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Sustainability Practices and Performance in the Manufacturing Sector: The Role of Paradoxical Mindset

Ismail Droup[1], Ahmad Jusoh[2], Sami Ahmed Alghamdi[3], Khalil Md Nor[4]

Abstract

Sustainability has recently become a key to long-term business success. Firms are applying sustainability practices to improve their sustainable performance. However, the application of these practices has led plant managers to face the competing demands of sustainability objectives. A paradoxical mindset may help these manager to respond to such competing demands. However, the existing literature lacks empirical research on the role of a paradoxical mindset in sustainability practices and related performance paths. To fill this research gap, our paper aims to test the direct relationship between sustainability practices and connected performance. Furthermore, the study also aims to explore how a paradoxical mindset affects this direct relationship. The data was collected from 224 manufacturing plants and analyzed using Structural Equation Modeling (SEM-Smart-Pls). The findings revealed that Sustainability practices positively influence economic, environmental performance, and social performance. Furthermore, this study discovered that a paradoxical mindset moderates the relationships between sustainability practices and environmental performance. however, the study did not find any empirical evidence to support the effect of the interaction of paradoxical mindsets and sustainability practices on social performance. This study attempts to fill certain gaps in operations management literature and provides researchers and manufacturing managers with a deeper understanding of the roles of sustainability practices and the paradoxical mindset of the plant' managers in the manufacturing sector.

Keywords: *Sustainability performance, sustainability practices, paradoxical mindset, triple bottom line, economic performance, environmental performance, and social performance.*

Introduction

Sustainable development has become a very popular field of research in the last decade. Driven by social changes, environmental deterioration, and accompanying public interest, sustainability is becoming a key topic among academic researchers and practitioners (Mensah, 2019). Scientific research on sustainability can help firms approach sustainability principles to meet the expectations of their current shareholders and, at the same time enhance the natural resources and social assets for future generations (Büyüközkan and Karabulut, 2018). In the context of operations management, sustainability provides manufacturing firms with opportunities to contribute to a sustainable development mindset. These opportunities, However, require more studies that develop or test theories to help those plants achieve superior sustainability performance outcomes. Sustainability performance refers to integrating three dimensions, including environmental performance, economic performance, and social performance (Norman and MacDonald, 2004). However, literature has shown that most manufacturing organizations mainly focus on achieving economic performance leaving, behind environmental performance and social performance, creating an imbalance among these dimensions (Khan *et al.*, 2021; Muñoz and Cohen, 2018; Phan *et al.*, 2020).

Economic performance includes economic value added, such as return on assets and profit (Fauzi *et al.*, 2010). In recent years, firms no longer rely economically on their operations (Haddach *et al.*, 2016). Other obligations have grown, and firms are never again restricted to including direct shareholders but rather integrate different stakeholders (Haddach *et al.*, 2016). From the stakeholders' viewpoint, sustainability performance measures the degree to which firms deliver economic, environmental, and social benefits (Artiach *et al.*, 2010; Lee and Ha-Brookshire, 2018; Wagner *et al.*, 2002). According to Elkington (1998), to drive firms towards sustainability performance, this calls for major changes in the firms' focus on the

[1] Sudan Technological University, Department of Administrative and social Sciences Technology, Omdurman Almlazmin,11111 Khartoum, Email: droup81@gmail.com, (Corresponding Author)
[2] Azman Hashim International Business School, Universiti Teknologi Malaysia, 81310, Johor Bahru, Malaysia, ahmadj@management.utm.my.
[3] Department of Business administration, College of Business, University of Bisha, Bisha 67845, Saudi Arabia, samig@ub.edu.sa
[4] Azman Hashim International Business School, Universiti Teknologi Malaysia, 81310, Johor Bahru, Malaysia, m-khalil@utm.my.

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dimensions of the triple bottom line. Hence, it is critical to gain an understanding of how manufacturing firms improve their sustainability performance from a triple-bottom-line persustainability performanceective. However, there is still a lack of studies that address sustainability performance based on the triple bottom approach, which takes the three dimensions of sustainability asustainability performance into account (Abdul-Rashid *et al.*, 2017; Henao *et al.*, 2019). In this paper, sustainability performance is defined as the extent to which manufacturing firms have managed to achieve economic performance, environmental performance, and social performance. Economic performance was operationalized as the extent to which manufacturing firms managed to achieve financial benefits (Sajan *et al.*, 2017). Environmental performance is defined as the extent to which manufacturing plants have managed to reduce the harmful manufacturing impact of their process on the natural system (Sajan *et al.*, 2017; Yang *et al.*, 2011). Social performance is operationalized as the extent to which manufacturing plants have managed to improve the quality of life for their employees and the surrounding community.

Literature has also shown that growing sustainability awareness among stakeholders forces manufacturing plants to seek out sustainability practices to achieve dispered sustainability performance outcomes (Abdul-Rashid *et al.*, 2017; Adam *et al.*, 2019; Afum *et al.*, 2020; Agan *et al.*, 2013; Ahmad *et al.*, 2020; Busu and Nedelcu, 2018; Gimenez *et al.*, 2012; Habidin *et al.*, 2013; Khan *et al.*, 2021). Sustainability practices are defined as a group of actions/activities executed by one organization in a specific context and driven by a sustainable value (Pham and Kim, 2019). To apply sustainability practices, manufacturing plants need to avoid destroying the natural and human systems in their manufacturing operations and processes while creating economic value for their shareholders (Gao and Bansal, 2013). Accordingly, the objectives of sustainability practices should not be only for economic values, but environmental and social values should also be considered in an integrated manner (e.g. triple bottom line) (Evans *et al.*, 2017). However, the applications of sustainability practices based on the triple bottom line view render manufacturing firms face situations in which they need to address competing demands of sustainability objectives (i.e. economic, environmental, and social) simultaneously (Hahn *et al.*, 2014b). Surprisingly, firms differ in their sustainability practices and applications, and many of them put economic objectives ahead of social and environmental objectives (Hahn *et al.*, 2014b; Hockerts, 2015; Sharma and Jaiswal, 2017). How firm managers address sustainability objectives might explain the differences in in sustainability practices and the outcomes associated with them. This means that firms differ in how they apply sustainability practices, which leads to the differences in the level of sustainability performance outcomes. These differences can be attributed to how manufacturing addresses sustainability objectives, i.e., by either prioritizing economic objectives over social and economic ones or addressing all three dimensions based on the trible bottom line.

Current literature has adopted the paradox theory of Smith and Lewis (2011) to explain how manufacturing firms respond to the competing demands of sustainability objectives. Such theory posits that the effectiveness of addressing the competing demands of sustainability objectives (i.e., economic, environmental and social) depends on their paradoxical mindset (Hahn *et al.*, 2017; Hahn *et al.*, 2014b; Sharma and Jaiswal, 2018; Van der Byl and Slawinski, 2015a). Paradoxical Mindset is operationalized as the extent to which manufacturing plants respond (i.e. accept, value, and work comfortably) to accommodate competing demands of sustainability objectives (Miron-Spektor et al., 2018). However, the literary work in this domain has remained conceptual, and some of them call for empirical research to address how firms can react to the competing demands of sustainability objectives from an organization's paradox viewpoint (Hahn *et al.*, 2018; Hahn *et al.*, 2014b; Sharma and Jaiswal, 2018; Van der Byl and Slawinski, 2015a). To fill this research knowledge gap, this research paper introduces a paradoxical mindset variable to explain the variances in the applications of sustainability practices and related performances in the context of manufacturing firms in Sudan.

The two main objectives of this research paper are: (1) to empirically investigate the direct relationships between Sustainability practices (e.g., economic, environmental, and social) and sustainability performance (e.g. economic performance, environmental performance, and social performance). (2) to investigate the moderating effect of a paradoxical mindset on sustainability practices and environmental and social performance. The findings of this paper attempt to fill the imbalance of sustainability gaps in the existing

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operations management literature and help researchers and plant managers better understand the positive effects of sustainability practices applications and the role of plant managers across the manufacturing process. The remainder of the research paper is organized as follows: The second section reviews the literature, explaining the relationship between sustainability practices and related performance, leading to a research hypothesis development and research model. The third section explains the methodology that has been used to analyse the data. The fourth section illustrates the analysis and results. The fifth section provides a discussion of the findings. The final sections are about conclusion, contribution, and future research.

Literature Review and Hypothesis Development

Sustainability Practices and Performance

The term practice is associated with several relatively similar terms, such as actions, interactions, and activities (Silva and Figueiredo, 2017). Sustainability can be practical because it depends on existing organizations to carry out actions that enable sustainability to happen (Silva and Figueiredo, 2017). Practice is a repeated action that eventually becomes rooted in one's daily routine. Sustainability practices are a group of actions or activities executed by manufacturing firms and driven by sustainable value (Pham and Kim, 2019). Miska *et al.* (2018) defined sustainability practices as the framework of activities\ and actions that contribute to economic, social, and environmental causes. Accordingly, sustainability practices are conceptualized as three-dimensional attributes of economic, environmental, and social dimensions (Pham and Kim, 2019). Economic practices refer to the degree to which manufacturing plants undertake activities that consider the economic aspect (i.e., the survival of the manufacturing plants in the marketplace, maintaining stable cash flow, providing important products for consumers, and profitability) when running their manufacturing operations (Uddin *et al.*, 2008). Environmental practices refer to the extent to which manufacturing plants undertake actions to improve the harmful impact of their manufacturing process (Gimenez *et al.*, 2012). Relying on Gimenez *et al.* (2012), social practices refer to the extent to which the manufacturing plant undertakes socially related actions to enhance their employees' well-being. These socially-related actions entail providing employees with health and safety, education, and positive working conditions, as well as wages as well as wages and perspectives.

According to contemporary research, sustainability practices and related performance relationships have been approached from two research stream viewpoints. The first research stream has addressed this issue from a business-case perspective. Most of these researchers' findings supported the significant relationship between sustainability practices and related sustainability performance (Hajmohammad *et al.*, 2013; Yang *et al.*, 2013; Zhan *et al.*, 2018; Zhu and Sarkis, 2004). In contrast, some researchers have presented mixed or non-significant findings, e.g., (Graham and Potter, 2015; Li *et al.*, 2016; López-Gamero *et al.*, 2009; Pullman *et al.*, 2009; Schoenherr, 2012). In the business case approach, the focus is on the shareholders' values, in terms of profit maximization with limited attention to social and environmental dimensions. Accordingly, in the business case approach, sustainability objectives are dominated by economic objectives, which may lead to success in a short period of time (Gao and Bansal, 2013). However, in the long term, sustainability performance requires all three sustainability dimensions to be satisfied simultaneously (Elkington, 1998). The second research stream examined the relationship between sustainability practices and related sustainability performance from a triple-bottom-line view. This view gives equal weight to sustainability elements (i.e., economic, environmental, and social), and most of the researchers supported the significant positive relationship (Abdul-Rashid *et al.*, 2017; Gupta *et al.*, 2018; Wijethilake, 2017b). Hence, our paper argues that the triple bottom line approach tends to be more effective for the manufacturing process than the business case approach. This is because, to be sustainable, firms need to avoid destroying the natural and human systems while creating economic value for their shareholders (Gao and Bansal, 2013).

Manufacturing firms, as open systems, use resources from a natural system to produce consumer products through the production process (Fiksel *et al.*, 2014). The production process generates manufacturing waste and emissions (e.g., solid waste, toxic waste, air pollution, and water pollution), which are deposited into the environment (Fiksel *et al.*, 2014). Communities consume the products supplied by manufacturing firms and generate additional waste that may be recycled into manufacturing systems or deposited into the

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environment (Fiksel, 2012). Accordingly, these linkages between manufacturing plants, the natural environment, and the community, identify the pathways for creating three types of value (i.e., economic, environmental, and social) (Fiksel, 2012; Fiksel *et al.*, 2014). Work practices in terms of sustainability practices could maximize these values, by running the operations economically, reducing the harmful manufacturing impact and enhancing employees' well-being. Based on social-technical work practices, manufacturing practices are usually divided into three best work practices (technical (i.e., economic), social and environmental) to support efficient production (Qureshi et al., 2019). Besides the social and technical factors, social-technical work practices have been extended to include the environmental factor (Qureshi et al., 2019).

Manufacturing firms also have to balance their work practices to improve the natural environment and the community's well-being while considering the technical asustainability and economic performance of their practices. Evaluating sustainable performance outcomes requires attention to all these dimensions because sustainable value co-creation should reflect them (Sadok and Welch, 2017). Recognition of these imperatives can be found in the social-technical theory, which puts forward evidence for the contextual analysis' relevance. Attaining high levels of quality in environmental and social performance requires organizational work practices that ensure an alignment between these economic, environmental, and social practices underlying the improvement initiatives undertaken by manufacturing firms (Chaudhuri and Jayaram, 2019). It has been suggested by Magon *et al.* (2018) that analyzing the impact of external and internal sustainable operation practices separately or jointly can enrich the understanding of the direct effects of sustainable operation practices on sustainability performance. Gaiardelli *et al.* (2019). Therefore, in response to those calls, this research model focuses on internal Sustainability practices and their relationship to sustainability performance.

The achievement of a high level of sustainability performance depends on the patterns of Sustainability practices. The first fundamental component of sustainability performance is Economic performance (Khan *et al.*, 2021). The high level of such financial benefits relies on the extent to which manufacturing plants carry out actions that add economic value, improving the harmful manufacturing impact and employees' well-being (Pham and Kim, 2019). For instance, the extent to which those plants consider the economic aspect when it is running their operations, in terms of efficiency, productivity, survival, healthy cash flow, and profitability, will determine the degree of economic performance achievement. In addition to considering economic initiatives, the application of environmental practices in the manufacturing process would reduce energy and water costs. For example, recycling and reuse would reduce waste costs and help avoid costs required to correct environmental damage (Pullman *et al.*, 2009). Environmental practices can also lead to production efficiency, lower raw material costs, and corporate image' improvement (Ninlawan *et al.*, 2010). The improvement of the manufacturing process can result in reduced process operations costs, market advantages, higher revenues, and new market opportunities (De Giovanni, 2012). Finally, practices could be carried out to improve employment and working conditions across the plant (Perrini *et al.*, 2007), which may increase the human capital that provides economic benefits to companies by providing basic skills, safety, and healthy and better work environment conditions for the employees (Fiksel, 2012). Firms that adopt such practices to improve employee safety and working conditions can achieve cost savings from less absenteeism and fewer manufacturing accidents (Gimenez et al., 2012). According to Molamohamadi and Ismail (2014), firms that adopt Social performances are likely to reduce operational costs.

H1: Sustainability practices have a positive relationship with economic performance.

The second essential component of sustainability performance is environmental performance (Khan *et al.*, 2021) It assesses the degree to which manufacturing plants have managed to reduce the harmful manufacturing impact of their process on the natural system (Sajan *et al.*, 2017; Yang *et al.*, 2011). Accordingly, the effective implementation of such sustainability practices will lead to a great level of economic performance. For example, environmental practices should enhance the utilization of materials and energy usage, reduce manufacturing waste, and reduce harmful emissions. Social practices such as employees' education, wages, health and safety, positive working conditions, and perquisites are necessary to increase the levels of employee's abilities knowledge and skills (Marimuthu *et al.*, 2009). (Govindarajulu and Daily, 2004). Moreover, those types of employees are more likely to participate in improving the

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harmful impact of the manufacturing process (Govindarajulu and Daily, 2004). The literature on operations management highlighted the implications of sustainability practices for environmental performance. For instance, Wijethilake (2017a) revealed that a proactive sustainability strategy is positively and significantly related to environmental performance. Green *et al.* (2012). Hajmohammad *et al.* (2013) indicated a positive and significant link between environmental practices and environmental performance. In the same vein, Hami *et al.* (2015) confirmed that sustainable manufacturing practices positively and significantly impact Environmental performance. To summarize, based on the abovementioned discussion, the applications of sustainability practices (i.e. economic practices, environmental practices, and practices) are expected to increase the level of environmental performance.

H3: Sustainability practices have a positive influence on environmental performance.

The third essential component of sustainability performance is social performance (Khan *et al.*, 2021). It assesses manufacturing plants' performance on social indicators, e.g., training and development, health and safety, working conditions, and other employee-related benefits. A company running with an efficient economic aspect is expected to provide extra funds for the employees' well-being investment (Scholtens, 2008). Hence, the adoption of sustainability practices in terms of economic practices is expected to have a positive effect on the social systems. For example, the healthy cash flow and the manufacturing plants' survival in the market may improve the quality of life for employees and the surrounding community (Gimenez *et al.*, 2012). Besides economic practices, environmental practices may also influence the workers' health and productivity at work (Molamohamadi and Ismail, 2014). Regarding social practices**,** firms undertake actions to improve the impact of their operations and processes on both internal (e.g. employees) and external social systems (e.g. community) (Pullman *et al.*, 2009). Implementing those social practices in terms of employee safety and working conditions will most probably improve employees' occupational health and safety, development, skills, and social reputation. Social practices can also maximize job satisfaction, which contains benefits measured such as wages and so on. Such sustainability measures also impact job satisfaction and include the design of the workplace, accident prevention, and ergonomic stress (Jaehn, 2016).

H3: Sustainability practices have a positive relationship with firms' social performance.

The Moderating Effect of a Paradoxical Mindset

Based on Gaim (2018), a paradoxical mindset is the set of emotional and cognitive factors that firm members use to make sense of competing demands and respond accordingly. These cognitive and emotional dimensions give grounds for a behaviour or action. Further, Raza-Ullah (2018) explained that emotions (feelings) and cognition (thinking) are closely connected. Therefore, the interaction between emotional and cognitive factors shows managerial responses. Accordingly, how firm members make sense of the competing demands of sustainability objectives is guided by their paradoxical mindset, which reflects their behaviours in responding to such demands (Gaim, 2018). The idea of the moderating role of a paradoxical mindset is not new. Miron ektor et al. (2018) tested the moderating role of paradoxical mindset in the relationship between resource scarcity tensions and job performance and innovation, the results showed that when employees experience tensions, those with high paradoxical mindset scores are more likely to approach tensions as opportunities for gaining energy. Therefore, those employees search more broadly for integrative solutions, thereby enabling superior job performance and innovation. In contrast, employees who lack a paradoxical mindset are trying to eliminate tensions by leaving fewer resources available for performing their jobs. Besides that, Ingram et al. (2016) confirmed that a paradoxical mindset moderates the relationship between a managing family business and innovative behaviour. When firm leaders engage in paradoxical thinking, they are more likely to manage these tensions to become innovative. Consequently, they suggested that paradoxical thinking plays a fundamental role in encouraging innovative behaviour.

The paradox theory explains how repeated sustainability responses to competing demands enable sustainability. This theory has three key features: (1) a paradoxical tension, (2) managerial responses to such paradoxical tensions, and (3) the impact of the managerial response on sustainability outcomes (Smith and

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Lewis, 2011). Tension refers to competing elements such as contradictory demands, goals, interests, and perspectives (Hahn et al., 2014a; Miron-Spektor et al., 2018; Van der Byl and Slawinski, 2015a). The fact is that when firms' managers are faced with multiple competing demands, they make sense of them (Gaim, 2018). There are some organizational factors such as organizational design, process design, and resource allocation (i.e., financial resources, human resources and time) that activate tensions to be salient (Hahn et al., 2014a). In the context of sustainability practices, manufacturing managers experience tensions from competing demands that arise from addressing sustainability objectives (e.g., economic, environmental, and social). For instance, competing demands of sustainability exist between efforts to increase productivity and competitiveness on the one hand and to maintain better occupational health and safety for employees and environmental protection on the other hand (Maalouf et al., 2019; Van der Byl and Slawinski, 2015a). Hence, these competing objectives cause managers to face situations in which they need to address different needs (Smith, 2014).

Firm members make sense of competing demands and react accordingly based on their paradoxical mindset (Gaim, 2018; Miron-Spektor et al., 2018; Zhang et al., 2015; Zheng et al., 2018). The current literature classifies firm members' reactions to the tensions of competing demands as either proactive or defensive (Karhu and Ritala, 2018a; Miron-Spektor et al., 2018; Smith, 2014; Zheng et al., 2018). The proactive managerial responses include accepting, accommodating and integrating. Acceptance means learning to live with the paradoxical tensions by accepting their existence (Karhu and Ritala, 2018a). Accommodating is about creating creative synergies that tackle competing demands together (Smith, 2014). Confrontation means creating a context in which the firms can discuss work demands and find solutions (Karhu and Ritala, 2018a). On the other hand, the defensive reaction includes avoiding or dominating. Avoidance entails blocking the awareness of the competing demands and refusing to recognize them. Dominating entails favouring one object at the expense of others based on a one-sided power dynamic (Gaim, 2018).

Accordingly, manufacturing plants' members may differ in how to respond to the competing demands of sustainability objectives, which may explain the variance concerning the level of sustainability practices applications and related sustainability performance. Those with a high*ly* paradoxical mindset might respond proactively to the competing demands of sustainability objectives in terms of taking more actions aimed at reducing harmful manufacturing impacts and improving employees' well-being, in line with the economic considerations. Based on the study of Zheng *et al.* (2018), a paradoxical mindset allows managers to foster coexisting parts of the economic, environmental and social objectives. Therefore, those managers can sustain their manufacturing plants' performance by promoting sustainable actions and activities. Responding to the competing demands of sustainability objectives proactively in manufacturing plants may help the plant managers keep creating and adding value in the long term. As a result, they might discover the potential value opportunities for environmental and social benefits besides the economic ones. This will ultimately maintain the environmental performance and social performance at a high level.

In contrast, managers with a low score of paradoxical mindset may exhibit a defensive managerial response (i.e., business case logic) concerning sustainability objectives by focusing on the economic objectives (i.e., productivity and profitability) over environmental and social objectives (i.e., harmful manufacturing impact and employees' well-being). This argument is supported by Van der Byl and Slawinski (2015b) who stated that when firm managers are forced to choose, between competing elements, they typically tend to favour financial goals and put environmental and social values in a secondary position. These limitations compromise the firm's capacity to fully engage in substantive sustainability (Sajjad *et al.*, 2020). The defensive responses create difficulty for firms to harvest the potential opportunities for achieving environmental performance and social performance. This argument is supported by Evans *et al.* (2017), who asserted that existing business models are mostly based on creating and delivering economic value, with limited or no attention to environmental and social value.

Therefore, the direct effect of sustainability practices on sustainability performance can be moderated by variables explaining the mechanisms through which sustainability practices impact sustainability performance (Magon *et al.*, 2018). The paradoxical mindset may explain the mechanism by which sustainability practices impact sustainability performance. From a triple bottom line view, companies are responsible for achieving economic, environmental, and social benefits. However, it has been recognized

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that companies maximize owners' and shareholders' wealth rather than looking after social and environmental issues (Evans *et al.*, 2017; Sánchez-Flores *et al.*, 2020). Because it is not easy to quantify environmental and social objectives (Camilleri, 2017).

Accordingly, this research posits the subsequent hypotheses:

H4. Paradoxical mindset moderates the relationship between sustainability practices and environmental performance.

H5. Paradoxical mindset moderates the relationship between sustainability practices with Social performance.

Figure 1 presents the current research model showing that sustainability practices impact sustainability performance through the interaction effect of a paradoxical mindset. The research model consisted of five variables, i.e., sustainability practices as exogenous, economic performance, environmental performance and social performance as endogenous, and paradoxical mindset as moderator. The methodology was followed to test the research model.

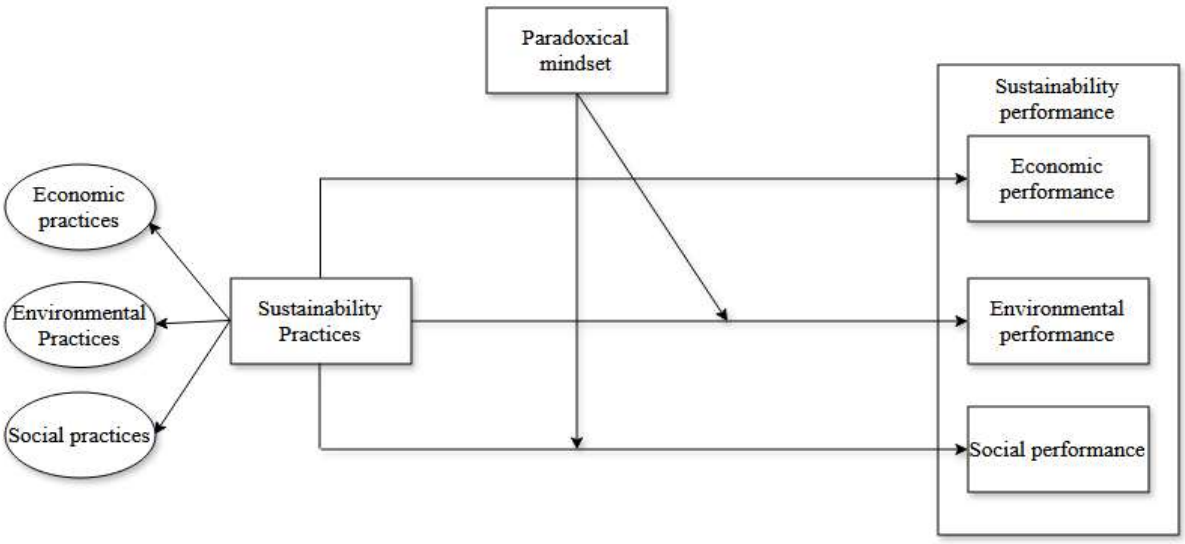

Figure 1. The Research Model

Research Methodology

Measures

The constructs of this research paper were measured based on many studies in the extant literature. economic performance, environmental performance, social performance and paradoxical mindset were measured on 1ist order construct, while sustainability practices were measured in a second-order construct. For each dimension of sustainability performance, respondents were asked to rate the performance of their plants compared to their primary competitors over the past three years. These measures are given in Table 1.

Data Collection

The total number of manufacturing plants in Khartoum State (the central industrial area in Sudan) is 667. The statistical table of Krejcie and Morgan (1970) indicates that this population's total predicted sample

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size is 244. Survey methodology was used for collecting data from manufacturing plants in nine manufacturing sectors in this region. A total of 244 questionnaires were distributed according to the sample size of the manufacturing industry. Several 224 questionnaires were returned, representing a 91% rate of return. The reason for this response's return rate could be due to the personal administration of the questionnaires. Table 2 shows the profiles of the responding companies regarding the number of employees, total job experience, manufacturing sector and plant age. To test the common bias, an EFA analysis was conducted on the scale items. The results reveal that the two conditions suggested by Podsakoff *et al.* (2003), were fully satisfied. A total of 13 factors emerged with Eigenvalue >1, and the principal factor accounted for only 40.5% of the total variance. Therefore, it can be safely concluded that the common method's bias is not a threat to this data validity.

Analysis and Results

Measurement Model

Reflective items were used in the measurement model in this study. Convergent and discriminant validity were tested to identify whether the items reflect the underlying construct. As observed from Table 3, all the items loading are greater than 0,70 except the item paradoxical mindsetwhich loaded 0.653, hence, this item was deleted. The coefficients of composite reliability of the latent constructs range from 0.854 to 0.927, showing that all constructs' composite reliability was greater than the minimum acceptable level and satisfied the required criteria (Hair Jr et al., 2014). AVE, was greater than 0.5 for all the contracts (Fornell and Larcker, 1981). Moreover, the discriminant validity is assessed by evaluating the square root of AVE Fornell and Larcker (1981). As given in Table 4 all off-diagonal correlations among constructs are lower than the squared root of AVE along the diagonal, thus suggesting sufficient discriminant validity.

Structural Model

To assess the significance of path coefficients between constructs in the structural model, a standard procedure of bootstrapping was adopted with 5000 bootstrap samples (Henseler et al., 2009). The results of the PLS Structural Model are shown in Figure 2. Moreover, the results of the SEM with standardized coefficients and t values are produced in Table 5. Accordingly, all the paths of the direct relationship are significant. Sustainability practices enhance the economic performance ($\beta = 0.625$ $t = 13.456$ $p < 0.05$) (Hypothesis 1), environmental performance ($\beta = 0.552$, $t = 9.302$, $p < 0.05$) (Hypothesis 2). And social performance ($\beta = 0.655$, $t = 10.36$, $p < 0.05$) (Hypothesis 3) There is a significant interaction of paradoxical mindset and sustainability practices and environmental performance ($\beta = 0.093$; $t = 2.747$; $p < 0.05$) (Hypothesis 4). However, the interaction of paradoxical mindset and sustainability practices on Social performance (H4) fell short of statistical significance ($\beta = 0.051$; $t = 1.367$; $p > 0.05$).

Table 1. Sustainability Performance, Sustainability Practices and Paradoxical Mindset' Items

Construct	Main Dimension	Items	Source
Sustainability Performance	Economic performance	Our plant has managed to reduce the operational cost.	(Hami et al., 2016; Sajan et al., 2017).
		Our plant has managed to improve profit growth.	
		Our plant has managed to improve the quality of the products.	
		Our plant has managed to improve the market growth.	
	Environmental performance	Our plant has managed to reduce the impact of manufacturing waste on the natural system.	(Zhu et al., 2005; Zhu et al., 2013) (Abdul-Rashid
		Our plant has managed to reduce energy and material usage.	

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		Our plant has managed to reduce non-renewable resource usage.	et al., 2017; Hami et al., 2016; Sajan et al., 2017; Zhu et al., 2008)
		Our plant has managed to reduce harmful emissions (i.e. gas, VOCs).	
	Social performance	Our plant has managed to improve employee satisfaction.	(Abdul-Rashid et al., 2017; Hami et al., 2016; Sajan et al., 2017).
		Our plant has managed to increase occupational health and safety.	
		Our plant has managed to improve employees' education and skill level.	
		Our plant has managed to increase customer satisfaction.	
		Our plant has managed to increase public health and safety.	
Sustainability practices	Economic practices	This plant takes economic consideration of operations such as efficiency and productivity.	(Masocha and Fatoki, 2018)
		We focus on the survival of our plant in the marketplace.	
		We maintain a stable cash flow for the plant's operations.	
		Our plant provides products that are important for consumers.	
		Our plant focuses on long-term profitability.	
	Environmental practices	We have designed our process and products to consume a low amount of input (i.e. materials/energy).	(Agan et al., 2013; Bagur-Femenias et al., 2013; Cantele and Zardini, 2018; Gimenez et al., 2012; Perrini et al., 2007).
		We have designed the production process to reduce waste.	
		We have designed our processes to reduce water consumption.	
		We comply with environmental systems to reduce harmful emissions	
		We comply with environmental systems to reduce packaging's environmental effects	
	Social practices	We provide procedures to ensure the health and safety of our employees	(Cantele and Zardini, 2018; Gimenez et al., 2012; Lindgreen et al., 2009)
		This plant supports employees who wish to pursue further education	
		The wages and perquisites given out to the employees in this plant are sufficient to meet their basic needs.	
		Our plant provides a positive working environment for all employees	
	Paradoxical mindset	When we consider conflicting demands in this plant, we gain a better understanding of the work issues.	(Miron-Spektor et al., 2018).
		We are comfortable dealing with the conflicting demands of our plant's operations.	
		Accepting contradictions in our plant's operations is essential for our success.	
		The tension between different ideas about the plants' operations energizes us.	
		We enjoy the work when we manage to pursue contradictory goals.	

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		We often experience ourselves as simultaneously embracing competing demands of the plants' operations.	
		We are comfortable working on tasks that contradict each other.	
		We feel uplifted when realizing that the competing demands of the plant's operations all can be true.	
		We feel energized when managing to address contradictory issues of the plant's operations.	

Table 2. Demographic Characteristics of the Sustainability of The Respondents

Demographic variables	**Category**	**Frequency**	**(%)**
The number of employees	1-99	44	17 %
	100 -199	40	18 %
	200 – 299	43	19 %
	300 – 399	45	20 %
	400 – 499	31	14 %
	More than 500	21	9 %
Manufacturing sector	Foods Industry	53	24%
	Petrochemicals, Energy & Mining	22	10%
	Oil & Soap	12	5%
	Pharmaceuticals, Fragrances & Cosmetics	17	8%
	Flour & Animal Product	8	4%
	Textile & Cloths	6	3%
	Packaging and Publication	15	7%
	Leather & Footwear	6	3%
	Engineering Industries	85	38%
Plant age	Less than 5	15	7%
	5-10	47	21%
	11-15	59	26%
	16-20	36	16%
	More than 20	67	30%

Table 3. Items Loading, Composite Reliability (CR) And Average Variance Extracted (AVE), For the Reflective Constructs

Construct	**Items**	**Loading**	**CR**	**AVE**
EcP	EcP1	0.703	0.863	0.612
	EcP2	0.77		
	EcP3	0.835		
	EcP4	0.815		
EnP	EnP1	0.813	0.886	0.661
	EnP2	0.789		
	EnP3	0.812		
	EnP4	0.837		
SoP	SoP1	0.818	0.916	0.685
	SoP	0.865		

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	SoP	0.819		
	SoP	0.783		
	SoP	0.851		
Eps	EcPs1	0.808	0.905	0.656
	EcPs2	0.868		
	EcPs3	0.834		
	EcPs4	0.796		
	EcPs5	0.739		
EnPs	EnPs1	0.708	0.912	0.675
	EnPs2	0.853		
	EnPs3	0.805		
	EnPs4	0.872		
	EnPs5	0.858		
SoPs	SoPs1	0.819	0.854	0.594
	SoPs2	0.751		
	SoPs3	0.755		
	SoPs4	0.756		
PM	PM1	0.653	0.927	0.586
	PM2	0.784		
	PM3	0.795		
	PM4	0.812		
	PM5	0.834		
	PM6	0.811		
	PM7	0.741		
	PM8	0.72		
	PM9	0.724		

Table 4. Squared Roots of AVEs

	ECP	ECPs	ENP	ENPs	PM	SOP	SOPs
EcP	**0.782**						
EcPs	0.587	**0.81**					
EnP	0.511	0.355	**0.813**				
EnPs	0.499	0.557	0.657	**0.821**			
PM	0.397	0.469	0.374	0.476	**0.783**		
SOP	0.593	0.473	0.565	0.602	0.43	**0.828**	
SOPs	0.524	0.543	0.45	0.696	0.479	0.717	**0.771**

EcP (Economic Performance), EcPs (Economic Practices), ENP (Environmental Performance, EnPs (Environmental Practices), PM (Paradoxical Mindset) SOP (Social Performance) and SoPs (Social Practices)

Table 5. Results of Hypotheses Testing for Direct Relationships

Relationship	**B**	**T value**	**P Value**

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SPs -> ECP	0.625	13.456	0
SPs -> ENP	0.552	9.302	0
SPs -> SOP	0.655	10.361	0
Moderating Effect 1 -> ENP	0.093	2.747	0.003
Moderating Effect 2 -> SOP	0.051	1.367	0.086
SPs (Sustainability Practices), EcP (Economic Performance), EnP (Environmental Performance, and SoP (Social Performance)			

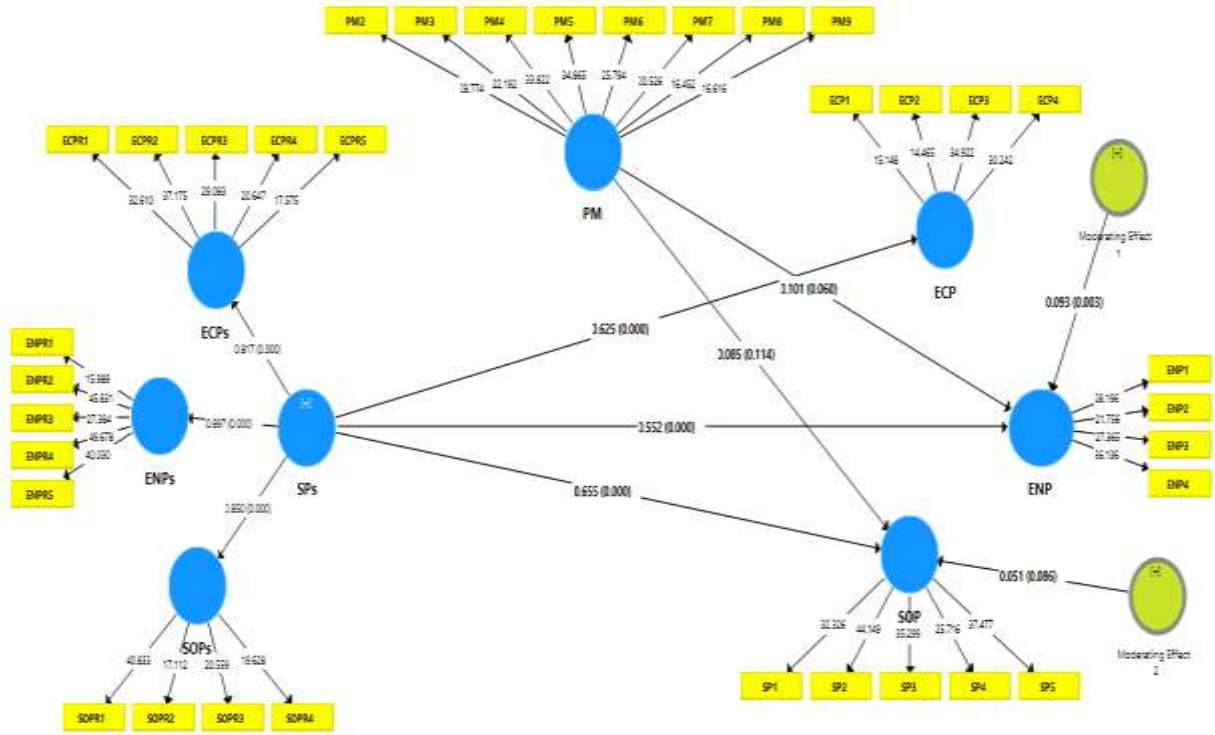

Figure 2. The results of the PLS Structural Model

Discussion on Research Findings

Every economy gives great importance to sustainability since it contributes to the GDP but also engages in natural environment protection (Dey *et al.*, 2020). Sustainability can be well accomplished by properly combining social, environmental, and economic values (Dey *et al.*, 2019, 2020). Therefore, there is a need for a more comprehensive understanding of the value to promote sustainability (Yang *et al.*, 2017).

Hypothesis 1 shows the positive effect of sustainability practices on economic performance. This finding is consistent with the findings of the previous studies. For instance, Gadenne et al. (2012a) stated that sustainable management practices are positively and significantly associated with economic performance outcomes in terms of financial performance (i.e., cash flow, sales growth, and return on investment). Similarly, the research of Gimenez et al. (2012) suggested that sustainability in terms of environmental practices positively impacts economic performance. This is in parallel with the results of Abdul-Rashid et al. (2017) who found a significant relationship between sustainable process improvement and economic

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performance, such as improved company image, market share, and profitability, company position in the marketplace. It is also noteworthy that hypothesis (H2) is supported as the path from sustainability practices to environmental performance is significant and positive. These results are consistent with the findings of previous research. To give an example, Gimenez et al. (2012) stated that environmental practices have a positive impact on environmental performance. Similarly, the results of Hami et al. (2015a) showed that internally sustainable manufacturing practices have a positive and significant impact on environmental sustainability. Moreover, Wu et al. (2015) confirmed that the implementation of social practices is positively related to environmental performance, operationalized as the reduction in consumption of hazardous or harmful toxins, solid waste sustainability performances, water waste, air emissions, and energy and materials consumption. Furthermore, the findings of Sezen and Cankaya (2013) indicated that the applications of green manufacturing have a significant positive impact on environmental performance.

The positive impact of sustainability practices on social performance (H3) is in line with the findings of past studies. The results of Gimenez et al. (2012) highlighted the significant influence of internal social initiatives on environmental performance, and the study argued that manufacturing firms still need to achieve positive financial benefits from their social program applications. The results of Hami et al. (2015a) confirmed a significant and positive path between sustainable manufacturing practices and social sustainability, in terms of employee satisfaction, occupational health and safety, better staff retention and recruitment, employee education and skills, customer satisfaction and public health and safety. Another research conducted by Gadenne et al. (2012a) showed a significant and positive association between sustainable management practices and employee value performance, sustainability specifically, employee training and development, employee health and safety, workplace relations, trained employee retention, and employee satisfaction. To sum up, based on the current research paper and the previous studies, it is clear that sustainability practices are the main driver in reaching a better triple bottom line performance. hence, the findings of our paper can be generalized across the manufacturing plants in a similar context.

The results supported that a paradoxical mindset moderates the relationship between sustainability practices and environmental performance (H4). This finding can be explained through the paradox theory of Smith and Lewis (2011), which indicates that organisations which value, accept, and work through multiple competing demands achieve better overall sustainability performance. According to plants, managers have to react proactively to the competing demands of sustainability objectives, instead of overemphasising economic objectives over environmental objectives. These findings bridge the research gap identified in the literature regarding challenging situations that constrain managers from applying sustainability practices, as discussed earlier. These limitations compel plant managers to react to sustainability in a reactive way (i.e., a business-case approach). A business case normally indicates that sustainability is expected to improve the economic dimension of a business (Van der Byl and Slawinski, 2015b). This defensive response that prioritizes economic sustainability performances over social and environmental ones may lead to compromising the organization's capacity to fully engage in substantive sustainability actions (Sajjad et al., 2020). Thus, through a paradoxical mindset, sustainability' demands are accepted and balanced, and working through conflicting issues holds considerable potential for improved sustainability performance (i.e., environmental dimension) (Hahn et al., 2018; Hahn et al., 2014b).

In respect of hypotheses (H5), it was expected that a paradoxical mindset would strengthen the relationship between sustainability practices and social performance. However, the analyses indicated no significant moderating effects. As a result, the research did not find any empirical evidence to support the hypotheses. The cross-cultural difference may explain the insignificant findings in the context of the Sudanese manufacturing firms. This is because human behaviours such as the firm members' reactions are mainly and profoundly affected by the national culture of the country. Based on the findings of Schreier et al. (2010). Cross-cultural differences, especially in terms of individualism versus collectivism, may restrict the effectiveness of the firm members to proactively and collectively react towards social objectives of sustainability, consequently, this may affect the social outcomes of such practices. In the context of Sudan, Mansour et al. (2019) stated that Sudanese people are highly individual (about 79 based on the Hofstede index), which means that Sudanese societies are individual-oriented communities. Firm members engage in collective interaction concerning work-related issues compared to an individualist culture in a collectivist

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culture. Vadi et al. (2002) demonstrated that in comparison to the collectivist culture with individualist culture, facets of collectivist culture can predict the organizational members' willingness to support the two aspects of organizational culture, namely task and relation. They support the relationship in terms of interpersonal relationships between members of the organization and support the task in terms of understanding such task-related work. Collectivist culture provides individuals with outlets to learn and share knowledge about task-related information, ideas and opinions (Keller et al., 2020).

Hence, the individualist-collective culture can encourage or discourage the tendency to adopt a PM (Keller et al., 2017), especially in a social context. This discussion on culture and PM may reasonably prove the insignificant finding for the moderating effect of the PM on the relationship between SPs and SOP.6.

Conclusion, Implication, and Future Research

Our paper explored the impact of sustainability practices on sustainability performance from the triple-bottom-line approach empirically. Additionally, the study examines the moderating effect of a paradoxical mindset on the relationship between Sustainability practices with environmental performance and social performance. These results may enable manufacturing plants to identify the means for achieving triple bottom line sustainability, through the right combination of sustainability practices applications across manufacturing systems and react actively to the competing demands of sustainability elements that may arise due to the limited resources and work design. This paperwork is among the few attempts to examine the relationship between sustainability practices and sustainability performance in the operations management field Abdul-Rashid et al. (2017), Chin et al. (2015b), Gimenez et al. (2012), Habidin et al. (2013), Hami et al. (2016) and Pham and Kim (2019). These effects from the triple bottom line did not receive adequate attention in prior research. It has been investigated extensively from the business case (Manzoni and Volker, 2017; Sajjad et al., 2020; Van der Byl and Slawinski, 2015b; Zhang et al., 2015). Such an approach preferred the economic dimension over social and environmental ones (Xiao et al., 2019). This issue has dominated business sustainability.

From the organization paradox view, there is growing research conducted on how firms react to the competing demands of sustainability. However, most of this recognition has remained at a conceptual level or qualitative studies. The current quantitative study has overcome this limitation by providing a deeper theoretical underpinning and empirically confirming that a paradoxical mindset strengthens the link between sustainability practices and environmental performance. Hence, another contribution lies in demonstrating that the paradox theory of Smith and Lewis (2011) can be applied to better explain sustainability practices and performance paths. For practical contributions, paradoxical thinking may enlighten practitioners, and manufacturing plants that seek to promote an optimal level of sustainability measures based on a triple-bottom-line approach. Therefore, the simultaneous implementation of these three types of sustainability is essential for creating optimal sustainable values in the process. Manufacturing plants may particularly feel the effects of uncertainties and complexities when operating in global or novel national contexts. A paradox-based view can help manufacturing managers better understand how to deal with increasing uncertainties that often involve competing demands and possibilities in terms of managerial actions. In short, we suggest that manufacturing plants' managers should be trained to handle all sustainability dimensions focusing on a high level of paradoxical thinking and actions.

The objectives of this research paper were achieved, but it was not possible without some limitations on the scope of the study. Firstly, industries need a method to refine and measure specific indicators for environmental, economic, and social aspects at the factory in a practical way (Hartini et al., 2020). Therefore, the current study focused on the internal sustainability practices of the manufacturing process at the factory level. For this reason, external sustainability practices are excluded. Therefore, future researchers could attempt to overcome this limitation by examining the influence of external sustainability practices such as sustainable supply chain practices and performance outcomes in line with the triple bottom line approach. As discussed earlier, to achieve optimal outcomes of sustainability actions and activities, firms' members experience the tensions of sustainability demands. Therefore, further research is needed to extend the

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current research model by testing empirically how sustainability tensions mediate the relationship between sustainability practices and sustainability performance.

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