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RESEARCH ARTICLE

Impact of Big Data on Strategic Sustainability: The Moderating Role of Organizational Resilience in the Service Sector in Palestine

Huda Abedl Rahman Mahmoud Takrouri*

Ph.D in Strategic Management, Lecturer at the Faculty of Modern Sciences, Arab American University

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***Corresponding Author**

Huda.takrouri@aaup.edu

ABSTRACT

This study examines the impact of big data on strategic sustainability with the presence of the moderating role of organizational resilience in the services sector in Palestine. Applying a strategic perspective is essential for effective planning and engagement with sustainable development. There is a risk that solutions and actions, which may appear more sustainable than the current situation in the long term, could ultimately prove to be ineffective in achieving a fully sustainable state. The descriptive analytical method was used, and an electronic questionnaire was sent to all service companies through the website and e-mail, and the researcher was able to collect (238) questionnaires that were agreed to be filled out by employees of service companies in Palestine.The results indicated that there is a moderate role of organizational flexibility in the impact of big data (accuracy, consistency, completeness, timeliness) on strategic sustainability in the service sector in Palestine. Investments in the knowledge of personnel data can be made by an organization to interpret and use big data to effectively make strategic decisions. Secondly, companies must build resilience through strategies that encourage innovative responses and the ability to adapt to new data insights and changing external challenges. This focus should also help examine advanced technologies in massive data and analytics tools for real-time decision-making as part of tracking sustainability metrics.

1. INTRODUCTION

At both societal and organizational levels, applying a strategic perspective is essential for effective planning and engagement with sustainable development. There is a risk that solutions and actions, which may appear more sustainable than the current situation in the long term, could ultimately prove to be ineffective in achieving a fully sustainable state. Strategic action in any context requires a clear understanding of the desired outcome. A vision of a sustainable future society is essential in this context. After establishing a vision, back casting can be utilized to analyze the necessary steps to progressively advance toward the envisioned future. The Framework for Strategic Sustainable Development (FSSD) employs a back casting perspective to derive fundamental principles for sustainability. These principles are designed to be necessary, sufficient, general, concrete, and non-overlapping, thereby defining an ecologically and socially sustainable society. They signify the fundamental causes of unsustainability, positioned upstream in cause-and-effect relationships (Schulte et al., 2020).

According to Duchek (2020), organizational resilience is an option that is considered to be the first and ultimate choice for survival in an environment that is turbulent and uncertain. It is possible to think of it as a proactive attribute (Ragmoun & Almoshaigeh, 2020), an absorptive - adaptative capability, a reactive attribute, or a dynamic attribute (Asamoah et al. 2020). These attributes are developed prior to the event, and they continue to develop during the event and after the event. Independently, there is a consensus that proactive thinking about organizational resilience is still the only best way to survive and face future and present crises in such a turbulent environment (Mokline

& Ben Abdallah, 2021; Settembre-Blundo et al. 2021). This is the case despite the fact that there are a number of different ways to think about organizational resilience.

While the emergence of Big Data has transformed organizational data management and analysis, emphasizing the importance of data in informed decision-making. Nonetheless, data quality continues to pose a substantial challenge for organizations, as inaccurate data can result in erroneous decisions and adverse outcomes (Ridzuan & Zainon, 2024). Based on the importance of the previous variables (big data, strategic sustainability, organizational resilience), this study examines the impact of big data on strategic sustainability with the presence of the moderating role of organizational resilience in the services sector in Palestine.

LITERATURE REVIEW

Big Data is a term that refers to a very large and complex amount of data that cannot be stored, analyzed, and managed using traditional storage and processing tools and techniques or typical data management applications (Sandhu, 2021). Big Data typically involves data sets of sizes that exceed the ability of commonly used software to capture, manage, and process data within an acceptable time frame (Mikalef et al., 2018). Big Data is generated from a variety of sources such as the Internet, social media, sensors, medical devices, scientific laboratories, businesses, governments, and others (Ikegwu et al., 2022).

Data quality is crucial to measuring data quality. (please check this sentence) Accuracy, consistency, completeness, and timeliness are used to evaluate data quality (Ridzuan & Zainon, 2024):

Accuracy: The accuracy of data determines whether it is free of common errors like misspelling and typos. Accurate data matches the real world (Taleb et al., 2016), reflects the truth of information, and does not create uncertainty (Cai & Zhu, 2015). Data context affects accuracy. Sometimes a simple value set like male and female can be assessed. If there is no reference value, accuracy may be difficult to assess.

Consistency: Consistency is the accurate of system-defined semantic rules (Schelter et al., 2018). It indicates information equivalency when the concept, value domains, and formats match before and after data processing (Cai & Zhu, 2015). Semantic and structural consistency (Micic et al., 2017). Structural consistency describes the data's structure, while semantic consistency describes the dataset's field relationships.

Completeness: Completeness is another data quality indicator. Completeness is the amount of information needed to describe a significant real-world state (Schelter et al., 2018). This is usually expressed as a percentage of raw data volume to required data volume (Cappiello et al., 2018). This quantitative metric measures how many reliable analytical data can be derived from a dataset when all data accuracy and integrity factors are present (Cai & Zhu, 2015).

Timeliness: Real-time and near-real-time data processing. Since data is collected every second and changes quickly, timeliness is crucial. Currency and volatility determine timeliness (Taleb et al., 2018). Currency measures system or real-world validity, while volatility measures data change frequency. It measures whether data is delivered on time, modified regularly, and processed within the specified timeframe (Cai & Zhu, 2015). Some researchers believe timeliness should be measured as part of data quality because it does not reveal data relevance. Big Data's five V's require revised data quality dimensions (Ridzuan & Zainon, 2024).

Strategic Sustainability

Strategic sustainability has received heightened focus in academic literature (Watz and Hallstedt, 2020). Companies will invest in sustainability to eliminate business barriers, generate new opportunities, and persuade environmentally conscious consumers regarding the company's sustainable products. Strategic sustainability is closely linked to competition and competitive positioning within the business environment (Przychodzen & Przychodzen, 2015). Connelly et al. (2009) define strategic sustainability as a planning and implementation approach that optimally allocates limited resources to maximize sustainability outcomes. Numerous catalysts are prompting companies to incorporate sustainability into their operations. Legislation, customer and investor demands, competition, green trends, and global social and public pressure are primary drivers for

the integration of strategic sustainability into corporate operations (Abuzeinab et al., 2017), alongside the intangible value of green social responsibility.

Organizational Resilience

Organizational resilience is the ability of a company to anticipate, plan for, and respond to challenges when they occur. It manifests itself as a flexible and sustainable organization for transformation (Miceli et al., 2021). Resilient organizations are those that recover and withstand impacts through good risk management, as well as being adaptable, flexible, and sustainable (Karman, 2020). For organizations to be successful in this volatile and complex environment, they must be more adaptable and flexible, especially in crisis situations (Gölgeci et al., 2020). One of the major setbacks for organizations that do not succeed is increased stress levels in the workplace for the work team. This can lead to decreased performance, productivity, employee morale, and strained relationships in the workplace (White, 2013). In addition, developing organizational resilience is important because it demonstrates the ability to maintain a competitive advantage over time (Fathi et al., 2021). This is achieved by driving excellent performance and effective innovation at the same time. By doing so, organizations will also demonstrate the ability of their business objectives to adapt to market changes (Garrido-Moreno et al., 2024).

Hypotheses Development

Business strategy, which pertains to how a company should compete (Carpenter et al., 2011), has evolved due to the rise of sustainability valuation (Parida & Wincent, 2019). Wei et al. (2017) asserted that the objective of green strategies is to distinguish companies from their competitors' products and meet the demands of environmentally conscious consumers. Parida & Wincent (2019) discovered that, throughout the last century, business success was primarily defined by the generation of financial returns for shareholders; however, innovative business models are essential for effectively implementing the principles of the circular economy. Swift transformations in the business landscape, coupled with significantly heightened customer and regulatory expectations concerning sustainability and environmental issues, necessitate that construction firms revise their business strategies to enhance their sustainability performance and brand value (Parida & Wincent, 2019).

Big data and sustainability management go hand in hand, according to Etzion & Aragon-Correa (2016), because many of the affordances big data offers are inherently related to sustainability issues (e.g., multidimensional nature, collective actions, smart allocation of resources, efficiency priority). Findings by Wided (2023) affirm that the big data analytics capability fully mediates between IT capabilities and strategic resilience. Big data infrastructure flexibility has a negative influence on strategic resilience. Personal big data expertise negatively affects the relationship between IT capabilities and strategic flexibility while at the same time increasing the relationship of strategic resilience to organizational resilience. The critical pathway identified and assessed the trend that had to be changed in order for the organization to become an immune system-one that would exploit negative situations for the better. This needed policy makers and managers to accept and understand big data analytics capability more than IT capabilities in order to devise focused strategies toward the achievement of strategic flexibility and organizational resilience. Ciampi et al. (2018) assert that in contemporary economically turbulent times, organizations must maintain flexibility and resilience to adapt to a constantly changing environment. Organizations should utilize flexible information structures while also integrating more rigid infrastructures to enable the collection and analysis of substantial internal and external data. This contrast necessitates a trade-off. Academic literature (Tallon et al., 2019; Salmela et al., 2022; Al-Matari et al., 2023) has emphasized that information systems can impose challenges on organizations aiming for strategic agility, flexibility, and resilience.

According to the above discussion, the following hypotheses can be postulated:

- There is a positive impact of Big Data on Strategic Sustainability in the service sector in Palestine.
- There is a positive impact of accuracy in data on Strategic Sustainability in the service sector in Palestine.

- There is a positive impact of consistency in data on Strategic Sustainability in the service sector in Palestine.
- There is a positive impact of completeness in data on Strategic Sustainability in the service sector in Palestine.
- There is a positive impact of timeliness in data on Strategic Sustainability in the service sector in Palestine.
- There is a moderating role of organizational resilience in the impact of Big Data on Strategic Sustainability in the service sector in Palestine.

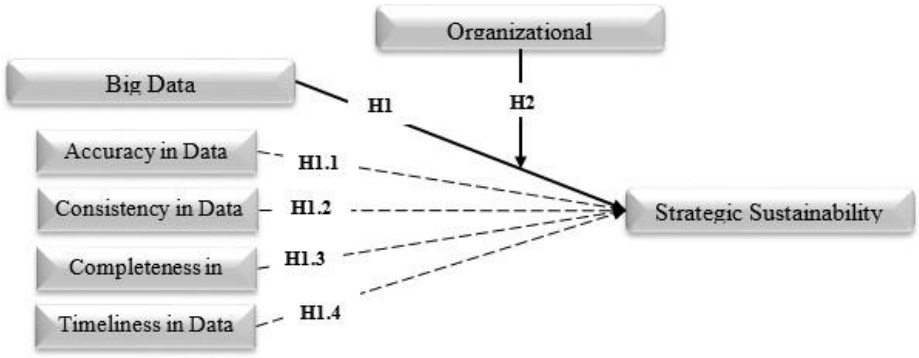

Figure (1): Conceptual Model

The study investigates the relationship that exists between Big Data and Strategic Sustainability in the service sector of Palestine. It also focuses on the influence of different dimensions of the quality of data: accuracy, consistency, completeness, and timeliness, on strategic sustainability. The model will also focus on organizational resilience as the moderator of this relationship. This conceptual model can be diagrammed schematically to show the relationships among the main constructs, namely Big Data with its dimensions, Strategic Sustainability, and Organizational Resilience. The framework illustrates a complex interplay among the constructs, where Big Data has a number of dimensions that directly influence Strategic Sustainability. Moreover, Organizational Resilience is proved to be a critical moderator that may enhance or reduce the potential influences of Big Data on strategic sustainability outcomes in service industry contexts in Palestine. Answering these hypotheses empirically makes it possible to find out best practices which may be strategic to use to achieve sustainability objectives.

METHODOLOGY

To achieve the objectives of the study and answer its questions, the descriptive analytical method was used, where the descriptive method was used based on the study of the research topic by relying on an appropriate tool used to collect data and information. The analytical method was used to process the collected data, analyze it, and test the hypotheses to reach the results of the study and provide appropriate recommendations for those results.

The target research community in this research consists of service companies in Palestine, as service companies are considered among the largest companies that have a direct impact on national income, and are trying to keep pace with global changes in the field of information technology. In terms of activity distribution in 2022, the services sector employed around 172,00 individuals, accounting for 32.8% of total employment. Between 2017 and 2022, service activities accounted for 23.1% of total economic activity in Palestine (PCBS, 2022).

Since the size of the target community is large, it is relatively difficult to reach everyone, and the time available for collecting data is limited, which led to the use of the appropriate sample. To achieve the goal of this study, an electronic questionnaire was sent to all service companies through the website and e-mail, and the researcher was able to collect (238) questionnaires that were agreed to be filled out by workers in service companies in Palestine.

Data Collection

To collect the data required to achieve the study objectives, two primary sources were used. Firstly, theoretical and scientific literature was used as starting secondary sources. Which helped the researcher provide data to develop the theoretical framework of the study and develop the study hypotheses. While reliance was placed on primary sources by collecting data from members of the study sample through a study questionnaire prepared to achieve the goal of the study, which expresses the dimensions and variables of this study.

Reliability Test

In order to confirm whether the questionnaire items were sufficient and reliable, the Cronbach's alpha coefficient was calculated. If the result is more than 0.70, the value is statistically acceptable (Sekaran and Bougie, 2016). Table (1) shows that Cronbach's alpha falls between 0.955 to 0.967. In other words, the data generated by the study tool is accurate and trustworthy for evaluating the factors, and it is a reliable tool. Reliability was taken into account since all dimensions of the independent and validated variables were above 70%.

Table (1): Cronbach's Alpha Coefficient

	Number of items	**Cronbach alpha**
Accuracy In Data	5	0.963
Consistency In Data	5	0.961
Completeness In Data	5	0.962
Timeliness In Data	5	0.955
Big Data	20	0.957
Strategic Sustainability	10	0.964
Organizational Resilience	10	0.960
Total	40	0.956

Table (2): Results of Testing H1

D.V	**Model Summery**		**ANOVA**		**Coefficients**				
	R	**R^2**	**F**	**Sig F***	**Variable**	**B**	**standard error**	**T**	**Sig T***
Strategic Sustainability	0.773	0.597	86.326	0.000	Accuracy In Data	0.149	0.081	2.592	0.013
					Consistency In Data	0.191	0.057	3.344	0.001
					Completeness In Data	0.221	0.073	4.283	0.000
					Timeliness In Data	0.365	0.062	5.890	0.000

In service companies, Big Data has an effect on Strategic Sustainability, as indicated by the correlation coefficient (R = 0.773). Table No. (2) indicates a statistically significant relationship between the independent variable (Big Data) and Strategic Sustainability, with a computed value of F (86.326) and a significance level (sig = 0.000) less than 0.05. and 59.7% of the variation in Strategic Sustainability may be explained by variations in Big Data, according to the coefficient of determination (R^2 = 0.597).

Table (2) shows the values of the regression coefficients for the sub-dimensions of the variable (Big Data). Accuracy in Data Dimension's computed T value was (2.592) at a significant level (0.013), and its B value was clearly 0.149, as the table shows. It is less than 0.05, indicating a significant positive effect at the significance threshold (α≤0.05).

In terms of Consistency in Data, B has a value of (0.191). In this dimension, the value of T was determined at a significance level of 0.001, or less than 0.05, as the table clearly demonstrates. This indicates a significant positive influence at (α≤0.05).

With the B value of 0.221 and the T value of 4.283 at a significance level of (0.000), less than 0.05, where (α≤0.05), the table clearly shows a significant positive influence of Completeness in Data on Strategic Sustainability.

With a B value of 0.365 and a T value of 5.890 at a significance level of (0.000), less than 0.05, where (α≤0.05), the table clearly shows a significant positive influence of Timeliness of Data on Strategic Sustainability.

To test the sub-hypotheses, simple linear regression analysis was performed.

H1.1: "There is a statistically significant impact at the level (α≤0.05) of accuracy in data on Strategic Sustainability in the service sector in Palestine".

H1.2: "There is a statistically significant impact at the level (α≤0.05) of consistency in data on Strategic Sustainability in the service sector in Palestine".

H1.3: "There is a statistically significant impact at the level (α≤0.05) of completeness in data on Strategic Sustainability in the service sector in Palestine".

H1.4: "There is a statistically significant impact at the level (α≤0.05) of timeliness in data on Strategic Sustainability in the service sector in Palestine".

Table (3): Impact test results H1.1, H1.2, H1.3 and H1.4

V	Model summery		ANOVA		Coefficients			
	R	R^2	F	Sig F*	B	standard error	T	Sig T*
Accuracy In Data	0.608	0.370	138.701	0.000	0.748	0.064	11.772	0.000
Consistency In Data	0.681	0.464	204.579	0.000	0.555	0.039	14.303	0.000
Completeness In Data	0.685	0.469	208.263	0.000	0.559	0.039	14.431	0.000
Timeliness In Data	0.743	0.553	291.659	0.000	0.565	0.033	17.078	0.000

The R-value of (0.608) in Table 3 indicates that there was a positive correlation between the first dimension (Accuracy in Data) and the second dimension (Strategic Sustainability). The coefficient of determination data reveal that (R^2 = 0.370) while all other components remain constant, meaning that the (Accuracy in Data) domain accounted for (37%) of the variation in Strategic Sustainability. The value of (F) reaching 138.701 at the confidence level (sig = 0.000) showed that the regression's significance was supported at the significance level (α ≤ 0.05).

R-value of 0.681 for the second dimension indicates that there is a positive correlation between the two dimensions (Consistency in Data and Strategic Sustainability). R^2 = (0.464) is the coefficient of determination after all other factors have been taken into account. This means that 46.4% of the

variance in (Strategic Sustainability) can be attributed to the (Consistency in Data) domain. Moreover, the regression's significance at the level of significance ($\alpha \leq 0.05$) was showcased by the value of (F) reaching (204.579) at the confidence level (sig = 0.000).

The R-value of 0.469 shows that there is a positive relationship between the dimension of Completeness in Data on Strategic Sustainability, algorithms. The coefficient of determination results indicates that, 46.9% of the variance in (Strategic Sustainability) was explained by the (Completeness in Data) domain, assuming that all other variables remain constant. This translates to a 0.395 coefficient of determination. The regression's significance at the $\alpha < 0.05$ significance level was also shown by the value of (F) obtained (208.263) at the level of confidence (sig = 0.000).

The R-value of 0.743 for the fourth dimension shows that there is a positive correlation between the two dimensions (Timeliness in Data and Strategic Sustainability). Following the removal of all other variables, the coefficient of determination yields a value of ($R^2 = 0.553$), indicating that the domain of Timeliness in Data accounted for 55.3% of the variance in Strategic Sustainability. Additionally, it was shown that the regression was significant at the level of significance ($\alpha \leq 0.05$) by reaching the value of (F) at (291.659) at the confidence level (sig = 0.000).

H2: "There is a statistically significant impact at the level ($\alpha \leq 0.05$) of organizational resilience in the impact of Big Data on Strategic Sustainability in the service sector in Palestine".

Table (4): Test results H2

DV	IV	First model			second model		
		B	**T**	**Sig***	**B**	**T**	**Sig***
Strategic Sustainability	Big data	0.737	18.054	0.000	-		
	organizational resilience × big data	-			0.753	12.731	0.000
	R	0.762			0.867		
	R^2	0.580			0.751		
	ΔR^2	0.578			0.749		
	ΔF	325.944			355.251		
	Sig. ΔF	0.000			0.000		

The findings of the hierarchical multiple regression analysis based on two models are shown in Table (4). According to the results of the first model, there is a positive association between big data and Strategic Sustainability, with a correlation value of R = 0.762. Additionally, the results demonstrated that organizational resilience variable had a statistically significant impact on Strategic Sustainability, with a value of (F = 325.944) and a significance level of (Sig = 0.000), which is less than (0.05).

The determination coefficient's value, $R^2 = 0.580$, indicates that changes in big data have an impact on Strategic Sustainability, as measured by changes in Strategic Sustainability of (0.580). With a value of 0.737, the impact score value of (B=0.737) indicates that 73.7 percent of the variation in Strategic Sustainability can be explained by big data. This means that an increase of one degree in the level of interest in big data leads to an increase in Strategic Sustainability.

The second model included the moderation variable "organizational resilience "in the regression model. As a result, the correlation coefficient increased to R = 0.867 and the determination coefficient R^2 increased by 75.1%. This percentage and the change in the value of F (355.251) and the level of significance (Sig = 0.000), which is less than (0.05), both indicate that the model is statistically significant.

The results indicate that the moderating variable (organizational resilience) significantly improved the impact of big data on Strategic Sustainability. The rate of interpretation of the discrepancy in Strategic Sustainability increased by 75.1%, from 57.8% to 74.9%. The effect score value β for the moderating variable (organizational resilience) was (0.753), and the calculated T value was (T = 12.731) with a significance level (Sig = 0.000).

DISCUSSION

From this, the hypotheses in this study have suggested that, regarding the Palestinian service industry, data accuracy, data consistency, data completeness, and data timeliness are related to different facets of sustainability. The hypotheses go on to postulate that organizational resilience moderates the effect of Big Data on the strategic sustainability of organizations in this industry. In the service sector of Palestine, good prospects for the sustainability of the sector are created by the availability of accurate data. It is through such accurate data that informed decisions leading to strategic and operational efficiency, good factors that can enable the realization of sustainable practices, may be made. On the other hand, the notion of consistency refers to the fact that data are in consonance and reliable across a variety of datasets. Based on this hypothesis, this will ensure that decisions are based on information that is harmonized and consistent, which again will be beneficial in the strategic sustainability of an organization. Completeness of data is whereby all the information is available. Based on this, one may argue that completeness in data can facilitate positive results from the perspective of the Palestinian service sector. This may be so because it would offer a complete understanding of the nature of operational activities and requirements, therefore generating superior strategic decisions. Otherwise, the timeliness of the data denotes that the information can be availed at the time needed. Based on this hypothesis, access to timely data may widen opportunities for the service sector in Palestine to make timely decisions and respond to circumstances and, therefore, may be more viable and sustainable. Organizational resilience is the ability of an organization to adapt to changes and shocks. It provides a moderating effect on Big Data's influence on strategic sustainability within the service sector in Palestine. Additionally, organizational resilience is expected to provide capacity that enables an organization to effectively use Big Data for significant improvement in achieving strategic sustainability.

CONCLUSIONS AND FUTURE RESEARCH

This research is, therefore, of great theoretical significance in that it embeds big data and organizational resilience within strategic sustainability discourse. It develops a framework to illustrate how big data analytics can shape informed sustainable practices in the service sectors, especially in a very peculiar context like Palestine. The results of this study emphasize big data in decision-making on sustainability and how organizations can practically move to better their efforts. It also brings out organizational resilience that equips the manager with strategies which prepare not just for sustainability but also for disruptions. These results assume that the different dimensions of data quality, which include the accuracy, consistency, completeness, and timeliness of the data, increase the dimensions of sustainability in the service industries in Palestine. Besides, they assume that organizational resilience will modify the impact of Big Data on strategic sustainability in the respective context. Enterprises in the service sector in Palestine can be better off if they take measures to ensure the quality of data and build organizational resilience toward sustainable strategic outcomes.

This research also contributes to contextual knowledge about challenges and opportunities that specifically face the service sector in Palestine. The nuances herein draw on how local conditions affect the adoption and impacts of big data on sustainability efforts. The study thus proposes some policy recommendations toward an enabling environment for the service sector to support such initiatives. It calls for infrastructures and training that will pave the way for integrating big data analytics into best practices for sustainability.

From this perspective, investments in employee data literacy can be made by an organization for interpreting and using big data for strategic decisions effectively. Secondly, companies should build resilience through strategies that encourage innovative responses and adaptability to new data insights and changing external challenges. Such focus shall also help examine advanced technologies in big data and analytics tools for real-time decisions as part of tracking sustainability metrics.

The collaboration between business, government, and academia will greatly facilitate the sharing of best practice and experience with big data use for sustainability. Networking within the industry can be developed to promote shared learning and access to a resource. Policymakers should focus on developing relevant infrastructures-such as Internet access and data managing systems-that would facilitate service sector organizations in leveraging big data. In the future, research should be directed at longitudinal studies assessing long-term effects of big data on strategic sustainability, in light of dynamism in technology and market conditions. In addressing these contributions and

recommendations, this research work is expected to significantly influence both the academic discourse and practical applications within the service sectors in Palestine.

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