlation structure models (Lin & Jeng, 2017).

The suggested structural model in Figure 1 was examined using Smart-PLS, which has advantages over regression-based approaches in evaluating multiple latent constructs with various manifest variables (Gefen, 2000; Henseler, Ringle & Sarstedt, 2015; Henseler, Ringle & Sarstedt, 2015). Both the inner structural model and the outer measurement model were computed to test the proposed model as presented in Figure 1.

Consideration was given to CA scores over the accepted level of 0.70 (Hair, Hult, Ringle, & Sarstedt, 2016; Hinton, Brownlow, & McMurray, 2004). A confirmatory factor analysis (CF) result between 0.50 and 0.75, according to Hinton et al. (2004), denotes a fairly dependable construct. Though the CA is "sensitive to the number of items in the scale and typically tends to underestimate the internal consistency dependability," PLS-SEM "prioritizes the indicators according to their individual reliability," as stated by Hair et al. (2016).

They suggested using Composite Dependability (CR), a measure of internal consistency reliability that is said to be technically more appropriate because it takes into consideration the various outer loadings of the indicator variables, given the constraint and condition, respectively (Henseler, Ringle, & Sarstedt, 2015; Hair, Hult, Ringle, & Sarstedt, 2016). In an exploratory study, CR values between 0.60 and 0.70 are considered acceptable, whereas values between 0.70 and 0.90 are regarded as satisfactory, according to Hair et al. (2016). A cautious reliability measurement, CA typically yields low reliability values, while CR reflects the dependability's top bound (Henseler, Ringle, & Sarstedt, 2015).

Data analysis

Evaluation of outer measurement model

The questionnaire is used to measure both observable and unobservable variables, and the outer measurement model is designed to assess the validity, internal consistency, and reliability of these measurements (Ho, 2013). Single observed and construct reliability tests are used to evaluate consistency, while convergent and discriminant validity are used to estimate validity (Hair, Sarstedt, Ringle, & Mena, 2012).

The variance of an individual observed variable relative to an unobserved variable can be labeled using a single observed variable reliability by looking at the standardized outer loadings of the observed variables (Götz, Liehr-Gobbers, & Krafft, 2010). Observed variables with an outer loading of 0.7 or higher are predicted to be noticeably satisfactory, while those with a value of less than 0.7 should be ignored, according to Ho (2013) and Henseler, Hubona, and Ray (2016). However, observed variables with an outer loading of less than 0.7 should be ignored. Despite this, 0.7 was the appropriate outer loading cut-off number for this inquiry.

Table 1 shows a range of outer loadings from 0.688 to 0.896. Cronbach's alpha and Composite Reliability were used to evaluate the internal consistency of the construct reliability (CR). However, Cronbach's alpha is considered to be a more accurate indicator of internal consistency since it captures the standardized loadings of the observed variables (Fornell & Larcker, 1981).

Cronbach's alpha and CR values for all constructs were greater than 0.70, as shown in Table 1. As a result, Cronbach's alpha and CR indicated that the scales were statistically reliable. They also showed that all latent construct values were above the minimal threshold value of 0.70. To ensure the variables' convergent validity, the Average Variance Extracted (AVE) for each latent construct was calculated (Fornell & Larcker, 1981). The latent constructs in the model should absorb the lowest 50% of the variance from the observable variables. Therefore, this suggests that the average extracted variance (AVE) for each construct should be greater than 0.5. (Barclay, Thompson, & dan Higgins, 1995; Hair, Ringle, & Sarstedt, 2011). The results demonstrated the measurement model's strong internal consistency and proved its convergent validity. As can be shown in Table 1, all of the average extracted variance values were greater than 0.5.

Table 1. Outer loadings and quality criteria

	Outer loading	T-TEST	Cronbach's Alpha	rho_A	CR	AVE
Continuous improvement of system and structure			0.869	0.882	0.902	0.607
CISS2	0.889	17.182				
CISS2	0.719	39.893				
CISS3	0.843	37.956				
CISS4	0.843	30.487				
CISS5	0.813	20.141				
CISS6	0.774	14.763				
Customer-supplier r/ship			0.656	0.759	0.782	0.548
CSR1	0.660	9.307				
CSR2	0.701	9.879				
CSR3	0.847	31.575				
Organizational culture			0.901	0.904	0.931	0.771
OC1	0.889	57.448				
OC2	0.875	42.993				
OC3	0.854	27.724				
OC4	0.893	47.500				
Productivity			0.904	0.907	0.929	0.724
PR1	0.795	23.655				
PR2	0.848	30.177				
PR3	0.897	57.038				
PR4	0.816	16.537				
PR5	0.895	53.328				
Sources: Survey 2022						

Discriminant validity

The discriminant validity of the study's latent constructs will be tested in the following analysis. When a variable's cross-loading value in the latent variable is higher than that in any other constructs, it is said to have discriminant validity, making it different from other constructs in the route model (Sarstedt, Ringle, Smith, Reams, & Hair, 2014).

Cross-loadings and the Fornell and Larcker criterion were employed to assess the discriminant validity (Fornell & Larcker, 1981). A construct should not exhibit the same variance as any other construct that exceeds its AVE value, according to the specified criterion (Sarstedt, Ringle, Smith, Reams, & Hair, 2014). The Fornell and Larcker criterion test of the model, which compared the squared correlations with the correlations from other latent components, is shown in Table 2. The observation that all correlations were lower than the average variance exerted along the diagonals (square root) suggests excellent discriminant validity. This demonstrated that each construct's observed variables indicated the relevant latent variable, supporting the model's discriminant validity.

Table 2. Discriminant validity fornell-larcker criterion

	OC	CISS	FPCSR	PR
Organizational_culture	0.878			
Continuous_ improvement and system structure	0.359	0.779		
Customer-supplier_relationship	0.745	0.587	0.740	
Productivity	0.349	0.477	0.446	0.851
Sources: Survey 2022				

Average coefficient correlation coefficient

Table 3 displays the correlation coefficient for latent variables. HTMT criterion measures the average correlations of the indicators across constructs. The model in Table 3 shows that all variables were less than .85, indicating that it fits well with the acceptable levels of discriminant validity (< 0.85/0.90), as suggested by Henseler et al. (2015)

Table 3. Heterotrait-monotrait ratio (HTMT)

Paths	Heterotrait-monotrait ratio (HTMT)
continuous_ improvement and system structure <-> Organizational_ Culture	0.395
customer_supplier relationship <-> Organizational_ Culture	0.766
customer_supplier relationship <-> continuous_ improvement and system structure	0.826
productivity <-> Organizational_ Culture	0.386
productivity <-> continuous_ improvement and system structure	0.531
productivity <-> customer_supplier relationship	0.581
Sources: Survey 2022	

Cross loading

Table 4 demonstrates that the cross loading of all observed variables in the model was greater than the construct's inter-correlations for all other observed variables. These results therefore offer confirmation that the discriminant validity of the measurement model is well fitted with the threshold suggested by Hair, Hult, Ringle, and Sarstedt (2016). In addition, the recommended conceptual model was valid, with sufficient reliability, convergent validity, and discriminant validity as suggested by Hair, Hult, Ringle, & Sarstedt (2016) thresholds.

Table 4. Cross loading

	CISS	CSR	OC	PR
CISS1	0.239	0.719	0.411	0.293
CISS2	0.305	0.843	0.448	0.388
CISS3	0.378	0.843	0.568	0.417
CISS4	0.287	0.813	0.456	0.416
CISS5	0.202	0.774	0.351	0.322
CISS6	0.229	0.668	0.474	0.366
CSR1	0.249	0.512	0.660	0.279
CSR2	0.257	0.566	0.701	0.428
CSR3	0.857	0.372	0.847	0.327
OC1	0.889	0.382	0.689	0.314
OC2	0.875	0.308	0.665	0.274
OC3	0.854	0.287	0.604	0.324
OC4	0.893	0.277	0.654	0.314
OC5	0.324	0.434	0.354	0.795
PR1	0.292	0.367	0.382	0.848
PR2	0.297	0.432	0.408	0.897
PR3	0.251	0.375	0.339	0.816
PR4	0.315	0.416	0.409	0.895
PR5	0.239	0.719	0.411	0.293
Sources: Survey 2022				

Evaluation of the inner structural model

The results of the present study reveal that the measurement model was an accurate predictor of the hypothesis that was put forth. The outcomes of the Inner Structural Model were then measured. This included looking at the relevance of the model's projections and the connections between the constructs. The correlation between two variables (R^2), Path coefficient (β value) and T-statistic value, Effect size (f^2), the Predictive relevance of the model (Q^2), and Goodness-of-Fit (GOF) index are the key standards for evaluating the inner structural model.

Measuring the value of R^2

The general effect size and variation explained in the endogenous construct for the structural model are measured by the coefficient of determination, which also serves as a predictability indicator for the model. The inner path model for the endogenous latent variable of businesses' productivity in this study was 0.559. These results showed that the five independent variables effectively account for 35.9% of the variation in the firms' productivity, meaning that about 55.9% of the change in the firms' productivity was due to five latent constructs in the model. An R^2 value of 0.75 is considered substantial, an R^2 value of 50 is considered moderate, and an R^2 value of 0.26 is measured as weak. Hence, the R^2 value in this study was moderate (Table 6) (Henseler, Ringle, & Sinkovics, 2009; Hair, Ringle, & Sarstedt, 2013).

Table 5. Path coefficients

	Total effects	**T statistics (|O/STDEV|)**	**P values**
Organizational_ Culture -> continuous_ improvement and system structure	0.359	5.205	0.000
Organizational_ Culture -> customer_supplier relationship	0.745	26.990	0.000
Organizational_ Culture -> productivity	0.307	5.925	0.000
continuous_ improvement and system structure -> productivity	0.328	4.798	0.000
customer_supplier relationship -> productivity	0.253	3.528	0.000
	Specific indirect effects	**T statistics (|O/STDEV|)**	**P values**
Organizational_ Culture -> customer_supplier relationship -> productivity	0.189	3.559	0.000
Organizational_ Culture -> continuous_ improvement and system structure -> productivity	0.118	3.575	0.000
Sources: Survey 2022			

Estimation of path coefficients(β) and T-statistics

The standardized β coefficient in the regression analysis and the path coefficients in the PLS were comparable. The significance of the hypothesis was examined using the β value. For a unit variation in the independent construct, the symbol β represented the predicted variation in the dependent construct (s). Every path in the proposed model had its values computed; the higher the values, the more significant the impact on the endogenous latent construct. The significance level of the value has to be confirmed, though, using the T-statistics test.

The significance of the model was assessed using the bootstrapping technique (Chin, 1998). The researcher assumed that the structure and method for continuous improvement would have a significant, favorable impact on the firm's productivity. As expected, the results in Table 4 and Figure 2 confirmed that system and structural factors that were continuously improved had a significant impact on a firm's productivity (β = 0.328, T = 4.797, p= 0.00) hence, the model is well supported.

Table 5 indicated organizational culture significantly affects continuous improvement system and structure (β = 0.389, T = 5.205, p= 0.00), and confirms that organizational culture affects continuous improvement system and structure of the organization. Organizational culture was supported since there was a positive and significant influence of customer and supplier relationships (β = 0.745, T = 26.990, p= 0.000). The customer and supplier connection factor had a substantial impact on organizational productivity (β = 0.253, T = 3.528, p = 0.000).

The influence of an exogenous latent construct on the endogenous latent construct is stronger the higher the beta coefficient (β). When compared to other values in the model, Table 4 and Figure 2 indicate that the customer and supplier connection-related component had the top path coefficient of β = 0.745, indicating that it had a higher value of variance and a high influence with regard to altering the businesses performance. The graphical representation of every path coefficient in the model is shown in Figure 3.

Measuring the effect size f^2

The magnitude of each exogenous latent construct's influence on the endogenous latent construct is represented by the value f^2 (Hair, Hult, Ringle, & Sarstedt, 2016). The coefficient of determination (R^2) changes when an independent construct is removed from the path model, indicating whether the removed latent exogenous construct had a significant impact on the latent endogenous construct's value. The values of the f^2 were 0.35 for a high influence, 0.15 for a moderate effect, and 0.02 for a weak effect (Cohen, Statistical Power Analysis for the Behavioral Sciences, 1988)..

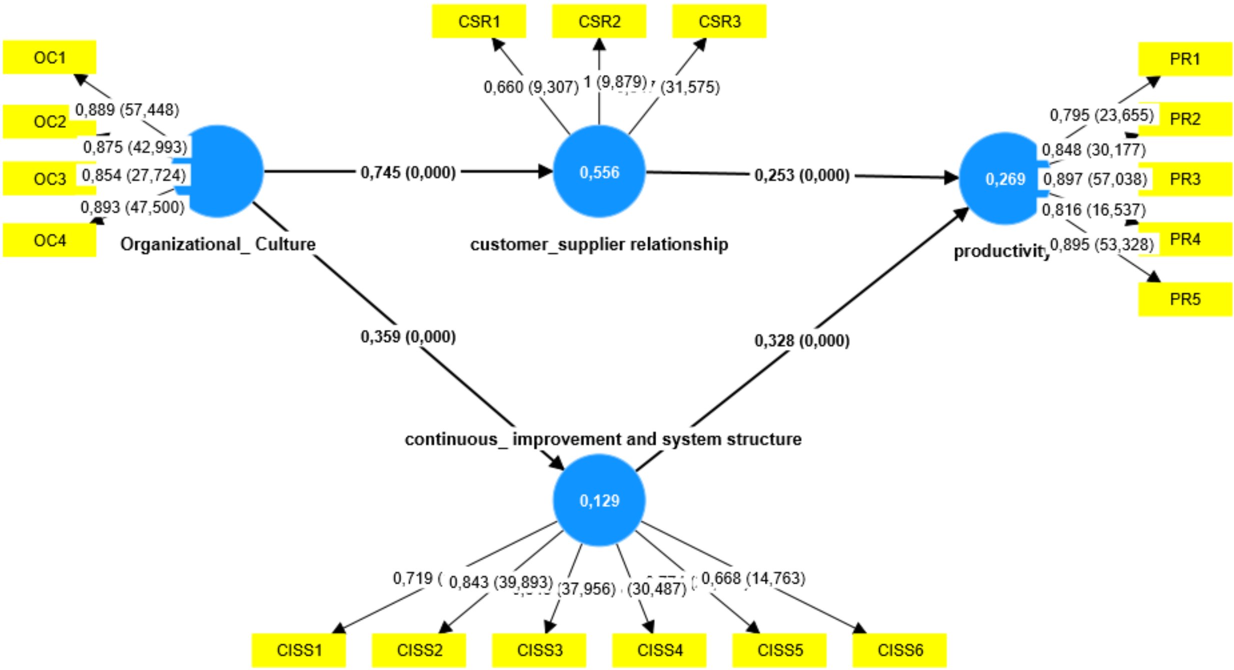

Figure 2. Model tested using partial least square / Sources: Survey 2022

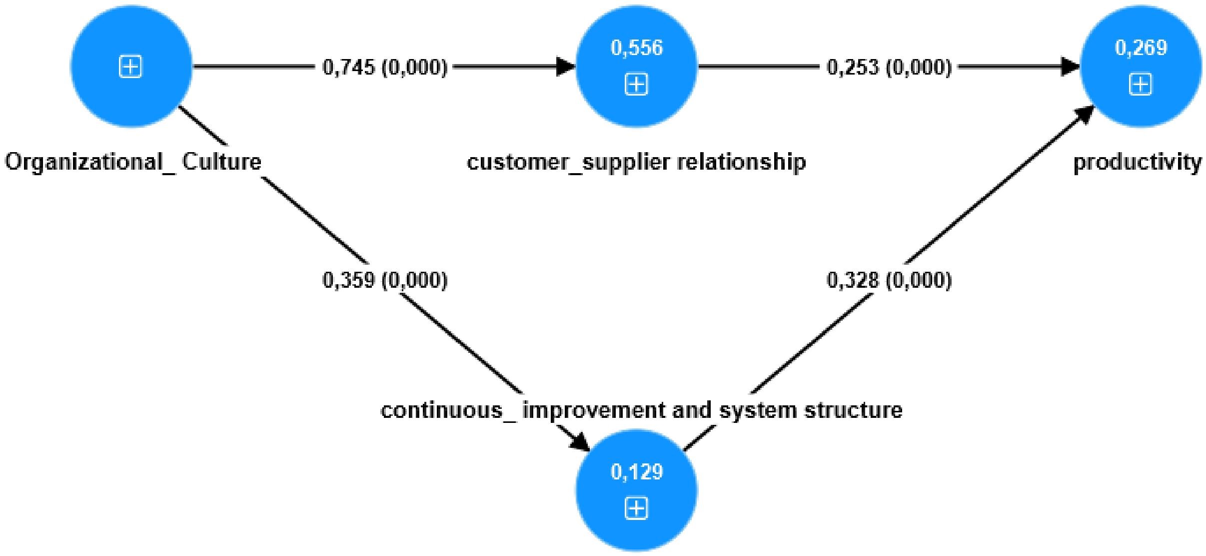

Figure 3. Proposed model result of outer loading and p-value / Sources: Survey 2022

As shown in Table 6, the association between organizational culture and performance, customer-supplier interactions, and continuous improvement systems and structure all had small to moderate effect sizes. As a result, three of the four exogenous latent variables on productivity, according to Cohen's advice, had a minimal impact on the value of R^2 (Cohen, 1988; Hair, Hult, Ringle, & Sarstedt, 2016).

Readings for the variance inflation factor (VIF) are below the critical value of 3.33, demonstrating that the structural model is free of multicollinearity issues (Diamantopoulos & Siguaw, 2000).

Model fit

Goodness-of-Fit (GOF) is used as an index for the whole model fit to make sure the model effectively accounts for the empirical data (Tenenhaus, Esposito Vinzi, Chatelin, & Lauro, 2005). The GOF values range from 0 to 1, with small, mid, and large values of 0.10, 0.25, and 0.36, respectively, denoting the path model's overall validity. A good model fit shows how practical and plausible

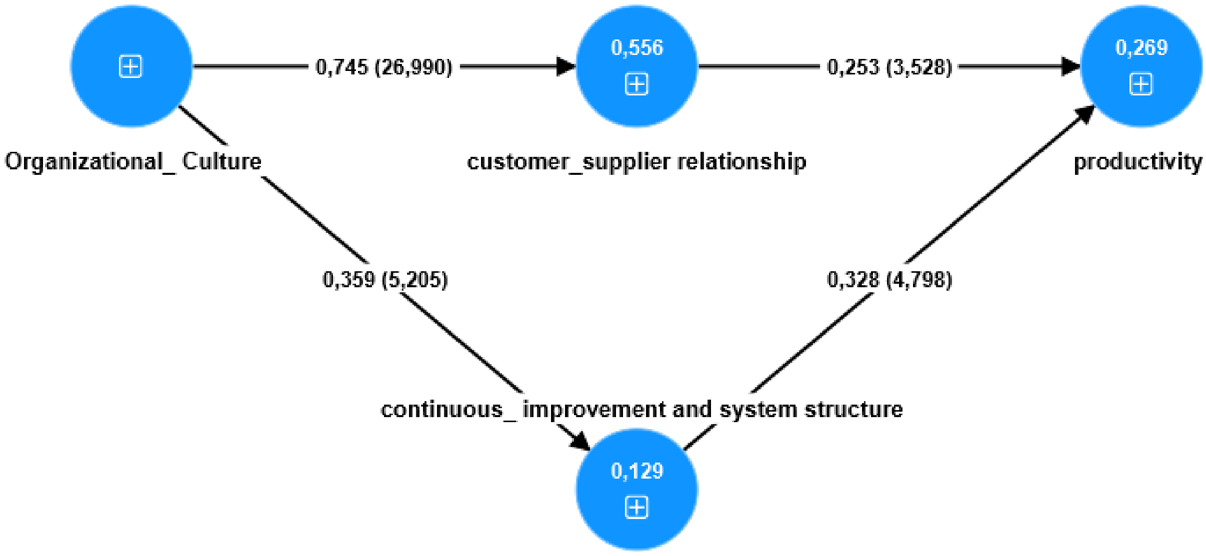

Figure 4. Proposed model result of T-test and path outer loading / Sources: Survey 2022

Table 6. Effect size (f^2) and VIF

	f^2	VIF
Organizational_ Culture -> continuous_ improvement and system structure	0.148	2.139
Organizational_ Culture-> customer_ supplier relationship	1.251	2.417
continuous_ improvement and system structure -> productivity	0.097	2.513
Customer _supplier relationship-> productivity	0.057	2.107
Sources: Survey 2022		

a model is (Henseler, Hubona, & Ray, 2016). The study model's computed GOF score was 0.943, showing that empirical data fits the model satisfactorily and has a strong ability to predict outcomes when compared to baseline values.

Table 7. Model fit measurements

	AVE	R2	SRMR	d_ULS	d_G1	d_G2	Chi-Square	NFI
CISS	0.869	0.127	0.075	1.622	0.943	0.943	978.51	0.862
CSR	0.656	0.554						
PR	0.904	0.265						
OC	0.869							
Sources: Survey 2022								

The standardized residual of root mean square (SRMR) is a measure of the average of the residuals between the hypothesized and observed covariance matrices (Chen, 2007). The SRMR is a measurement of estimated model fit. According to Hu and Bentler (1998), the research model fits the data well when the SRMR is less than 0.08; a lower SRMR indicates a better match. Table 6 demonstrates that the SRMR for this study model was 0.075, indicating a strong fit, while the Chi-Square value was 978.51 and the NFI value was 0.862, respectively, where all fitted well to the thresholds suggested by Chen (2007).

Conclusion and managerial implication

Conclusion

The results of this study showed that system and structure improvement over time had a favorable impact on organizational productivity. Aktaa, Içekb, and Kyakc, 2011, Alexandra Jancikova, 2009, Assefa, 2011, Ahmed, Hassan, and Fen, 2005, and Sondakh, Christiananta, and Ellitan, 2017 support the current finding. Additionally, early research has shown a positive correlation between customer-supplier relationships and organizational productivity and culture. Culture affects customer-supplier relationship, system structure and organizational productivity (Boulding, Staelin, Ehret, & Johnson, 2005; O'Leary, Rao, & Perry, 2004; Iriana & Buttle, 2006; Stein & Smith, 2009).

The current findings indicate that as system improvement increases, organizational cultures become more supportive and customer-focused, which is also supported by early findings i.e. Ahmed, Loh, & Zairi, (1999), Anand, Ward, Tatikonda, & Schilling, (2009), Anand, Ward, Tatikonda, & Schilling (2009), Asaad, Rohaizah, & Yusoff (2015), and Alexandra Jancikova (2009). In addition, the finding in this study indicate that organizational culture affects customer-supplier relationship, system structure improvement and organizational productivity. The finding is consistent with Akta, Içekb, & Kyakc (2011), Alexandra Jancikova (2009), Satsomboon & Pruetipibultham (2014), and Danish, Munir, & Butt (2012)

Managerial and theoretical implications

The study provides organizations and their managers with a greater understanding of the connections between productivity, customer relationships, organizational culture, and continual system and structure improvement. By analyzing the moderating effect of customer-supplier relationships on organizational culture and ongoing organizational productivity, managers will be able to make smarter and more successful decisions. In addition, the study can help organizations decide which performance measures are more strategically vital to improve and how to prioritize the execution of continuous improvement. By analyzing the effects of all the most important lean approaches on the most crucial metrics of organizational productivity and organizational culture, this study adds to the body of prior research in this field in terms of its theoretical significance.

Research limitations and further research

There were a number of issues that need to be taken into account when doing such investigations in the future. First, only workers in the manufacturing sector were called to obtain the necessary information. There are many other factors that may have been included, but they were not included in the study's variables because of the limited scope of the research. As a means of advancing this field, researchers should look beyond the manufacturing business and into a variety of other industries where the lean strategy can be applied, taking into account both the social and technical aspects of the process.

These factors' varied boundaries must be identified in order to be taken into account in future investigations of the same nature. Only employees in the manufacturing sector who were actively engaged in certain industrial parks were contacted in order to begin obtaining the essential data. Even though a number of other hindrances may be identified, the variables in the study were restricted to productivity, organizational culture, customer-supplier relationships, and continuous improvement. We need research that not only focuses on manufacturing, but also takes into account other industries where a lean strategy could be beneficial by considering both the social and technical aspects of implementing kaizen.

It is also possible to investigate the impact of lean methods and tools on organizational culture and CRM, taking into account the importance that governments, non-governmental organizations, civil societies, international unions and institutions, and industry and society as a whole place on the "green" and sustainable area and preservation. A mixed method approach, which incorporates both quantitative and qualitative data sets that can be rigorously verified using statistical techniques like the non-response bias test, can be used in future empirical investigations in order to improve data reliability.

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