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The impact of contextual factors on costing system design: The moderating role of facilitator factors

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ABSTRACT

Achieving optimal performance is partially conditioned by aligning the costing system design (CSD) with the context's requirements. Research on the relationship between the context and CSD has produced inconsistent results, which has prompted research on the moderating role of various factors in this relationship. An omission by this research is the moderating impact of factors that play a facilitating role in obtaining the intended CSD. Hence, this research employs the contingency theory to investigate the moderating impact of various facilitators, including top management support (TMS), organizational culture, and the availability of resources to invest in the costing system, on the relationship between the context and CSD. This research utilizes a questionnaire survey to gather data from Saudi manufacturing businesses and analyzes the data using a moderated regression analysis (MRA). The results did not support the moderating influence of facilitator factors, which may be related to the characteristics of the Saudi context and/or the measures adopted. However, the results revealed interesting findings regarding the direct effects of facilitator and contextual factors on CSD. This research provides manufacturing industry practitioners with important insights regarding the facilitating role of multiple factors in the design and implementation of costing systems that are compatible with the context.

Contribution/Originality: This research adds to the literature by investigating the inconsistent results regarding the determinants of CSD through testing the moderating effects of multiple factors, which act as facilitators, on the relationship between the context and CSD. This helps to create compatible CSDs that contribute toward achieving optimal performance.

1. INTRODUCTION

Achieving an optimal level of performance is a central objective that businesses seek to achieve in order to succeed and satisfy their stakeholders (Alam, 2006; Kaplan, 2009). Contingency theory suggests that among the main contributors to obtaining an optimal level of performance is operating with an optimal costing system design (CSD) for the assignment of overhead/indirect costs to products that is compatible with the requirements of the surrounding context (Aljabr, 2020; Burkert, Davila, Mehta, & Oyon, 2014; Cooper, 1988; Drury, 2018; Hadid, 2019; Ittner, Lanen, & Larcker, 2002; Pizzini, 2006; Schoute & Budding, 2017; Stuart, 2013; Vetchagool, Augustyn, & Tayles, 2020). This is attributable to the fact that compatible CSDs produce balanced information regarding the costs of measurement required by the costing system and the costs of the errors incurred as a result of making inferior decisions based on distorted product costs (Drury, 2018; Kaplan & Cooper, 1998). Given the importance of

having compatible CSDs, a large number of studies have utilized contingency theory to test the influence of various factors on CSD, defined by the adoption of activity-based costing (ABC) or the level of costing system complexity (CSC), to determine their importance regarding CSD (Alsayegh, 2020; Chenhall, 2003; Gosselin, 2006; Ibrahim, El Sibai, & El Din, 2021).[1] Although the factors examined covered a wide range of factors, the literature suggests that the central contextual factors are the production complexity (PC), of which product diversity and product customization represent the main dimensions, the level of indirect costs (IndirectCosts), the level of competition (COMP), and the extent of the information technology's quality (IT quality) (Abernethy et al., 2001; Aljabr, 2020; Cooper, 1988; Kaplan & Cooper, 1998; Stuart, 2013). The importance of the first three factors stems from their association with the costs of errors and CSD, while the significance of the last factor arises from its association with the costs of measurement and CSD (Cooper, 1988). Prior empirical studies have examined how these four contextual factors affect ABC adoption (e.g., (Aljabr, 2020; Bjørnenak, 1997)) and CSC (e.g., (Drury & Tayles, 2005; Hadid & Hamdan, 2022; Moalla & Mezouel, 2020)). However, the results are inconsistent, which raises the question: "When do the contextual factors execute their effect, if any, on ABC adoption and CSC?"

To our knowledge, four studies have focused on explaining the inconsistent results, therefore answering this question through investigating the role of moderator factors with regard to the relationship between the contextual factors and CSD. Abernethy et al. (2001) and Schoute (2011) examined the moderation effect of advanced manufacturing technologies (AMT) on the impact of PC on CSC and ABC adoption, respectively. Both found support for the moderation role of AMT in that, at high levels of AMT, there is no significant, positive relationship between PC and most CSC aspects (e.g., the number and type of cost drivers) or ABC adoption, while, at low levels of AMT, a significant or positive relationship exists between PC and most CSC aspects and ABC adoption. Hadid and Hamdan (2022) examined the moderation role of company age on the relationship between company size and CSC. The study found that age exerts a negative moderation effect on the association between size and CSC, where the impact of size on CSC is positive and stronger when age is at a low value compared to a high value. Mazbayeva, Barysheva, and Saparbayeva (2022) investigated the moderating role of accountants' participation in costing development on the link between PC and ABC adoption and found that the effect is positive and more pronounced at higher levels of the moderator variable compared to lower levels.

Despite the contributions of the four aforementioned studies, no attempts, to our knowledge, have been made to explain the inconsistent results and thus answer the raised question by investigating the moderating role of multiple facilitator factors on the relationship between all of the key contextual factors and CSD. Prior research has theorized and supported the facilitation role of various factors, such as top management support (TMS) and organizational culture, in the adoption of ABC and the intended level of CSC (e.g., (Argyris & Kaplan, 1994; Baird, Harrison, & Reeve, 2004; Innes & Mitchell, 1990; Krumwiede, 1998b; Moalla & Basti, 2020; Shields, 1995)). Innes and Mitchell (1990) stated that the complexity of the change process in adopting innovative management accounting techniques necessitates interaction between three groups of factors, namely motivator, catalyst and facilitator factors. Motivator factors include indirect costs and competition, catalyst factors include poor financial performance and loss of market share (factors that create the need for change), and facilitator factors include the availability of accounting staff and computing resources (factors that facilitate the change process).[2] The facilitation

[1] When referring to the complexity of costing systems regarding the assignment of indirect costs, prior literature has used the terms "costing system complexity" (Drury & Tayles, 2005) and "costing system sophistication" (Abernethy, Lillis, Brownell, & Carter, 2001). In this paper, the term "costing system complexity" is used.

[2] IT quality consists of two elements; namely the introduction of new information technology and the improvements in information processing technology (Cooper, 1988). The first element can be considered as a motivator factor, while the second can be considered as a facilitator factor (Innes & Mitchell, 1990). In this paper, as discussed in Section 0, IT quality covers its first element, i.e., the introduction of new information technology, because it is assumed that, in recent years, the norm represents high levels of IT quality's second element, i.e., the improvements in information processing technologies (Cooper, 1988). Accordingly, it is appropriate to consider IT quality as a motivator factor.

role of these factors suggests that they can alter the relationship between the contextual factors and CSD. For example, although theory and previous findings suggest that the contextual factor of indirect costs positively affects ABC adoption and CSC (Al-Omiri & Drury, 2007), it may be argued that this is only true when the level of TMS is high; otherwise, indirect costs have no effect on ABC adoption or CSC. Examining the moderating role of facilitator factors regarding the relationship between the contextual factors and CSD is crucial to determine their contribution in making CSDs compatible with the requirements of the surrounding context. Although the study by Mazbayeva et al. (2022) accounted for what can be considered a facilitator factor, namely accountants' participation in costing development, the limitation of the study is that it only investigated the moderation effect of a signal facilitator factor on the relationship between a single contingency factor, namely PC and CSC.

Given the limited research regarding the moderating role of facilitator factors and the importance of examining their role in creating compatible CSDs that assist in gaining optimal overall performance, this paper utilizes contingency theory to examine the moderating impact of multiple facilitator factors on the effect of the contextual factors of PC, IndirectCosts, COMP and IT quality on CSD, as defined by ABC adoption and CSC. Although the range of facilitator factors is extensive, this paper selects three well-explored factors, namely top management support (TMS), organizational culture, and the availability of resources, with which to fund the costing system (Baird et al., 2004; Brierley, 2010; Shields & Young, 1989; Zhang, Hoque, & Isa, 2015).

The remainder of this paper is organized as follows: Section 2 develops the hypotheses regarding the moderation role of facilitator factors on the relationship between the contextual factors of PC, IndirectCosts, COMP and IT quality and CSD; Section 3 explains the research methodology; Section 4 provides and discusses the results; and Section 5 concludes.

2. HYPOTHESIS DEVELOPMENT

This section establishes the influence of the contextual factors on CSD and reviews the related results of empirical studies (Section 0). Then, it develops the hypotheses related to the moderating role of the facilitator factors of TMS, organizational culture, and the availability of resources to fund the costing system on the relationship between the contextual factors and CSD (Section 0). These hypotheses are depicted in the research model in Figure 1.

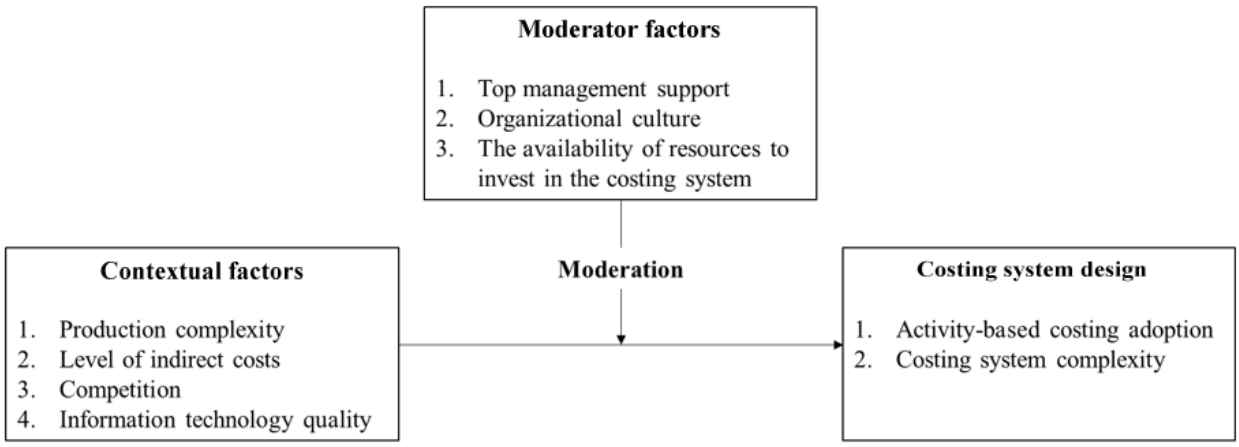

Figure 1. Research model.

2.1 The Effect of the Contextual Factors

Contingency theory suggests that no optimal CSD exists to suit all organizations; rather, the optimal CSD is determined by the surrounding context, represented by factors such as PC, IndirectCosts, COMP and IT quality (Aljabr, 2020; Burkert et al., 2014). The relationship between each of the contextual factors of PC, IndirectCosts,

COMP and IT quality and CSD is well-established and has been examined by several researchers (e.g., (Al-Omiri & Drury, 2007; Aljabr, 2020, 2021, 2022; Cooper, 1988; Drury & Tayles, 2005)). The existing literature suggests that the costs of error-related factors, i.e., PC, IndirectCosts and COMP, positively impact ABC adoption and CSC (Drury & Tayles, 2005; Kaplan & Cooper, 1998). This is attributed to the link between these factors, the costs of errors, and CSD (Cooper, 1988). Specifically, if the levels of these factors are high, the likelihood of producing distorted product costs and higher costs of error increase if, in the context of ABC, traditional costing systems (TCS) are used, or in the context of CSC, less complex than required CSDs are used (Aljabr, 2020; Cooper, 1988; Kaplan & Cooper, 1998). High levels of PC are associated with different patterns of resource consumption by products; hence, with high levels of batch- and product-level costs, the TCS cannot accurately assign them to products (Al-Omiri & Drury, 2007; Cooper, 1988; Kaplan & Cooper, 1998; Schoute, 2011). High levels of indirect costs are likely to be associated with high levels of batch- and product-level costs (Cooper, 1990). High levels of competition increase the risk that competitors may be able to take advantage of errors made due to reliance on the cost information generated by the TCS or a less complex CSD (Cooper, 1988). The results of empirical studies regarding the influence of the costs of error-related factors on ABC adoption and CSC are mixed, as indicated in Table 1.

In addition, the existing literature indicates that the costs of measurement-related factor, namely IT quality, positively influences ABC adoption and CSC (Al-Omiri & Drury, 2007; Cooper, 1988, 1989; Krumwiede, 1998b; Stuart, 2013). This is attributed to the link between IT quality, the costs of measurement and CSD (Cooper, 1988). Specifically, high levels of IT quality, when defined by the usage of new information technologies, are generally associated with the existence of a large amount of information in the system about the organization's various functions, e.g., production and marketing (Al-Omiri & Drury, 2007; Aljabr, 2020; Cooper, 1988). This means that the details regarding resources, products and production processes, and thus activities and cost drivers required by ABC or highly complex costing systems, are likely to be available virtually cost-free, which reduces their associated costs of measurement (Al-Omiri & Drury, 2007; Aljabr, 2020; Baxendale & Jama, 2003; Cooper, 1988; Krumwiede, 1998b; Stuart, 2013). The results of empirical studies are mixed in the ABC context and limited in the CSC context, as shown in Table 1.

Table 1. Summary of prior studies' results.

Contextual factor	Significant results		Insignificant results	
	On ABC adoption	On CSC	On ABC adoption	On CSC
Production complexity (PC)[a]	(e.g., (Al-Mulhem, 2002; Chongruksut & Brooks, 2005; Jusoh & Miryazdi, 2015; Khalid, 2005; Krumwiede, 1998b; Malmi, 1999)) (+)	Drury and Tayles (2005) (+)	(e.g., (Al-Omiri & Drury, 2007; Bjørnenak, 1997; Brown, Booth, & Giacobbe, 2004; Chen, Firth, & Park, 2001; Clarke, Hill, & Stevens, 1999; Nassar, Morris, Thomas, & Sangster, 2009; Van Nguyen & Brooks, 1997))	(Al-Omiri & Drury, 2007; Ismail & Mahmoud, 2012)
Indirect costs (IndirectCosts)	(e.g., (Al-Omiri & Drury, 2013; Bjørnenak, 1997; Jusoh & Miryazdi, 2015)) (+) Pokorná (2015) (-)	Brierley (2007) (+)	(e.g., (Al-Mulhem, 2002; Brierley, 2008, 2011; Brown et al., 2004; Chen et al., 2001; Clarke et al., 1999; Cohen, Venieris, & Kaimenaki, 2005; Khalid, 2005; Malmi, 1999; Van Nguyen & Brooks, 1997))	(Al-Omiri & Drury, 2007, 2013; Drury & Tayles, 2005)
Competition (COMP)	(e.g., (Al-Omiri & Drury, 2007, 2013; Jusoh & Miryazdi, 2015; Malmi, 1999; Van Nguyen & Brooks, 1997) (+) Bjørnenak (1997) (-)	(Al-Omiri & Drury, 2007, 2013) (+)	(e.g., (Booth & Giacobbe, 1998; Brierley, 2008, 2011; Chen et al., 2001; Chongruksut & Brooks, 2005; Cohen et al., 2005))	(Brierley, 2007; Drury & Tayles, 2005)
IT quality	Krumwiede (1998b) (+) (-)[b]		Al-Omiri and Drury (2007)	Al-Omiri and Drury (2007)

Note: a. The PC results pertain to the product diversity dimension. Nevertheless, inconsistent results were also found with other PC dimensions, such as product complexity and customization.
b. Krumwiede (1998b) found that IT quality can both encourage and discourage ABC adoption.
ABC = activity-based costing; CSC = costing system complexity.

2.2. The Moderating Role of the Facilitator Factors

2.2.1. Top Management Support (TMS)

The facilitation role of TMS in the adoption of innovations in general (Dong, Neufeld, & Higgins, 2009; Grover, 1993; Kwon & Zmud, 1987; Sharma & Yetton, 2003), and the intended CSD in particular (Baird, Harrison, & Reeve, 2007; Byrne, 2011; Foster & Swenson, 1997; Maiga & Jacobs, 2007), has been emphasized. This is unsurprising, given that the top management controls the required resources, e.g., financial, human and technical, for organizational change (Anderson & Young, 1999; Baird et al., 2007; Dong et al., 2009; Shields, 1995) that are necessary for successful change (Brown et al., 2004; Grover, 1993; Krumwiede, 1998a, 1998b; Premkumar & Potter, 1995). In addition, the top management can influence the employees to adapt to any organizational change through performing many activities, e.g., conducting training courses, that increase the employees' knowledge and skills related to the change (Dong et al., 2009) or through implementing incentives that are linked to the objectives of the change (Maiga & Jacobs, 2007; Sharma & Yetton, 2003). The empirical evidence supports the positive impact of TMS on ABC adoption (e.g., (Brown et al., 2004; Krumwiede, 1998b; Maelah & Ibrahim, 2007)). Based on the above, it can be argued that TMS is essential to make any change to the CSD, including those changes that make the CSD compatible with the context's requirements. Without TMS, it would be difficult for organizations to make the CSD changes required by the context that is represented by PC, IndirectCosts, COMP and IT quality. Hence, the following hypothesis will be tested:

H1: The effect of (a) PC, (b) IndirectCosts, (c) COMP and (d) IT quality on ABC adoption/CSC is moderated by TMS, such that the positive effect of PC, IndirectCosts, COMP and IT quality on ABC adoption/CSC is stronger when the level of TMS higher.

2.2.2 Organizational Culture

Organizational culture indicates the shared beliefs and values that a business develops over time (Gordon & DiTomaso, 1992). The existing literature has highlighted the facilitating role of organizational culture regarding the adoption of the intended CSD (e.g., (Argyris & Kaplan, 1994; Baird et al., 2004; Malmi, 1997; Shields & Young, 1989)). This is due to different reasons related to the various dimensions of organizational culture, of which the cultural dimensions of outcome orientation, attention to detail, and control form our current focus due to their established relevance to CSD (Baird et al., 2007; Baird et al., 2004). The outcome orientation dimension indicates the extent to which the business values competitiveness and emphasizes actions, achievements, results and performance (Baird et al., 2007; Baird et al., 2004; Charaf & Bescos, 2013). The adoption of ABC, and hence CSC, requires an outcome-oriented culture because there needs to be an appreciation of the system's benefits in relation to improving the processes, competitiveness and performance (Aljabr, 2021; Baird et al., 2004). The attention to detail dimension shows the extent to which the business values detail, precision and carefulness (Baird et al., 2007; Charaf & Bescos, 2013). The adoption of ABC, and thus CSC, needs a detail-oriented culture because an appreciation of the system's benefits is required in terms of providing accurate and detailed cost information (Aljabr, 2021; Baird et al., 2007). The control dimension indicates the extent to which the business values the control over activities and costs and emphasizes a detailed planning, budgeting and costing system (Baird et al., 2004; Merchant & Van Der Stede, 2003). The adoption of ABC, and therefore CSC, demands a control-focused culture because there needs to be an appreciation of the system's benefits in accurately identifying the amount of costs assigned to activities and products (Aljabr, 2021; Baird et al., 2004).

The empirical evidence supports the positive influence of each of outcome orientation (Charaf & Bescos, 2013; Zhang et al., 2015), attention to detail (Baird et al., 2007) and control (Baird et al., 2004) on ABC adoption and/or success. Based on the above, it can be argued that organizational culture is crucial to facilitate the process of changing the CSD to mold it to the context's requirements. Without a suitable organizational culture, it would be

problematic for organizations to make the CSD changes required by the context that is represented by PC, IndirectCosts, COMP and IT quality. Accordingly, the following hypotheses will be tested:

H2: The effect of (a) PC, (b) IndirectCosts, (c) COMP and (d) IT quality on ABC adoption/CSC is moderated by an outcome orientation culture, such that the positive effect of PC, IndirectCosts, COMP and IT quality on ABC adoption/CSC is stronger when the outcome orientation culture is at a higher level.

H3: The effect of (a) PC, (b) IndirectCosts, (c) COMP and (d) IT quality on ABC adoption/CSC is moderated by an attention to detail culture, such that the positive effect of PC, IndirectCosts, COMP and IT quality on ABC adoption/CSC is stronger when the attention to detail culture is at a higher level.

H4: The effect of (a) PC, (b) IndirectCosts, (c) COMP and (d) IT quality on ABC adoption/CSC is moderated by the control culture, such that the positive effect of PC, IndirectCosts, COMP and IT quality on ABC adoption/CSC is stronger when the control culture is at a higher level.

2.2.3 The Availability of Resources to Invest in the Costing System

The existing literature has emphasized the facilitation role of the factors related to the availability of resources for funding the costing system (Byrne, 2011; McGowan & Klammer, 1997). Resources are required to design, implement and operate complex CSDs because of the costs of collecting, storing and processing a large amount of data necessary for accurate product costs (Babad & Balachandran, 1993; Cooper, 1988; Dopuch, 1993; Estrin, Kantor, & Albers, 1994; Homburg, 2001; Pizzini, 2006). The empirical evidence suggests that the availability of resources positively affects ABC success (Anderson & Young, 1999; Shields, 1995). Furthermore, Brierley (2010) found that the availability of finance to fund product costing systems moderates the effect of the level of customization and COMP on CSC, in that customization and COMP do not execute a positive effect on CSC unless the finance required to fund the costing system is available.[3] Given the above, it can be argued that the availability of resources to fund the costing system is important when wishing to make any changes to the CSD, including those changes that make it compatible with the context's requirements. Without resources, it would be difficult for organizations to make the CSD changes required by the context that is represented by PC, IndirectCosts, COMP and IT quality. Thus, the following hypothesis will be tested:

H5: The effect of (a) PC, (b) IndirectCosts, (c) COMP and (d) IT quality on ABC adoption/CSC is moderated by the availability of finance to fund the costing system, such that the positive effect of PC, IndirectCosts, COMP and IT quality on ABC adoption/CSC is stronger when the availability of resources to fund the costing system is at a higher level.

3. METHODOLOGY

3.1. Strategy, Context and Non-Response Bias

The research required the collection of quantitative data from a large number of participants, which was then subjected to statistical analysis, thus the questionnaire survey strategy was used (Ryan, Scapens, & Theobald, 2002). The guidelines of Dillman, Smyth, and Christian (2014) were followed in the preparation and administration of the questionnaire. The selected context was Saudi Arabia due to the various changes that have occurred there, which make it an interesting subject for this research (Ministry of Commerce and Investment (MCI), 2013; Vision 2030, 2018). For example, Saudi Arabia has started making efforts to reduce its dependence on oil revenues and increasing the local content contribution. These efforts are best reflected in its national industrial strategy initiated in 2009 (Burton, 2016; Ministry of Commerce and Investment (MCI), 2009; Saudi Industrial Development Fund (SIDF), 2009), which is now part of the Vision 2030's National Industrial Development and Logistics Programme (Vision 2030, 2018). A significant facet of these efforts is the development of the manufacturing sector through developing

[3] Brierley (2010) found this relationship in an attempt to build a model for the influences on CSC using qualitative interviews. Hence, there has been no testing yet for the moderating role of the availability of resources.

the production technologies used and increasing product diversification (Vision 2030, 2018), which is expected to cause differences between the level of PC, IndirectCosts and IT quality among Saudi manufacturing businesses. Another example is the fact that Saudi Arabia joined the World Trade Organization (WTO) in 2005 (WTO, 2023), which is expected to modify the level of competition among Saudi manufacturing businesses. As a result of the variations in the contextual factors, discrepancies in CSD are expected, making the country a rich context in which to examine the effect of these and other contextual factors on CSD.

The questionnaire was distributed to 368 businesses extracted from the Saudi Industrial Property Authority (MODON) and Royal Commission for Jubail and Yanbu (RCJY) databases. Multiple phone and e-mail reminders were issued to non-respondents. A total of 233 responses (63.3%) were received, 200 (54.3%) of which did not have issues related to missing data, inconsistent answers, outliers and normality (Hair, Black, Babin, & Anderson, 2019; Tabachnick & Fidell, 2007) and were suitable for analysis. Checking for non-response bias through comparing early and late respondents regarding the contextual factors revealed no significant differences between the two groups (Armstrong & Overton, 1977; Van Der Stede, Young, & Chen, 2005).

3.2. Construct Measurement

The measures of the constructs employed in this research were adopted/adapted from the prior literature or developed by the researcher. Regarding the contextual factors, production complexity (PC) was developed by the researcher through: (1) conducting a literature review to identify the PC dimensions, and (2) conducting exploratory interviews with costing and production staff from eight Saudi manufacturing businesses regarding the identified PC dimensions. This process resulted in determining six PC dimensions: product customization (Bjørnenak, 1997), product complexity (Swenson, 1998), product diversity (Cooper, 1988), the frequency at which new products were introduced (Van Nguyen & Brooks, 1997), the frequency at which changes were made to the products and manufacturing processes (Cagwin & Bouwman, 2002), and the production period for products (Duh, Lin, Wang, & Huang, 2009). A five-point Likert-scale question containing 13 items was used to measure PC. The level of indirect costs (IndirectCosts) was measured as a percentage of the indirect manufacturing costs to total manufacturing costs (Brierley, 2007). The level of competition (COMP) was measured using a five-point Likert-scale question with three items adapted from Khandwalla (1972) and Drury and Tayles (2000). The extent of the information technology quality (IT quality) was measured using a five-point Likert-scale question with four items adapted from Swamidass and Kotha (1998) and Kotha and Swamidass (2000). These researchers used this question to measure the extent of advanced manufacturing technology (AMT) usage. Nevertheless, it can be used to measure the introduction of the new information technology element of IT quality (see, Cooper (1988)), which is the focus of this paper. This is because the question explores the extent of usage of new information technologies, such as computer-aided manufacturing and material requirement planning systems, which contribute toward increasing the amount of information available regarding the resources, products and production processes.

With respect to the facilitator factors, top management support (TMS) was measured using a five-point Likert-scale question with three items, adapted from Grover (1993); Premkumar and Potter (1995) and Krumwiede (1998b). For all the organizational culture dimensions, five-point Likert-scale questions were used. The five items for the outcome orientation dimension (CultureOutcome) were adopted from Baird et al. (2004) and Baird et al. (2007), the three items for the attention to detail dimension (CultureDetail) were adopted from Baird et al. (2007), and the eight items designed to measure the control dimension (CultureControl) were adopted from Baird et al. (2004). The availability of resources to invest in the costing system was measured with respect to business size using the number of employees (SizeEmployees). This is based on the assumption that the size of a business reflects the extent of the owned resources, with large businesses having more resources to invest in the costing system (Baird et al., 2004; Brierley, 2010; Chenhall, 2007; Van Nguyen & Brooks, 1997).

CSD was operationalized from two perspectives, namely ABC adoption and the CSC level (Al-Omiri & Drury, 2007). ABC adoption (ABC_adopt) was measured using a dichotomous measure of ABC usage versus ABC non-usage (Aljabr, 2020; Banker, Bardhan, & Chen, 2008; Innes & Mitchell, 1995; Maiga, Nilsson, & Jacobs, 2014; Schoute, 2011). The CSC level was measured using a composite measure of the number of cost pools and cost drivers (CSC_Composite) (Schoute, 2009).[4]

4. RESULTS AND DISCUSSION

4.1. Measurement Evaluation

The existing literature provides many guidelines that assist researchers in operationalizing constructs into reflective, formative and single-indicator constructs (for example, see (Diamantopoulos & Winklhofer, 2001; Hair et al., 2019; Petter, Straub, & Rai, 2007)). Based on these guidelines, the PC, IT quality and CultureControl constructs were operationalized as formative constructs because each of their indicators represents a specific facet of the conceptual domain of the constructs and, therefore, they are not interchangeable.[5] The COMP, TMS, CultureOutcome and CultureDetail constructs were operationalized as reflective constructs because the group of indicators of each construct represents a sample of all of the possible indicators available within the construct's conceptual domain, and therefore the indicators are interchangeable. IndirectCosts, SizeEmployees, ABC_adopt and CSC_Composite were operationalized as single-indicator constructs.

The formative constructs were assessed regarding content validity and collinearity issues among the indicators (Diamantopoulos & Winklhofer, 2001; Hair Jr, Sarstedt, Hopkins, & Kuppelwieser, 2014; Petter et al., 2007). Given the lack of a well-established PC measure, the content validity of PC was established by performing the following steps: (1) determine the construct's conceptual domain, (2) review the literature to create a comprehensive list of indicators that covers the construct's conceptual domain, and (3) gain feedback from experts regarding the appropriateness of the selected indicators (Diamantopoulos & Winklhofer, 2001; Hair et al., 2017). The content validity for IT quality and CultureControl was established through adopting their measures from prior literature (Petter et al., 2007). Regarding collinearity, the variance inflation factor (VIF) values for all of the formative indicators were under the threshold value of five (PC: 1.23 to 2.32, IT quality: 1.50 to 2.39, and CultureControl: 2.07 to 4.56) (Hair et al., 2017; Hair, Ringle, & Sarstedt, 2011), suggesting that there were no collinearity issues between the formative indicators of PC, IT quality and CultureControl.

The reflective constructs were assessed regarding the internal consistency reliability and convergent and discriminant validity (Hair et al., 2017; Henseler, Ringle, & Sinkovics, 2009) by employing confirmatory factor analysis with partial least squares (PLS) as the estimation method (Tenenhaus & Hanafi, 2010). SmartPLS software was utilized to conduct the analysis (Ringle, Wende, & Becker, 2015). The results shown in Table 2, Table 3 and Table 4 suggest that the reflective constructs met the quality criteria. The formative and reflective constructs' quality standards are not applicable to single-indicator constructs because the later constructs have a relationship of 1 with their single indicator, i.e., constructs and indicators share identical values (Hair et al., 2017). Hence, it can be assumed that the single indicator constructs of IndirectCosts, SizeEmployees, ABC_adopt and CSC_Composite can be safely used for the data analysis.

[4] To reduce the impact of univariate outliers, IndirectCosts was transformed using square root transformation, while SizeEmployees was transferred using the Log N transformation (Hair et al., 2019; Tabachnick & Fidell, 2007).

[5] In this research, it is assumed that formative constructs are represented by composite formative constructs instead of causal formative constructs. This is because the composite type of formative constructs is more appropriate for social science research than the causal type, as the former assumes that measurements represent an approximation rather than a full reflection of the theoretical concept (Hair, Hult, Ringle, & Sarstedt, 2017).

Table 2. The results for the reliability and average variance extracted.

Factor	Internal consistency reliability (suggested value between 0.70 and 0.95)		Convergent validity (suggested value of 0.50 or higher)
	Cronbach's alpha	Composite reliability	Average variance extracted
COMP	0.75	0.86	0.68
TMS	0.87	0.92	0.79
CultureOutcome	0.89	0.92	0.69
CultureDetail	0.83	0.90	0.75

Table 3. The results of the indicators loadings.

Suggested value of 0.70 or higher				
Indicator	COMP	TMS	CultureOutcome	CultureDetail
COMP1	0.90			
COMP2	0.89			
COMP3	0.66			
TMS1		0.85		
TMS2		0.92		
TMS3		0.89		
CulOutcome1			0.73	
CulOutcome2			0.86	
CulOutcome3			0.84	
CulOutcome4			0.88	
CulOutcome5			0.84	
CulDetail1				0.85
CulDetail2				0.88
CulDetail3				0.87

Table 4. The results of the discriminant validity (the Heterotrait-Monotrait [HTMT] ratio of the correlations)

Suggested values of 0.85 and lower				
Factor	COMP	TMS	CultureOutcome	CultureDetail
COMP				
TMS	0.14			
CultureOutcome	0.15	0.55		
CultureDetail	0.11	0.49	0.75	

4.2. Descriptive Analysis

Table 5 provides the descriptive results for the independent, moderator and dependent factors. Regarding the independent factors, Table 5 Panel A shows the mean and median values for PC (mean = 2.72, median = 2.69), IndirectCosts (mean = 23.00%, median = 21.00%) and IT quality (mean = 2.69, median = 2.75), indicating that the Saudi production environment is less complex, dominated by direct manufacturing costs and operated with low levels of IT quality, respectively. In contrast, the mean and median values of COMP are high (mean = 3.86, median = 4.00), which suggests that Saudi manufacturing businesses face high levels of competition.

With respect to the moderator factors, Table 5 Panel A shows that the mean and median values of TMS (mean = 4.10, median = 4.00) are high, meaning that the managers of Saudi manufacturing businesses provide support for costing systems. It also shows high mean and median values for CultureOutcome (mean = 4.00, median = 4.00), CultureDetail (mean = 3.92, median = 4.00) and CultureControl (mean = 3.45, median = 3.50). This indicates the strong presence of these organizational cultural dimensions in Saudi manufacturing businesses. Furthermore, Table 5 Panel A shows the range, mean and median values of SizeEmployees, which suggest the presence of small, medium and large businesses and, hence, the possession of low, medium and high levels of resources, respectively. Concerning the dependent factors, Table 5 Panel B shows that the number of ABC adopters is 19, representing 9.5% of respondents (n = 200), suggesting the limited usage of this complex costing system. For CSC_Composite,

Table 5 Panel A shows the range, mean and median values that suggest the existence of both simple and complex costing systems in Saudi manufacturing businesses.[6]

Table 5. Descriptive analysis.

Panel A						
Factor	**N**	**Mean**	**Median**	**Std. deviation**	**Minimum**	**Maximum**
PC	200	2.72	2.69	0.70	1.15	5.00
IndirectCosts	200	0.23	0.21	0.14	0.00	0.88
COMP	200	3.86	4.00	0.68	1.00	5.00
IT quality	200	2.69	2.75	1.15	1.00	5.00
TMS	200	4.10	4.00	0.77	1.33	5.00
CultureOutcome	200	4.00	4.00	0.69	1.60	5.00
CultureDetail	200	3.92	4.00	0.75	1.67	5.00
CultureControl	200	3.45	3.50	0.76	1.38	5.00
SizeEmployees	200	476.66	300.00	623.33	20.00	4500.00
CSC_Composite	200	5.85	6.00	3.45	0.00	15.00
Panel B						
ABC adoption	N	Percentage				
ABC adopters	19	9.50 %				
ABC non-adopters	181	90.50 %				

Table 6 displays the Pearson correlations for the research constructs. Regarding the correlation between each of the contextual and moderation factors on one hand and the CSD measures of ABC_adopt and CSC_Composite on the other, Table 6 indicates that PC and IndirectCosts have negative correlations with CSC_Composite, which does not conform with the prior findings in this area. In addition, Table 6 shows that COMP, CultureDetail and CultureControl do not correlate with ABC_adopt and CSC_Composite. However, the results support the prior findings, that TMS and SizeEmployees were found to be positively correlated with both ABC_adopt and CSC_Composite, while IT quality and CultureOutcome were found to be positively correlated with CSC_Composite. Additionally, many significant correlations were found between and among the contextual and moderation factors. For example, TMS was found to be positively correlated with IT quality, CultureOutcome, CultureDetail, CultureControl and SizeEmployees.

4.3. Moderation Analysis

To test the hypotheses, we utilized Statistical Package for the Social Sciences (SPSS) version 23 for a moderated regression analysis (MRA) (Dawson, 2014; Edwards, 2009; Hayes, 2013). The typical MRA model involves regressing the dependent factor (Y) on an independent factor (X), a moderator factor (Z) and an interaction term of both the independent and moderator factors (XZ) (Dawson, 2014; Hartmann & Moers, 1999), as shown in Equation 1.

$$Y = b_0 + b_1 X + b_2 Z + b_3 XZ + e \quad (1)$$

Z is assumed to change the relationship between X and Y (Dawson, 2014; Field, 2013; Hayes, 2013). To assess the support for the moderation effect of Z, XZ needs to be significant (Hartmann & Moers, 1999), and Z was not found to exert any moderating effect on the relationship between X and Y (ibid). In this research, the typical MRA model is extended to incorporate multiple independent factors (X_n) (Dawson, 2014). For each moderator factor (Z), the examined MRA model is represented by Equation 2 as follows:

$$Y = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 Z + b_6 X_1 Z + b_7 X_2 Z + b_8 X_3 Z + b_9 X_4 Z + e \quad (2)$$

[6] The descriptive analysis shown in Table 5 pertains to the original measures of IndirectCosts and SizeEmployees, rather than the transformed measures.

Table 6. The results of the Pearson correlations.

Factor	PC	Indirect Costs	COMP	IT quality	TMS	Culture Outcome	Culture Detail	Culture Control	SizeEmployees	ABC_adopt	CSC_Composite
PC	1.00	-0.04	0.14*	0.12	-0.03	0.10	0.11	0.13	-0.05	-0.02	-0.14*
IndirectCosts	-0.04	1.00	-0.05	-0.05	0.01	-0.01	-0.04	-0.05	-0.09	-0.03	-0.15*
COMP	0.14*	-0.05	1.00	0.00	0.11	0.12	-0.05	-0.01	0.01	0.02	0.06
IT quality	0.12	-0.05	0.00	1.00	0.29**	0.26**	0.21**	0.34**	0.25**	0.12	0.17*
TMS	-0.03	0.01	0.11	0.29**	1.00	0.48**	0.41**	0.45**	0.26**	0.17*	0.29**
CultureOutcome	0.10	-0.01	0.12	0.26**	0.48**	1.00	0.64**	0.57**	0.25**	0.10	0.16*
CultureDetail	0.11	-0.04	-0.05	0.21**	0.41**	0.64**	1.00	0.55**	0.06	0.00	0.09
CultureControl	0.13	-0.05	-0.01	0.34**	0.45**	0.57**	.55**	1.00	0.13	0.12	0.11
SizeEmployees	-0.05	-0.09	0.01	0.25**	0.26**	0.25**	0.06	0.13	1.00	0.22**	0.47**
ABC_adopt	-0.02	-0.03	0.02	0.12	0.17*	0.10	0.00	0.12	0.22**	1.00	0.44**
CSC_Composite	-0.14*	-0.15*	0.06	0.17*	0.29**	0.16*	0.09	0.11	0.47**	0.44**	1.00

Note: * Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

The various Xs represent the independent factors, which are PC, IndirectCosts, COMP and IT quality. Table 7 provides a qualitative summary of the results, which show that TMS, CultureOutcome, CultureControl and SizeEmployees do not moderate the relationship between any of the independent factors and the two CSD measures of ABC_adopt and CSC_Composite.

Hence, H1, H2, H4 and H5 are not supported. Given that the moderation models of these four facilitator factors, i.e., moderators, were insignificant, the direct models were tested by regressing Y on the Xs and Z only, excluding the interaction terms.

As Table 7 shows, the results for the moderator factors' direct effects showed that TMS and SizeEmployees positively influence ABC_adopt and CSC_Composite, while CultureOutcome and CultureControl do not have any impact on these two CSD measures.[7]

Collectively, these results provide no evidence of the moderating role of TMS, CultureOutcome, CultureControl and SizeEmployees regarding the relationship between the independent factors examined and the CSD measures, while that of TMS and SizeEmployees has an independent direct, positive influence on CSD, while keeping the independent factors constant.

The results in Table 7 show that CultureDetail moderates the relationship between each of PC, COMP and IT quality and CSC_Composite.

However, CultureDetail fails to moderate the relationship between IndirectCosts and CSC_Composite and the relationship between all independent factors and ABC_adopt. The detailed results regarding the moderation effects of CultureDetail are shown in Table 8.

A close examination of CultureDetail's significant moderation effects on the relationship between PC and CSC_Composite suggests that the results are opposite to expectations.

As shown in Figure 2, there is almost no relationship between PC and CSC_Composite at low values of CultureDetail, but the relationship turns to negative at high values of CultureDetail. Similarly, a close examination of CultureDetail's significant moderation effect on the relationship between IT quality and CSC_Composite suggests that the results are opposite to expectations.

Figure 3 shows that the positive effect of IT quality on CSC_Composite is stronger at low CultureDetail values compared to high CultureDetail values. The third significant moderation effect of CultureDetail, shown in Figure 4, is as expected, since the relationship between COMP and CSC_Composite is positive and stronger at higher CultureDetail values compared to lower values.

Interestingly, Figure 4 shows that this moderation effect in non-monotonic, as the relationship between COMP and CSC_Composite turns to negative at low levels of CultureDetail, suggesting that businesses cannot adapt to the CSC requirements of high COMP levels if the organizational culture, in terms of the attention to detail cultural dimension, is not compatible.

Overall, the existence of several insignificant moderation results combined with the mostly contradicted significant moderation results of CultureDetail indicate no support for H3.

Although the results revealed moderation effects of CultureDetail, the direct models were tested and showed that CultureDetail has no direct independent effect on both CSD measures.

Taken together, these results indicate that CultureDetail has neither a notable moderating role on the relationship between the independent factors examined and CSD measures nor a direct impact on the CSD measures.

[7] The detailed direct results are available from the author upon request.

Table 7. Summary of the moderation and direct results.

Outcome	**CSC_Composite**			**ABC_adopt**		
Moderator	**TMS**			**TMS**		
	Contextual factor	**Moderation effect**	**Direct effect**	**Contextual factor**	**Moderation effect**	**Direct effect**
	PC		-	PC		
	IndirectCosts		-	IndirectCosts		
	COMP			COMP		
	IT quality			IT quality		
	TMS	NA	+	TMS	NA	+
Moderator	CultureOutcome			CultureOutcome		
	Contextual factor	Moderation effect	Direct effect	Contextual factor	Moderation effect	Direct effect
	PC		-	PC		
	IndirectCosts		-	IndirectCosts		
	COMP			COMP		
	IT quality		+	IT quality		
	CultureOutcome	NA		CultureOutcome	NA	
Moderator	CultureDetail			CultureDetail		
	Contextual factor	Moderation effect	Direct effect	Contextual factor	Moderation effect	Direct effect
	PC	-	-	PC		
	IndirectCosts		-	IndirectCosts		
	COMP	+		COMP		
	IT quality	-	+	IT quality		
	CultureDetail	NA		CultureDetail	NA	
Moderator	CultureControl			CultureControl		
	Contextual factor	Moderation effect	Direct effect	Contextual factor	Moderation effect	Direct effect
	PC		-	PC		
	IndirectCosts		-	IndirectCosts		
	COMP			COMP		
	IT quality		+	IT quality		
	CultureControl	NA		CultureControl	NA	
Moderator	SizeEmployees			SizeEmployees		
	Contextual factor	Moderation effect	Direct effect	Contextual factor	Moderation effect	Direct effect
	PC		-	PC		
	IndirectCosts			IndirectCosts		
	COMP			COMP		
	IT quality			IT quality		
	SizeEmployees	NA	+	SizeEmployees	NA	+

Table 8. The results for CultureDetail's moderation effect on the relationship between the contextual factors and CSC_Composite.

Variable	**Unstandardized coefficients**		**Standardized coefficients**	**t**	**Sig.**
	B	**Std. error**	**Beta**		
Constant	6.04	0.24		25.59	0.00
PC	-0.61	0.24	-0.18	-2.56	0.01
IndirectCosts	-0.54	0.23	-0.16	-2.33	0.02
COMP	0.27	0.24	0.08	1.13	0.26
IT quality	0.60	0.24	0.17	2.47	0.01
CultureDetail	0.35	0.24	0.10	1.42	0.16
CultureDetailxPC	-0.60	0.25	-0.17	-2.38	0.02
CultureDetailxIndirectCosts	-0.03	0.29	-0.01	-0.11	0.91
CultureDetailxCOMP	0.62	0.23	0.19	2.69	0.01
CultureDetailxIT quality	-0.47	0.23	-0.15	-2.04	0.04
Adjusted R^2	0.12				
F value	4.03				
Sig.	0.00				

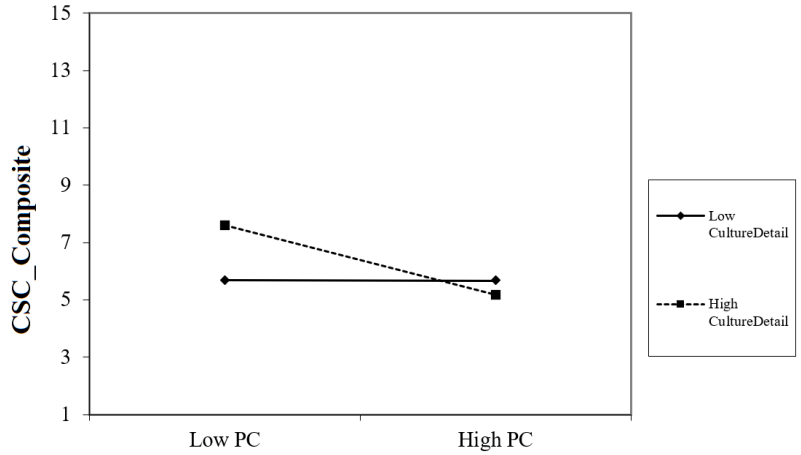

Figure 2. CultureDetail's moderation effect on the relationship between PC and CSC_Composite.

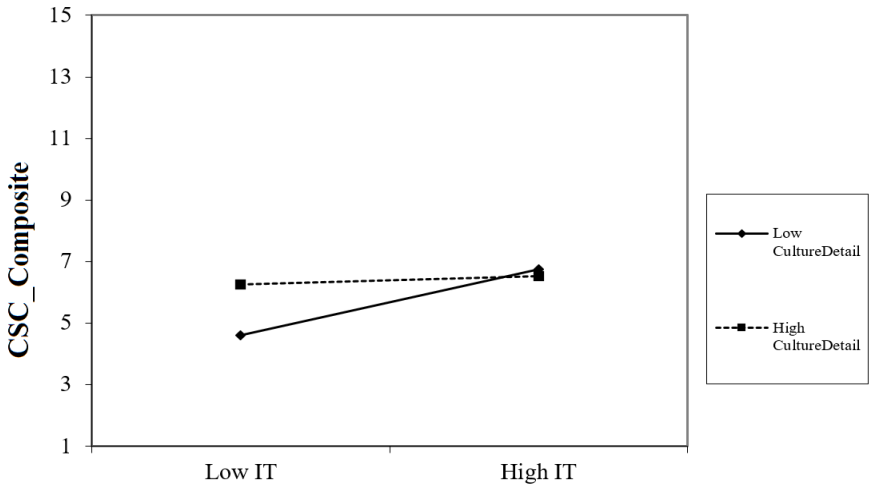

Figure 3. CultureDetail's moderation effect on the relationship between IT quality and CSC_Composite.

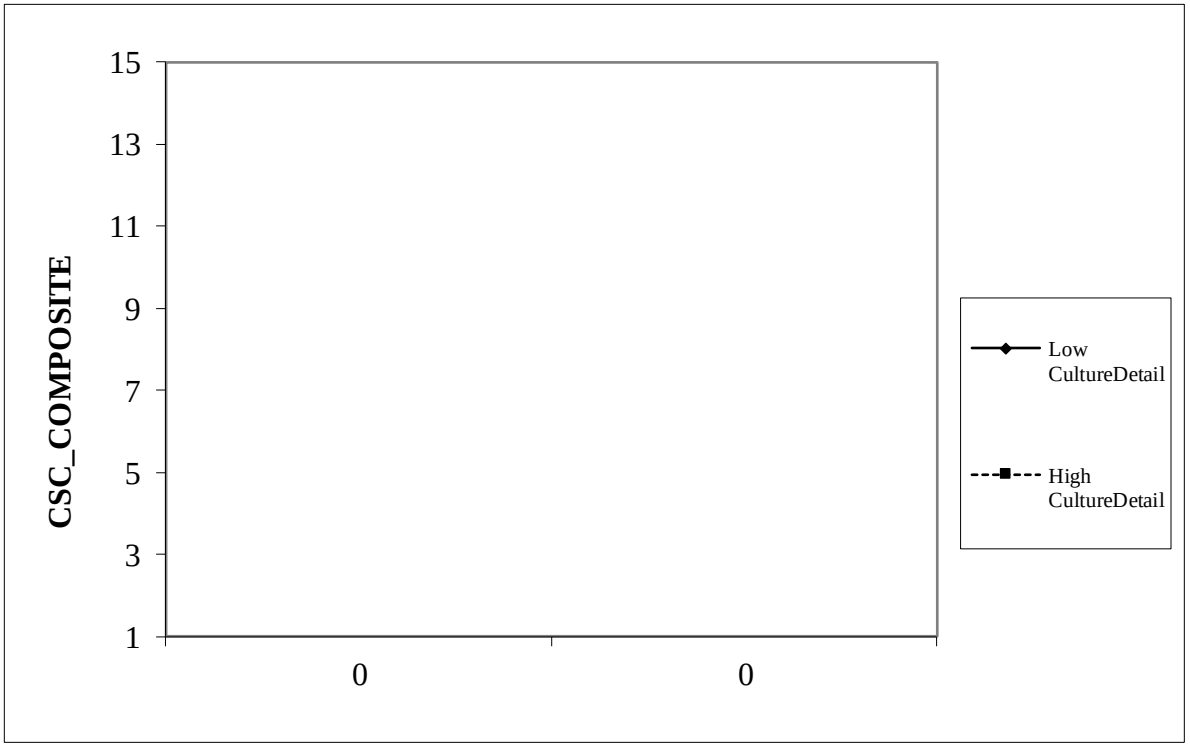

Figure 1: CultureDetail's moderation effect of on the relationship between COMP and CSC-COMPOSITE

The lack of significant moderating effects of TMS, CultureOutcome, CultureDetail, CultureControl and SizeEmployees may be due to the fact that, in the Saudi context, most of the required CSD changes – either increasing CSC or adopting ABC – to make the system compatible with the requirements of the contextual factors may be performed gradually and are, therefore, manageable and under the control of the cost accountant. This is due to the wide power distance that characterizes the national culture of Saudi Arabia, which can lead to businesses avoiding, and being risk-averse toward, new ideas and changes (Hofstede, 1984), including those related to CSD (Aljabr, 2020). The above suggests that TMS, a suitable organizational culture, and resources are not necessarily needed to adjust the CSD in many circumstances. They may only be required when undertaking an abrupt overhaul of the costing system.

Another possible reason is that, in the Saudi context, the decisions regarding CSD changes through increasing the level of CSC or adopting ABC might not be made based on the efficient choice perspective, which assumes that businesses are free to make these decisions and are certain about their goals and how CSD changes contribute toward the attainment of these goals (Abrahamson, 1991; Malmi, 1999). In addition, decisions regarding CSD changes in the Saudi context might not be made under the forced selection viewpoint (Abrahamson, 1991; Mohammad Al-Omiri & Al-Qura, 2012) given that there are no regulations or mandates enforced by governmental organizations in Saudi Arabia regarding the CSD that businesses must follow. However, decisions regarding CSD changes in the Saudi context may be made based on the fad perspective, which assumes that businesses: (1) are uncertain about their goals and unable to assess the role of CSD changes in accomplishing these goals, and (2) influence each other to make CSD change decisions with the aim of appearing legitimate or as protection against the risk of competitive advantage being gained by competitors as a result of making CSD change decisions (Abrahamson, 1991; DiMaggio & Powell, 1983; Malmi, 1999). In addition, CSD change decisions in the Saudi context may also be made based on the fashion perspective, which is similar to the fad perspective, except that the influence on CSD change decisions is assumed to come from organizations that do not have the potential to be involved in such decisions, e.g., business schools, consulting companies, and professional organizations (Abrahamson, 1991; Malmi, 1999). The applicability of both the fad and fashion perspectives in the Saudi context can be expected given the dominance of family-owned businesses (Burton, 2016; Hanware, 2016; Joshi, Bremser, Deshmukh, & Kumar, 2011; Schumpeter, 2016), which leaves room for irrational decisions, including the imitation of other businesses' costing systems without clear reasons (Aljabr, 2020). This suggests that the owners of Saudi businesses might support enhancing the readiness of the business in terms of the facilitator factors to implement CSD changes without regard for the needs of the surrounding context. Hence, the moderating role of the facilitator factors regarding the effect of the context on CSD cannot be observed. Although Al-Omiri (2012) found that the efficient choice perspective was the main motive for applying ABC in Saudi businesses during various periods before the study, the study sample was small (n = 75) and the motives might have changed since the study was conducted. In this regard, Malmi (1999) provided evidence of the influence of the fashion and fad perspectives along with efficient choice in the phases following the initial phase of the diffusion or change process.

Another possible reason why some of the hypotheses are not supported may be the measures adopted to assess either the independent, moderator or outcome variables. For example, the developed PC measure may have not uncovered all of the important facets of the construct, even though the development process of the PC measure involved multiple stages. The IndirectCosts measure may have been inappropriate as it included all levels of indirect costs, i.e., unit, batch, product and facility levels (Cooper, 1990). The IndirectCosts measure should have included the proportion of batch- and product-level costs that require high levels of CSC to assign them to products accurately and also should have included the non-manufacturing component of indirect costs (Al-Omiri & Drury, 2007; Aljabr, 2020). The TMS measurement can be refined with the measure used by Dong et al. (2009), where important TMS actions are included. These TMS actions include providing key resources, enhancing organizational receptivity to any new change, and ensuring that the lower-level managers gain a common

understanding of the vital objectives and principles related to the changes. Dong et al. (2009) found that these TMS actions impact the outcomes of enterprise resources planning (ERP) implementation in a different manner. The availability of finance to fund the costing system can be measured using a direct measure rather than the indirect measure of SizeEmployees. The composite measure could have accommodated other aspects of CSC, such as the number of resource drivers used to assign indirect costs to cost pools in the first of the two stages of the overhead assignment procedure (Cooper & Kaplan, 1991; Drury, 2018).

Regarding the direct effect of the contextual factors on CSD, the direct models tested above showed that PC and IndirectCosts have a negative effect on CSC_Composite, IT quality has a positive impact on CSC_Composite, and COMP has no effect on CSD (see Table 7). The positive effect of IT quality conforms with the literature, while the negative effects of PC and IndirectCosts and the insignificant effect of COMP do not. The unexpected negative effect of PC and IndirectCosts and the insignificant, direct influence of COMP might be attributed to the existence of untested moderation effects on the relationship between these contextual factors and CSD or the measures used.

Comparing the current results with those of prior research reveals the following: First, this research provides new insights regarding the moderation effect of various facilitator factors on the relationship between the contextual factors and CSD. Second, the findings provide evidence regarding the direct, positive effect of the facilitator factors of TMS and SizeEmployees on CSD, which agree with the majority of the prior studies (Al-Omiri & Drury, 2007; Brierley, 2007; Brown et al., 2004; Maelah & Ibrahim, 2007; Nassar et al., 2009). Third, the results regarding the insignificant effect of the facilitator factor of organizational culture on CSD contradict the findings of previous studies, which found support for the effect of one or more dimensions of organizational culture (Baird et al., 2007; Baird et al., 2004; Zhang et al., 2015). Fourth, the results identified the direct, negative effect of PC and IndirectCosts and the insignificant effect of COMP on CSD, which contradict the findings of the majority of previous studies (PC (Drury & Tayles, 2005; Malmi, 1999); IndirectCosts (Brierley, 2007; Jusoh & Miryazdi, 2015); COMP (Al-Omiri & Drury, 2007; Van Nguyen & Brooks, 1997) but agree with those of another group of studies (PC (Mazbayeva et al., 2022); IndirectCosts (Pokorná, 2015); and COMP (Brierley, 2011). Lastly, this research provides results regarding the direct, positive effect of IT quality on CSD that agree with several studies (Krumwiede, 1998b) but contradict others (Al-Omiri & Drury, 2007).

5. CONCLUSION

The underlying idea of contingency theory is that the compatibility of CSD with the context's requirements plays an important role in obtaining optimal overall performance (Burkert et al., 2014; Cooper, 1988; Drury, 2018; Ittner et al., 2002; Pizzini, 2006; Schoute & Budding, 2017; Stuart, 2013). This has triggered research on the influence of a range of factors, most notably PC, IndirectCosts, COMP and IT quality, on CSD in search of their importance to CSD (e.g., (Clarke et al., 1999; Drury & Tayles, 2005; Gosselin, 1997)). Yet, the results of this research are inconsistent, thereby raising the question of "when do the contextual factors execute their effect, if any, on ABC adoption and CSC?" To understand this inconsistency and answer this question, several studies have investigated moderation factors' role on the relationship between contextual factors and CSD (Abernethy et al., 2001; Hadid & Hamdan, 2022; Schoute, 2011). Nevertheless, there has been little examination of the moderating role of multiple factors that act as facilitator factors to adopt the intended CSD. Such an examination would help to identify the role of facilitator factors in the process of creating compatible CSDs that contribute to achieving optimal performance. Given the above, this paper drew on contingency theory to examine the moderating impact of multiple facilitator factors, namely TMS, organizational culture, and the availability of resources to fund the costing system, on the impact of the key contextual factors of PC, IndirectCosts, COMP and IT quality on CSD, as defined by ABC adoption and CSC.

By utilizing questionnaire data collected from Saudi manufacturing businesses, the analysis provided two main sets of results that contribute to the existing literature on CSD. First, the results did not find any support for the

moderating role of the facilitator factors regarding TMS, CultureOutcome, CultureDetail, CultureControl and SizeEmployees on the relationship between the contextual factors and CSD. Nevertheless, it showed that the facilitator factors of TMS and availability of resources represented by SizeEmployees have positive direct effects on CSD that are independent of the contextual factors' impact on CSD. The second set of results adds to the inconsistency of the CSD results. Specifically, it showed that the contextual factors of PC and IndirectCosts have a contradictive direct, negative effect on CSD, COMP does not exert any direct influence on CSD, while IT quality has a direct, positive impact on CSD.

This research has theoretical and practical implications. At the theoretical level, it emphasizes the importance of accounting for facilitator factors that can either support or fail to support the implementation of CSDs that are aligned with the surrounding context. In this regard, it demonstrates how to incorporate facilitator factors into CSD models by including them as moderator variables that affect the relationship between the contextual factors and CSD. In practice, this research confirms the importance of the facilitator factors of TMS and the need to provide the required resources to increase the complexity of the costing systems. However, this study failed to provide any evidence of the moderating role of the facilitator factors in the relationship between the contextual factors and CSD. In relation to the contextual factors, this research assures practitioners of the importance of enhancing the quality of IT in order to increase CSC. This research also demonstrates to practitioners that CSDs are negatively associated with PC and IndirectCosts and are not related to COMP. Overall, the initial practical implications need to be taken into account in future research to investigate their applicability in various settings.

This research has various limitations, which future research can validate and improve upon. First, although efforts have been made to use representative measures, there is room for further refinement of the measures employed for the contextual, moderator and outcome variables, as explained in Section 4.3. Therefore, to validate the results, future research should replicate this research using refined measures of the contextual, moderator and CSD factors. Second, this research was based on a sample drawn from the Saudi manufacturing industry and, hence, the findings cannot be generalized to the Saudi non-manufacturing industry or other national manufacturing and non-manufacturing industries. Accordingly, future research should repeat this research in other contexts to validate its findings. Third, although the questionnaire survey strategy used was deemed appropriate for achieving the research aim, the amount of interaction between the researcher and the participants to explain the unexpected findings is limited using this strategy. Thus, future research should utilize the explanatory sequential design of the mixed methods research strategy that includes a quantitative stage supplemented by a qualitative stage (Brierley, 2014; Creswell, 2014). This will enable researchers to more effectively explain any unexpected findings, such as those found in this research.

Despite the above limitations, this study contributes to CSD literature by examining the moderating role of various facilitator factors regarding the influence of the contextual factors of PC, IndirectCosts, COMP and IT quality on CSD. It is hoped that this paper will open up research avenues regarding the matching of CSD with its context, an important matching for achieving optimal performance.

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Institutional Review Board Statement: The Ethical Committee of the KingFaisal University, Saudi Arabia has granted approval for this study on 18 May 2023 (Ref. No. KFU-REC-2023-MAY-ETHICS853).
Transparency: The author states that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.
Data Availability Statement: Upon a reasonable request, the supporting data of this study can be provided by Abdulrahman Aljabr.
Competing Interests: The author declares that there are no conflicts of interests regarding the publication of this paper.

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