Exploring the Adoption of Big Data Analytics in Telecommunication Companies in Egypt: The Moderating Role of Resistance to Technological Change

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ABSTRACT

The study objectives were to shed light on adopting big data analytics technologies in leading mobile telecommunications companies in Egypt, focusing on the moderating role of resistance to technological change.), they were applied to a pilot sample of 80 respondents.

Following the observation of the results, they were processed. The Pearson correlation coefficient was calculated between the factors and the total scale score, Reliability coefficients for the scales (Adopting big data analytics, Moderating Role of Resistance to Technological Change) were calculated using Cronbach's Alpha coefficient after that, the researcher used an analytical descriptive strategy to test their hypotheses. The study's instrument, a questionnaire, was disseminated after being assessed and arbitrated by multiple experts on a sample. Participants in the study were random customers of mobile Telecommunication companies (Vodafone, Orange Egypt, Etisalat, and We) in Egypt. The sample was (385) and (350) were retrieved with a percentage of Recovery equal to (91%), according to the study's findings. Uncovering these underlying drivers shows significant differences between males and females in their perceptions or implementations of Big Data Analytics. Males reported a higher mean score (67.17) than females (63.9). This difference is statistically significant ($p < 0.001$), suggesting that gender does play a role in how Big Data Analytics is perceived or

implemented within the organization. The study provides valuable insights into strategies for fostering a culture of innovation and overcoming barriers to technology adoption within the telecommunications industry. It also significantly contributes to the theoretical understanding of technology acceptance and change management processes in the context of the telecommunications sector. Ultimately, this research provides actionable recommendations for mobile telecommunications companies in Egypt, guiding them on effective strategies to leverage the power of big data analytics while navigating the complexities of organizational change. By addressing resistance to technological change and promoting a culture of data-driven decision-making, these companies can enhance customer experiences, optimize operations, and maintain a competitive edge in an increasingly data-driven landscape.

Keywords:

Adoption – Big data analytics -resistance to change- Telecommunication Companies.

Introduction

Large volumes of organized and unstructured data that are difficult to evaluate using conventional methods because of their size and complexity—which increases exponentially over time—are referred to as big data (Patrick, W.M et al,2022). The importance of data analytics is found in its ability to create and capture value since it helps businesses make better decisions (Saggi, M.K.& Jain, S. A.,2018) Many telecom companies are using big data produced by internet interactions to obtain competitive benefits in the context of the fourth industrial revolution and the spread of social media. By integrating customer feedback into the data, businesses can improve the development of new products using big data. With this strategy, businesses can cut expenses while improving product offers and decision-making processes Considering the crucial part (Tan, K.H.; Zhan, Y,2018). A growing number of businesses are

implementing big data analytics to take advantage of big data's benefits in terms of value generation, given its crucial role and importance. Big data is gradually becoming a vital instrument that companies may use to develop their business models (Singh, S.K.& El-Kassar, A.N., 2019). This innovation that results from the use of big data could be very valuable economically. Data has emerged as a valuable asset in the digital age, driving organizations to invest in advanced analytics capabilities to extract actionable insights and gain a competitive edge. The telecommunications industry, characterized by its vast and diverse data streams, has been at the forefront of adopting big data analytics technologies to enhance customer experiences, optimize operations, and fuel innovation. However, despite the potential benefits, the implementation of these cutting-edge solutions often encounters resistance from employees accustomed to traditional ways of working This research delves into the adoption of big data analytics in telecommunications companies, with a particular focus on the moderating role of resistance to .technological change. It seeks to unravel the intricate interplay between the factors influencing the successful integration of these technologies and the barriers posed by an aversion to change within organizational settings. By examining real-world cases and conducting empirical studies, this research aims to shed light on the drivers and inhibitors of big data analytics adoption in the telecommunications sector. It will explore the organizational, technological, and human dimensions that shape accepting or rejecting these innovative solutions, providing a holistic understanding of the challenges and opportunities at hand. Furthermore, the study will investigate the moderating effect of resistance to technological change. This phenomenon can manifest in various forms, such as skepticism towards new methods, fear of job insecurity, or a general aversion to disrupting established routines. By uncovering the underlying causes and manifestations of this resistance, the research will offer valuable insights into strategies for mitigating its impact and fostering a culture of innovation within telecommunications companies. Through a rigorous analysis of the interplay

between big data analytics adoption and resistance to change, this research endeavors to contribute to the theoretical underpinnings of technology acceptance and change management. Moreover, it aspires to provide practical recommendations for telecommunications companies seeking to leverage the power of data-driven decision-making while navigating the complexities of organizational change. Ultimately, this study aims to empower telecommunications companies to harness the full potential of big data analytics, enabling them to deliver superior customer experiences, optimize operations, and drive sustainable growth in an increasingly competitive and data-driven landscape.

The problem of the research

1- How does resistance to technological change moderate the relationship between big data analytics adoption and organizational performance in Egyptian telecommunications companies?

2- What are the key factors at individual, organizational, and technological levels that influence the adoption of big data analytics in the Egyptian telecommunications sector?

3- To what extent do change management practices and organizational culture impact the successful implementation of big data analytics in Egyptian mobile service providers?

4- How do employee attitudes towards innovation and data-driven decision-making affect the adoption process of big data analytics in the telecommunications industry?

Research gap

While extensive research has been conducted on the technical aspects of big data analytics and its implementation in various industries, there is a significant gap in the literature regarding its adoption in the telecommunications sector, particularly

in the Egyptian context. The existing body of knowledge lacks a comprehensive understanding of how resistance to technological change moderates the relationship between big data analytics adoption and organizational performance in this specific industry and geographical setting.

Furthermore, the interplay between individual, organizational, and technological factors influencing big data analytics adoption in Egyptian telecommunications companies remains understudied. The unique challenges these organizations face in navigating organizational change, overcoming employee resistance, and leveraging data-driven approaches have not been thoroughly explored.

This study aims to bridge these gaps by:

1. Examining the moderating role of resistance to technological change in the context of big data analytics adoption in Egyptian telecommunications companies.
2. Investigating the multifaceted factors influencing the adoption process across individual, organizational, and technological levels.
3. Exploring the impact of change management practices and organizational culture on the successful implementation of big data analytics in this specific industry context.
4. Analyzing employee attitudes towards innovation and data-driven decision-making and their effects on the adoption process

Literature review

The study by (Alshawawreh A Ra'Ed, 2024) aimed to explore the potential uses of Big Data for enhancing the competitive position of telecommunication companies based on the Resource-Based View Theory. A quantitative approach was employed to collect and analyze primary data from 304 telecommunications companies, which was then utilized to test hypotheses related to the targeted phenomena. A structural equation model was proposed to analyze the effects of Big Data Analytics (BDA) on achieving a competitive advantage. The results indicated that BDA improves electronic word of

mouth (e-WOM) and electronic customer relationship management (e-CRM). Furthermore, it was found that BDA improves social media platforms. In addition, e-WOM, e-CRM, and social media were found to improve market performance, ultimately boosting competitive advantage. This research underscores the significance of analyzing BDA to achieve a competitive advantage among competing telecommunication firms, The study by (Ibrahim, A.A., & Abu Bakar, A.R.,2024) aimed to Identify, the crucial role in guiding organizational decision-making, big data analytics has garnered a great deal of scholarly attention in recent years. It is becoming increasingly clear that big data analytics capabilities, or BDAC, can assist businesses in various industrial contexts to gain a competitive edge. Prior studies have looked at BDAC's impact from a technology standpoint, but a more comprehensive strategic study is lacking. Thus, from the dynamic capacities view, this study suggests a conceptual model that looks into the direct and indirect relationships between the three dimensions of BDAC, environmental scanning, and an organization's strategic intent. This study aimed to examine the effects on the performance of Egyptian industrial organizations of the relationship between Big Data Predictive Analytics (BDPA) dynamic capability and integration of cloud ERP and BI based on the Technology-Organization-Environment (TOE) framework. After being designed utilizing constructs from earlier research that were related to study variables, the Survey was altered to meet the objectives of the investigation. 200 businesses from various Egyptian industrial sectors were surveyed using a questionnaire list as the data collection tool. The research hypothesis test was based on the structural equation modeling method of partial least squares method based on variance to analyze data through the "Smart-PLS" program The findings showed that enhancing the integration of cloud ERP and BI and establishing a favorable association between BDPA and these factors had a moderate impact on both operational and financial performance in the Egyptian context (Mohasseb, A.M.,2024), The study by (Maroufkhani P., et al, 2023) examines the

impact of Technological, Organizational, and Environmental (TOE) factors on the adoption of Big Data Analytics (BDA) in Small and Medium-Sized Enterprises (SMEs), thereby challenging the notion that these elements are independent. It was suggested that organizational and technological issues and BDA adoption could be mediated by top management support. Additionally, an assessment was conducted on the moderating influence of environmental factors on the relationship between relative advantage, compatibility, competitiveness, organizational readiness, and adoption of BD, the results validated the connections between the TOE components. Top management support acted as a mediating factor between compatibility, competitiveness, and organizational readiness as they related to BDA adoption. Additionally, organizational preparedness and compatibility have a moderating effect on top management support due to environmental circumstances. This study by (Lai y et al, 2018) aims to discuss the variables influencing businesses' decisions to implement BDA in their day-to-day operations. This analysis specifically divides probable contributing variables into four groups: organizational, environmental, technical, and SC features, The study by (Mikalef P et al 2019) Big data analytics is considered by many in commercial and academic circles to be a revolutionary technical advancement. Even though the number of businesses implementing big data efforts is increasing, little is known about how businesses convert the potential of these technologies into profit. According to the literature, businesses need to build strong big data analytics capabilities if they want to take advantage of big data analytics and achieve performance advantages. However, the majority of research are predicated on the notion that related resources are equally important in all circumstances and that there is little variation in how businesses develop their big data analytics skills. The study by (Grover, V,2018) aimed to focus on big data and analytics (BDA), but it is unclear how successful these projects are and what strategic value they produce. Few studies have looked at how BDA affects organizational value; instead, the majority of BDA literature

focuses on how it can be utilized to improve tactical organizational skills. Furthermore, how BDA can benefit the business strategically is not well framed. Ultimately, the achievement of strategic business value, which provides businesses with a competitive edge, is what makes a BDA project successful. Here, we outline the constituents of BDA to characterize its value proposition. By expanding on pre-existing information technology value frameworks, we provide a framing of BDA value, which is then demonstrated by real-world BDA applications. After that, the framework's applicability for examining concepts and connections related to the development and implementation of BDA value is examined. A problem-oriented perspective of the framework is also presented, wherein issues in BDA components might lead to specific research topics and directions for further investigation. By focusing research and practice on the efficient use of data resources, the study's design may aid in the development of a noteworthy research agenda for BDA.

What distinguishes the present study from previous ones?

Previous studies on adopting Big Data analytics in Egyptian mobile companies have focused on the direct factors influencing implementation, such as organizational readiness, perceived benefits, and technical infrastructure. However, your research introduces a novel perspective by examining the moderating role of resistance to technological change in this adoption process. This unique approach allows for a more nuanced understanding of how employee attitudes and organizational culture can impact the successful integration of Big Data analytics. By considering resistance to change as a moderating variable, your study provides valuable insights into the complex interplay between technological innovation and human factors in the context of Egyptian mobile companies. This distinction sets your research apart from previous work. It contributes to a more comprehensive understanding of the challenges and

opportunities in Big Data analytics adoption within this specific industry and geographic context.

customers' demands is what sets companies apart from one another. As a result, businesses must begin concentrating on customer experience management (CEM). Customer experience management is the approach used by the organization to manage all customer interactions with its products and services, (younis, R 2021).

What distinguishes the present study from previous ones?

Previous studies on adopting Big Data analytics in Egyptian mobile companies have focused on the direct factors influencing implementation, such as organizational readiness, perceived benefits, and technical infrastructure. However, your research introduces a novel perspective by examining the moderating role of resistance to technological change in this adoption process. This unique approach allows for a more nuanced understanding of how employee attitudes and organizational culture can impact the successful integration of Big Data analytics. By considering resistance to change as a moderating variable, your study provides valuable insights into the complex interplay between technological innovation and human factors in the context of Egyptian mobile companies. This distinction sets your research apart from previous work. It contributes to a more comprehensive understanding of the challenges and opportunities in Big Data analytics adoption within this specific industry and geographic context.

Objectives of research

1- To investigate the current state of big data analytics technology adoption within leading mobile telecommunications companies in Egypt.

2. To identify key factors influencing the successful implementation and integration of big data analytics solutions in Egyptian mobile telecommunications organizations.

3. To examine the moderating role of resistance to technological change in the adoption of big data analytics within the Egyptian telecommunications sector.

4. To explore the manifestations and underlying causes of employee resistance to change, including skepticism towards new methodologies, job insecurity concerns, and aversion to disrupting established routines.

5. To analyze how organizational culture, communication strategies, and change management practices impact the mitigation or exacerbation of resistance to technological change within these companies.

6. To contribute to the theoretical understanding of technology acceptance models and change management processes within the context of the Egyptian telecommunications sector.

7. To provide insights into fostering an innovation culture and overcoming barriers to big data analytics adoption, thereby enabling these companies to enhance customer experiences, optimize operations, and maintain competitive advantage in an increasingly data-driven landscape.

Research Hypotheses

1- There is a correlational relationship between Big Data Analytics and their factors and the Moderating Role of Resistance to Technological Change with their factors

2- There are no significant differences in the levels of (Big Data Analytics, Moderating the Role of Resistance to Technological Change) according to the Gender variable.

3-There is no significant variation in the levels of (Big Data Analytics, Moderating the Role of Resistance to Technological Change) according to the Management Levels variable.

4-The impact of the independent variables (Big Data Analytics) in explaining the variance in the dependent variable (Moderating Role of Resistance to Technological Change) varies according to the regression coefficients.

The Methodology of the Research

A-Research methods

The researchers relied on the following practical methodology:

1- Theoretical study: based on the analytical descriptive approach using books, references and the world's literature.

2- Pilot study: they were applied to a pilot sample of 80 respondents. Following the observation of the results, Following the observation of the results, they were processed. The Pearson correlation coefficient was calculated between the factors and the total scale score.

B- Practical study: without relying on electronic identification and distribution to employees, using statistical program SPSS.

Statistical analysis and testing of research hypotheses and access to specific findings and proposals.

C-Variables of study:

independent Variable: Adoption of Big Data Analytics.

- Big Data Infrastructure (high-performance storage and computing systems).
- Big Data Analytics Techniques (machine learning, network analytics, etc.).
- Big Data Analytics Skills (data analysts, data scientists).
- Organizational Readiness (data culture, effective project management).

Moderating Variable: Resistance to Technological Change.

Dependent Variable: Telecommunications Company Performance.

D- Sample and population

In the research, reliance was placed on internal consistency validity to verify the accuracy of the measure. To assess the internal consistency validity of the scales (Big

Data Analytics, Moderating Role of Resistance to Technological Change), they were applied to a pilot sample of 80 respondents.

E- Methods of measuring variables

The study community represents Telecommunication companies in Egypt (We, Vodafone, Orange Egypt, and Etisalat). The resolution was relied upon and distributed to a sample of 380 questionnaires in Telecommunication companies in Egypt Randomly(according to (Andrson et al 2007), (https://goodcalculators.com/sample-size-calculator/). The method chosen was based on equation 1), 350 were retrieved. The statistical program SPSS is based on the 24th test of study hypotheses. We are using multiple linear regression tests to determine the Adoption of analytical big data on performance in mobile companies in Egypt. A sample of research is shown in Table 5. The statistical results and the paperwork test will be presented and discussed in the paper.

Theoretical framework for the study

Procedural Definitions:

Big data: is an information asset that requires certain technologies and analytical techniques to turn into value because of its high volume, velocity, and variety. When referring specifically to the particular technology and methods mentioned in the main definition, words like "Big Data Technology" and "Big Data Methods" might be used in conjunction with this definition (Mauro, D.A., et al, 2017).

Adopting big data analytics: is the strategic organizational process of utilizing cutting-edge computing techniques and technology for the collection, processing, and analysis of large-scale, complex information (Duan, Y et al, 2022).

1-Analytical big data

The factors that affect the practices of big data analytics applications by commercial banks operating in Jordan and their performance. Data was collected from 235 senior and middle managers in commercial banks (information technology, finance, and marketing). The results of the study found that the practices of big data analytics applications have a positive impact on bank performance. Additionally, the scope of big data analytics application practices by commercial banks operating in Jordan is considered moderate (i.e., 60%), (Al-Dmour et al. 2023), the extent to which big data technology requirements affect business intelligence and identify the extent to which business intelligence affects organizational agility. It also aimed to identify the extent to which big data technology requirements affect organizational agility in light of business intelligence as a mediating variable. This was applied to commercial banks in Greater Cairo. The results of the study found that there is a direct positive impact of big data technology requirements on business intelligence and that big data technology requirements have a direct positive impact on organizational agility. Additionally, business intelligence partially mediates this relationship. Workplace (Elias et al, 2022). Meanwhile, the effect of big data analytics on the operational efficiency of the Commercial International Bank, which is considered the first bank in Egypt and the Middle East that begin implementing a strategy in 2015 to utilize big data, and used it in 2017. The bank now has a global data analytics center. The data envelopment analysis method was used to obtain the bank's efficiency coefficient during the period from 2010 to 2021. The results of the study found that one of the main reasons for the decrease in the bank's efficiency coefficient was the decrease in the non-interest income rate, with a positive impact of big data analytics on the bank's efficiency coefficient, (Ahmed et al. 2022). In the same the impact of technological, organizational, and environmental factors on the adoption of big data in the context of small and medium-sized enterprises in Jordan, The results of the study found that relative

advantage, complexity, security, top management support, organizational readiness, and government support positively influence the adoption of big data (BD), while competitive pressure and compatibility did not have a significant impact, (Lutfi et al. 2022), the effect of using big data analytics on decision-making quality and tested the mediating effect of data analytics capabilities. The study included data from 260 agricultural companies in China. The results of the study found that the use of big data analytics had a positive effect on decision-making quality and that data analytics capabilities played a mediating role in the relationship between the use of big data analytics and decision-making quality. Similarly, the study by (Behl et al, 2022) aimed to identify the role of big data analytics capabilities in enhancing sustainable competitive advantage in micro, small, and medium-sized enterprises. Data was collected from 312 employees in the service sector of Indian micro, small, and medium-sized enterprises. The study's results found that big data analytics capabilities indirectly affect sustainable competitive advantage (Li, et al, 2022). The importance of the characteristics of entrepreneurs and small and medium-sized enterprises (SMEs) in digital transformation. The study sample consisted of 369 Indian entrepreneurs in SMEs. The study results showed that SME owners' digital self-efficacy positively affects companies' digital transformation and that SMEs managed by a professional leader will achieve better results in the digital transformation journey. The study observed a strong moderating effect of the entrepreneur's age and the company's age between digital self-efficacy and digital transformation and between digital transformation and company performance (Malodia, S et al, 2023).

2-Adopting big data and the performance of the companies

the impact of big data analytics in improving the efficiency of the balanced scorecard by focusing on the customer and employee perspectives. The empirical study relied on hypothetical data from a company that applies the balanced scorecard. A questionnaire

was designed based on the hypothetical data and 104 questionnaires were distributed and collected from professional accountants in the Arab Republic of Egypt, and these questionnaires were sent via email to the respondents. The study found that the use of big data analytics enhances the efficiency of the customer dimension, as it increases the company's ability to analyze unstructured customer data and reduces the cost of collecting this data and the time consumed in analysis. In addition, it increases the ability to solve customer problems in less time, enhances the capability of the employee dimension to enable companies to monitor employee behavior, and reduces the time consumed in measuring the productivity of employees and workers in the company (Ali Q et al, 2020). The impact of big data analytics on operational performance in Jordanian telecommunication companies (Umniah, Orange, and Zain), in addition to the mediating role played by business intelligence between big data analytics and operational performance. To achieve this goal, the study addressed the theoretical framework of both operational performance and big data and business intelligence, as well as the impact of big data on operational performance, taking business intelligence as a mediating variable. The field study relied on the comprehensive survey method, and 218 questionnaires were distributed to two groups of employees in the Jordanian telecommunication companies under study, namely managers and data analysts. The questionnaires were sent via email to the respondents. The number of valid questionnaires for analysis was 181, with a response rate of 83.02% of the total distributed questionnaires. The study found that telecommunication companies use data from various sources; therefore, these companies are keen on using big data technology to link their diverse data sources Our contribution is to provide light on how external forces influence resource selection under the moderating influence of big data culture, how those resources are used to build capability, and how that capability impacts operational performance and cost. the study by (Raguso E, et al,2018) aimed to It has recently been acknowledged that one of the most significant areas of upcoming

technology is big data. Numerous industries have expressed interest in it because of its potential to offer highly valuable commercial opportunities to businesses. This study looks at the different kinds of business value that may be generated by big data analytics investments, the direct implications that these investments can have on a company's financial success, and the mediating roles that market performance and customer happiness can play. This study shows that the business value obtained from investments in big data analytics results in benefits in terms of a firm's financial performance, based on the resource-based view hypothesis. The findings provide proof of the presence of a mediation effect related to customer satisfaction and the lack of performance and customer happiness, thirteen important elements that have the biggest effects on BDA in SMEs were identified by the study. Support from upper management, training, comparative advantage, security, compatibility, complexity, flexibility, government policies, competency, teamwork, digital transformation tools, and decision quality are some of these aspects. The review's conclusions can help practitioners, researchers, and decision-makers comprehend the variables that affect big data analytics adoption as well as the possible advantages and difficulties of putting it into practice. The results will provide important insights for companies looking to build strong data governance frameworks that support successful BDA projects by illuminating the interactions between data governance and other factors driving adoption (Aldossaril, S et al, 2023).

3-Adopting big data analytics and resistance to change

The terms working with changes in individual behavior and "capturing the value of changes being made are used in change management (Hallin A., et al, 2020). It entails examining how initiatives are started, how they are organized, and how people are helped to effectively adjust to new developments. It also entails assessing an organization's capacity for ongoing change adaptation (Payne D., et al, 2022). However,

depending on the type of changes under focus, there are several approaches to working with change management. Therefore, it is critical to recognize the features of the shifts in emphasis, to guarantee that the appropriate strategic viewpoint is applied when implementing appropriate models and structures, to obtain a summary of the modifications that must be made, and to guarantee that resources. A planned change approach where management initiates the change (Jager, S. D., et al., 2021) fits best in a basic, stable environment where developments are clear and future situations predictable. An organizational change viewpoint may be more useful for changes involving a more complicated or dynamic issue where numerous developments are happening simultaneously, influencing one another, are more continuous, and predictability is less assured (Boonstra, J, 2022). The ability of an organization to adjust to changes and build a team with the necessary skills to effectively manage both planned and ongoing changes is referred to as organizational ability to change. The introduction of new technologies in a company has an effect on employees' performance and well-being (Kadir & Broberg, 2020), and it may also have an effect on the skills needed (Balsmeier, B., & Woerter, M., 2019). Moreover, resistance is a common human reaction to change since people typically prefer the status quo and find it difficult to break old behaviors (McLaren, T. A. S et al, 2022). Therefore, in order to comprehend the difficulties of effectively managing digital transformations, it is crucial to be aware of potential technology-specific resistance as well as the readiness for digital transformations among humans. Analogously, from the standpoint of change management, comprehending how people respond to changes is the primary goal for change project success. Resistant behavior refers to expressing negative reactions to change, whereas Positive responses, however, show that people are prepared for change (Endrejat, P. C et al, 2021). Resistance and readiness for change can also be characterized as belonging to distinct behavioral types; resistance is associated with preventive conduct, while readiness is associated with promotion behavior. According

to (Ito, A., et al, 2021), people who practice prevention may feel hesitant or as though they stand to lose if the change is successful. These people also have a strong need for clear communication and specific information, as stated by (Petrou, P, 2018).

Analysis and discussion of results

1-Study tools:

Pilot study: a pilot study has been done on a sample of 80 respondents to verify the accuracy of the measure, the result is shown in Tables 1,2,3,4.

Validity

In the research, reliance was placed on internal consistency validity to verify the accuracy of the measure. To assess the internal consistency validity of the scales (Big Data Analytics, Moderating Role of Resistance to Technological Change), they were applied to a pilot sample of 80 respondents. Following the observation of the results, they were processed. The Pearson correlation coefficient was calculated between the factors and the total scale score, the results are shown in the table 1, and 2.

Table 1: Big Data Analytics

Factors	No of Items	R	Sig
Big data infrastructure	3	0.839**	<0.001
Big Data Analytics Techniques	3	0.838**	<0.001
Big Data Analytics Skills	3	0.843**	<0.001
Organizational Readiness	6	0.808**	<0.001

Table 2: Moderating Role of Resistance to Technological Change

Factors	No of Items	R	Sig
Resistance to Technological Change	10	0.808**	<0.001
Telecommunications Company Performance	4	0.822**	<0.001

The previous tables reveal that the correlation coefficient values of the scale dimensions are statistically significant at the 0.01 level of significance, indicating the homogeneity of the scales and allowing their use in the current research.

Reliability

Reliability coefficients for the scales (Big Data Analytics, Moderating Role of Resistance to Technological Change) were calculated using Cronbach's Alpha coefficient.

Table 3: Big Data Analytics

Factors	No of Items	Cronbach's Alpha
Big data infrastructure	3	0.894
Big Data Analytics Techniques	3	0.891
Big Data Analytics Skills	3	0.882
Organizational Readiness	6	0.881
All	15	0.890

Table 4: Moderating Role of Resistance to Technological Change

Factors	No of Items	Cronbach's Alpha
Resistance to Technological Change	10	0.805
Telecommunications Company Performance	4	0.894
All	14	0.877

The previous tables indicate that Cronbach's Alpha reliability coefficients are high, confirming the scales' stability and suitability for use in the current research.

Sample of study:

Sample Size

The sample size was determined using a formula suitable for unknown or very large populations (Andrson et al 2007), (https://goodcalculators.com/sample-size-calculator/). The method chosen was based on the equation 1:

$$n = \frac{Z^2 \times p \times (1-p)}{E^2} \quad (1)$$

where 'n' represents the required sample size. A confidence level of 95% was set, corresponding to a Z-value of 1.96, and a default proportion (p) of 0.5 was used, indicating a 50% expected prevalence of the characteristic of interest. The margin of error (E) was set at 5%. Using these values, the calculated sample size was approximately 384.16, which was rounded up to 385 for practicality. This sample size ensures that study results are representative and reliable, maintaining a 95% confidence level and a margin of error not exceeding 5%.

Study Sample:

Table 5: Study Sample

Gender	Frequency	Percent
Female	230	59.74%
Male	155	40.26%
Total	385	100
Company Name	**Frequency**	**Percent**
We	89	23.12%
Vodafone Egypt	116	30.13%
Orange Egypt	86	22.34%
Etisalat Misr	94	24.42%
Total	385	100
Management Levels	**Frequency**	**Percent**
First-line Management	107	27.79%
Middle Management	197	51.17%
Executive Management	81	21.04%
Total	385	100

Source of the table, (The researcher)

The previous table detailed a breakdown of the study sample across three key demographic categories: Gender, Company Name, and Management Levels.

Study Sample Composition:

1. Gender Distribution:

- -The sample comprises 385 participants, with a notable gender imbalance:
- Female participants: 230 (59.74%)
- Male participants: 155 (40.26%)

This distribution indicates a higher representation of females in the study, with a difference of approximately 19.48 percentage points.

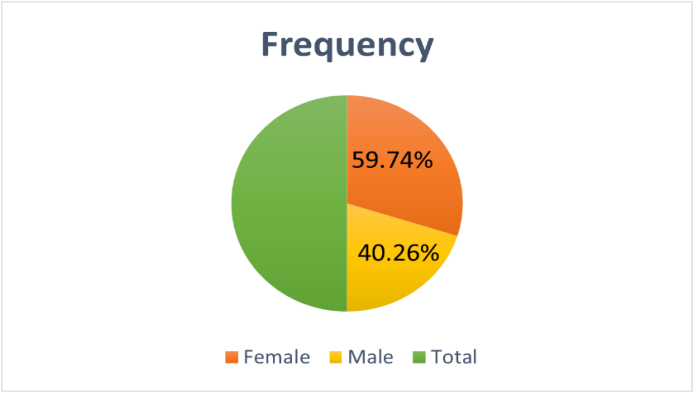

Figure 1 shows the distribution relative by Gender (prepared by the researcher)

2. Company Representation:

- The study encompasses employees from four telecommunications companies in Egypt:
- Vodafone Egypt: 116 participants (30.13%)
- Etisalat Misr: 94 participants (24.42%)
- We: 89 participants (23.12%)
- Orange Egypt: 86 participants (22.34%)

*Vodafone Egypt has the highest representation, while Orange Egypt has the lowest. The distribution across companies is relatively balanced, with all four companies having between 22% and 30% of the total sample.

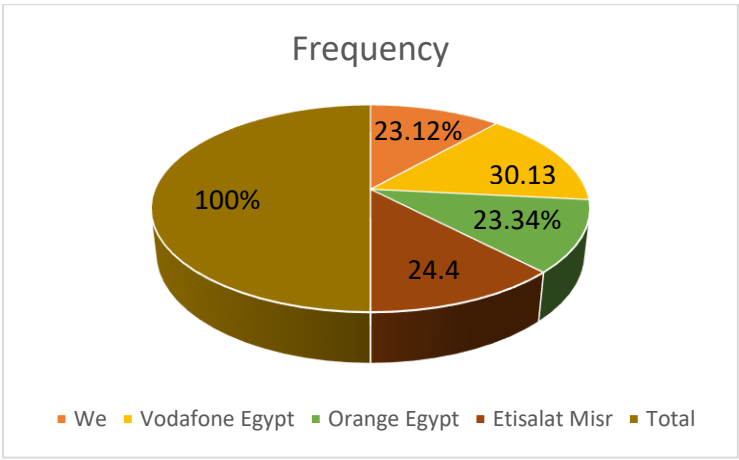

Figure 2 shows the distribution across telecommunication companies (prepared by a researcher)

3. Management Level Stratification:

- The sample is divided into three management levels:
- Middle Management: 197 participants (51.17%)
- First-line Management: 107 participants (27.79%)
- Executive Management: 81 participants (21.04%)

Middle management constitutes the majority of the sample, representing over half of the participants. First-line management forms the second largest group, while executive management has the smallest representation.

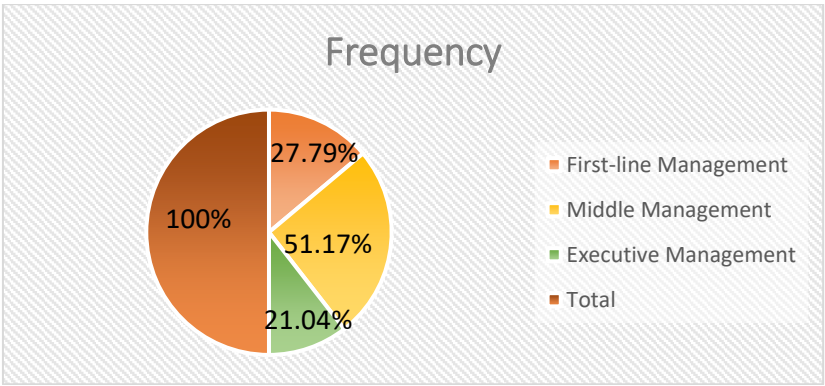

Figure 3 shows Management-level Satisfaction (prepared by the researcher)

Sample Size Consistency:

It's noteworthy that the total number of participants (385) remains consistent across all three categories, aligning with the previously determined sample size. This consistency suggests a well-structured data collection process and adherence to the planned sample size.

Implications for Analysis:

1. The gender imbalance may necessitate consideration in gender-related analyses or when concluding gender-specific aspects of the study.

2. The relatively even distribution among companies allows for meaningful comparisons between different telecommunications providers in Egypt.

3. The predominance of middle management in the sample could provide robust insights into this particular organizational level, while potentially limiting the generalizability of findings to other management levels.

In conclusion, this sample composition provides a diverse representation across gender, companies, and management levels within the Egyptian telecommunications sector. The stratification of the sample allows for various analytical approaches, including comparative analyses between different subgroups. However, researchers

should be mindful of the potential limitations posed by the uneven distributions, particularly at gender and management levels, when interpreting and generalizing the study's findings.

1. Big Data Analytics

1.1. Big data infrastructure

Table 6 Chi-square

Item	Strongly Agree		Agree		Natural		Disagree		Strongly Disagree		Rank	X^2	Sig
	F	%	F	%	F	%	F	%	F	%			
1	137	35.6	125	32.5	123	31.9	-	-	-	-	2	258.156	<0.001
2	178	46.2	110	28.6	97	25.2	-	-	-	-	1	305.818	<0.001
3	133	34.5	127	33	125	32.5	-	-	-	-	3	257.117	<0.001

(F: Frequency and %: Percent), df=4

1.2. Big Data Analytics Techniques

Table 6.1 Chi-square

Item	Strongly Agree		Agree		Natural		Disagree		Strongly Disagree		Rank	X^2	Sig
	F	%	F	%	F	%	F	%	F	%			
1	149	38.7	130	33.8	106	27.5	-	-	-	-	3	268.727	<0.001
2	160	41.6	114	29.6	111	28.8	-	-	-	-	2	276.26	<0.001
3	171	44.4	114	29.6	100	26	-	-	-	-	1	293.403	<0.001

(F: Frequency and %: Percent), df=4

1.3. Big Data Analytics Skills

Table 6.2 Chi-square

Item	Strongly Agree		Agree		Natural		Disagree		Strongly Disagree		Rank	X^2	Sig
	F	%	F	%	F	%	F	%	F	%			
1	148	38.4	127	33	110	28.6	-	-	-	-	2	266.078	<0.001
2	132	34.3	130	33.8	123	31.9	-	-	-	-	4	257.247	<0.001
3	152	39.5	125	32.5	108	28.1	-	-	-	-	1	269.455	<0.001
4	145	37.7	135	35.1	105	27.3	-	-	-	-	3	267.922	<0.001

(F: Frequency and %: Percent), df=4

1.4. Organizational Readiness

Table 6.3 Chi-square

Item	Strongly Agree		Agree		Natural		Disagree		Strongly Disagree		Rank	X^2	Sig
	F	%	F	%	F	%	F	%	F	%			
1	150	39	128	33.2	107	27.8	-	-	-	-	3	268.675	<0.001
2	146	37.9	124	32.2	115	29.9	-	-	-	-	4	263.273	<0.001
3	160	41.6	112	29.1	113	29.4	-	-	-	-	1	276.208	<0.001
4	158	41	127	33	100	26	-	-	-	-	2	278.545	<0.001
5	145	37.7	126	32.7	114	29.6	-	-	-	-	5	263.013	<0.001
6	139	36.1	131	34	115	29.9	-	-	-	-	6	260.545	<0.001

(F: Frequency and %: Percent), df=4

This section presents chi-square analyses for four aspects of Big Data Analytics:

1.1. Big data infrastructure

1.2. Big Data Analytics Techniques

1.3. Big Data Analytics Skills

1.4. Organizational Readiness

For each aspect, a chi-square test was conducted. All items across all four aspects show statistically significant results ($p < 0.001$), with a strong tendency towards "Strongly

Agree" responses. This indicates a generally positive perception of Big Data Analytics capabilities and readiness within the surveyed organizations.

2. Moderating Role of Resistance to Technological Change

2.1. Resistance to Technological Change

Table 6.4 Chi-square

Item	Strongly Agree		Agree		Natural		Disagree		Strongly Disagree		Rank	X^2	Sig
	F	%	F	%	F	%	F	%	F	%			
1	-	-	-	-	95	24.7	97	25.2	193	50.1	3	338.156	<.001
2	-	-	-	-	91	23.6	116	30.1	178	46.2	10	308.779	<.001
3	-	-	-	-	93	24.2	105	27.3	187	48.6	7	324.649	<.001
4	-	-	-	-	88	22.9	107	27.8	190	49.4	5	333.091	<.001
5	-	-	-	-	99	25.7	101	26.2	185	48.1	8	319.247	<.001
6	-	-	-	-	80	20.8	114	29.6	191	49.6	4	340.675	<.001
7	-	-	-	-	86	22.3	106	27.5	193	50.1	2	340.727	<.001
8	-	-	-	-	92	23.9	103	26.8	190	49.4	6	331.532	<.001
9	-	-	-	-	102	26.5	104	27	179	46.5	9	306.701	<.001
10	-	-	-	-	88	22.9	93	24.2	204	53	1	368.364	<.001

(F: Frequency and %: Percent), df=4

2. Moderating Role of Resistance to Technological Change.

2.1. Resistance to Technological Change.

A chi-square analysis was conducted for ten items measuring resistance to technological change. All items show statistically significant results ($p < .001$), with a strong tendency towards "Strongly Disagree" responses. This suggests that the surveyed population generally does not exhibit strong resistance to technological change.

2.2. Telecommunications Company Performance

Table 6.5 Chi-square

Item	Strongly Agree		Agree		Natural		Disagree		Strongly Disagree		Rank	X^2	Sig
	F	%	F	%	F	%	F	%	F	%			
1	159	41.3	114	29.6	112	29.1	-	-	-	-	4	275.013	<0.001
2	168	43.6	110	28.6	107	27.8	-	-	-	-	2	287.377	<0.001
3	166	43.1	119	30.9	100	26	-	-	-	-	3	286.649	<0.001
4	174	45.2	111	28.8	100	26	-	-	-	-	1	298.078	<0.001

(F: Frequency and %: Percent), df=4

2.2. Telecommunications Company Performance

The chi-square analysis for this section also shows statistically significant results ($p < .001$) for all items, with a strong tendency towards "Strongly Agree" responses. This indicates a positive perception of telecommunications company performance in Big Data Analytics.

3. Hypotheses Testing

1. First Hypothesis

There is a correlational relationship between Big Data Analytics with their factors and the Moderating Role of Resistance to Technological Change with their factors.

Table (7) Pearson correlation coefficients

Big Data Analytics		Moderating Role of Resistance to Technological Change		
		Resistance to Technological Change	Telecommunications Company Performance	ALL
Big data infrastructure	Pearson	-0.798**	0.842**	0.835**
	Sig	<0.001	<0.001	<0.001
Big Data Analytics Techniques	Pearson	-0.825**	0.823**	0.849**
	Sig	<0.001	<0.001	<0.001
Big Data Analytics Skills	Pearson	-0.845**	0.816**	0.724**

Big Data Analytics		Moderating Role of Resistance to Technological Change		
		Resistance to Technological Change	Telecommunications Company Performance	ALL
	Sig	<0.001	<0.001	<0.001
Organizational Readiness	Pearson	-0.826**	0.748**	0.825**
	Sig	<0.001	<0.001	<0.001
ALL	Pearson	-0.719**	0.835**	0.748**
	Sig	<0.001	<0.001	<0.001

To test this hypothesis, Pearson correlation coefficients were calculated between the components of Big Data Analytics and the Moderating Role of Resistance to Technological Change. The analysis reveals the following key findings:

1. Relationship between Big Data Analytics and Resistance to Technological Change:

- There is a strong negative correlation between all factors of Big Data Analytics and Resistance to Technological Change.
- The correlation coefficients range from -0.719 to -0.845, all significant at p <0.001.
- This indicates that as Big Data Analytics implementation increases, Resistance to Technological Change decreases substantially.

2. Relationship between Big Data Analytics and Telecommunications Company Performance:

- There is a strong positive correlation between all factors of Big Data Analytics and Telecommunications Company Performance.
- The correlation coefficients range from 0.748 to 0.842, all significant at p < 0.001.
- This suggests that increased implementation of Big Data Analytics is associated with improved Telecommunications Company Performance.

3. Overall relationship:

The overall correlation between Big Data Analytics and the Moderating Role of Resistance to Technological Change (combining both Resistance to Technological Change and Telecommunications Company Performance) is strong and positive ($r = 0.748$, $p < 0.001$).

Specific correlations of note:

- Big Data Analytics Skills show the strongest negative correlation with Resistance to Technological Change ($r = -0.845$).
- Big Data Infrastructure has the strongest positive correlation with Telecommunications Company Performance ($r = 0.842$).

In conclusion, the hypothesis is supported by the data. There are significant correlational relationships between Big Data Analytics and the components of the Moderating Role of Resistance to Technological Change. The relationships are negative with Resistance to Technological Change and positive with Telecommunications Company Performance. These findings suggest that as organizations implement Big Data Analytics, they may experience less resistance to technological change and improved company performance in the telecommunications sector.

Second Hypothesis

There are no significant differences in the levels of (Big Data Analytics, Moderating the Role of Resistance to Technological Change) according to the Gender variable.

Table 8 t-test

Factor	Gender	N	Mean	STD	DF	T	Sig
Big Data Analytics	Female	230	63.9	3.159	383	-8.158	<0.001
	Male	155	67.17	4.712			
	Female	230	55.89	3.18	383		<0.001

Factor	Gender	N	Mean	STD	DF	T	Sig
Moderating Role of Resistance to Technological Change	Male	155	63.7	6.365		-15.906	

This hypothesis aims to investigate whether gender plays a role in influencing perceptions or implementations of Big Data Analytics and the Moderating Role of Resistance to Technological Change within the organization.

To test this hypothesis, an independent samples t-test was conducted. This statistical test is appropriate when comparing the means of two independent groups (in this case, male and female) on continuous dependent variables.

Results:

The t-test results reveal significant differences between males and females for both Big Data Analytics and the Moderating Role of Resistance to Technological Change.

1. Big Data Analytics:

- Female (N = 230): Mean = 63.9, Standard Deviation = 3.159
- Male (N = 155): Mean = 67.17, Standard Deviation = 4.712
- t-value = -8.158, degrees of freedom (df) = 383, $p < 0.001$

2. Moderating Role of Resistance to Technological Change:

- Female (N = 230): Mean = 55.89, Standard Deviation = 3.18
- Male (N = 155): Mean = 63.7, Standard Deviation = 6.365
- t-value = -15.906, degrees of freedom (df) = 383, $p < 0.001$

Interpretation:

1. Big Data Analytics:

The results indicate a statistically significant difference between males and females in their perceptions or implementations of Big Data Analytics. Males reported a higher mean score (67.17) compared to females (63.9). Because Males were overrepresented in the sample compared to females This difference is statistically significant ($p < 0.001$), suggesting that gender does play a role in how Big Data Analytics is perceived or implemented within the organization.

Additional factors could account for these results such as: Cultural Factors- Psychological Factors- organizational factors but These factors were not directly addressed in the study.

2. Moderating Role of Resistance to Technological Change:

Similarly, there is a statistically significant difference between males and females regarding the Moderating Role of Resistance to Technological Change. Males again reported a higher mean score (63.7) compared to females (55.89). This difference is also statistically significant ($p < 0.001$), indicating that gender influences the moderating role of resistance to technological change.

Conclusion:

The null hypothesis, which stated that there are no significant differences based on gender, is rejected for both variables. The analysis reveals that there are indeed significant differences between males and females in their perceptions or implementations of Big Data Analytics and the Moderating Role of Resistance to Technological Change.

Implications:

These findings suggest that gender is an important factor to consider when implementing Big Data Analytics strategies or managing resistance to technological change within organizations. The higher mean scores for males in both variables might indicate that males have a more positive perception of Big Data Analytics and are potentially less resistant to technological change compared to their female counterparts.

Limitations and Future Research:

1-While these results are statistically significant, it's important to note that correlation does not imply causation. Other factors not accounted for in this analysis might influence these gender differences. Future research could explore the reasons behind these gender differences, potentially examining factors such as job roles, education levels, or organizational culture that might interact with gender to influence these perceptions. This detailed analysis provides a comprehensive understanding of the second hypothesis, its testing methodology, results, and implications within the context of Big Data Analytics and resistance to technological change in organizations.

Third Hypothesis

There is no significant variation in the levels of (Big Data Analytics, Moderating Role of Resistance to Technological Change) according to the Management Levels variable.

Table (9) Descriptives

Variable	Management Levels	N	Mean	Std. Deviation
Big Data Analytics	First-line Management	107	63.36	3.169
	Middle Management	197	64.55	3.099
	Executive Management	81	69.26	4.964

Variable	Management Levels	N	Mean	Std. Deviation
Moderating Role of Resistance to Technological Change	First-line Management	107	55.93	3.178
	Middle Management	197	57.32	4.651
	Executive Management	81	67.3	4.694

Table (9.1) One-Way ANOVA

Factor	Variance Type	Sum of Squares	DF	Mean Square	F	Sig.
Big Data Analytics	Between Groups	1777.504	2	888.752	69.018	<0.001
	Within Groups	4919.031	382	12.877		
	Total	6696.535	384			
Moderating Role of Resistance to Technological Change	Between Groups	7132.852	2	3566.426	192.626	<0.001
	Within Groups	7072.639	382	18.515		
	Total	14205.49	384			

Table (9.2) LSD

Factor	Management Levels (I)	Management Levels (J)	Mean Difference (I-J)	Sig.
Big Data Analytics	First-line Management	Middle Management	1.189-*	0.006

Factor	Management Levels (I)	Management Levels (J)	Mean Difference (I-J)	Sig.
		Executive Management	5.895-*	<0.001
	Middle Management	Executive Management	4.706-*	<0.001
Moderating Role of Resistance to Technological Change	First-line Management	Middle Management	1.390-*	0.007
		Executive Management	11.362-*	<0.001
	Middle Management	Executive Management	9.971-*	<0.001

A one-way ANOVA was performed to examine differences across management levels (First-line, Middle, and Executive) in Big Data Analytics and the Moderating Role of Resistance to Technological Change. Results show statistically significant differences ($p < .001$) for both variables across management levels. Post-hoc LSD tests reveal:

For Big Data Analytics:

- Executive Management scored significantly higher than both Middle and First-line Management
- Middle Management scored significantly higher than First-line Management

For Moderating Role of Resistance to Technological Change:

- Executive Management scored significantly higher than both Middle and First-line Management
- Middle Management scored significantly higher than First-line Management

These results suggest that higher management levels are associated with greater Big Data Analytics capabilities and, interestingly, higher resistance to technological change.

can be attributed to several factors:

- **Strategic Focus:** Executives may possess a broader, strategic perspective on the organization, enabling them to recognize the potential of Big Data Analytics for competitive advantage. However, their focus on long-term organizational goals might lead to a cautious approach to implementing disruptive technologies.
- **Risk Aversion:** As the highest-level decision-makers, executives may be more risk-averse due to the potential consequences of failed technological initiatives. This could manifest as resistance to change, even when the potential benefits are evident.
- **Resource Allocation:** Executives may have a clearer understanding of the resources required for successful Big Data Analytics implementation but might prioritize other strategic initiatives, leading to delayed or insufficient investment in this area.
- **Knowledge Gap:** While executives may possess a high-level understanding of Big Data Analytics, they might lack the technical expertise to fully appreciate the potential benefits and challenges associated with implementation. This could contribute to a sense of uncertainty and resistance to change.

Middle Management: Intermediate Position

The middle management position between executive and first-line management likely contributes to their intermediate scores in both Big Data Analytics capabilities and resistance to change. They may be caught between the strategic vision of executives

and the operational challenges faced by first-line managers, leading to a balanced approach to technological adoption.

First-line Management: Lower Big Data Analytics Capabilities and Lower Resistance to Change

First-line managers may exhibit lower Big Data Analytics capabilities due to their operational focus and limited exposure to strategic planning. However, their proximity to frontline employees and day-to-day challenges might make them more receptive to technological solutions that can improve efficiency and productivity. This could explain their lower resistance to change compared to higher management levels.

Fourth Hypothesis

The impact of the independent variables (Big Data Analytics) in explaining the variance in the dependent variable (Moderating Role of Resistance to Technological Change) varies according to the regression coefficients.

Table (10) Model Summary

Model	R	R^2	Adjusted R^2	Std. Error
	0.392	0.154	0.152	5.602

Table (11) Multiple Linear Regression

Model	Coefficients			F	Sig-F
	β	T	Sig-T		
Constant	21.768	4.866	<0.001	69.699	<0.001
Big Data Analytics	0.571	8.349	<0.001		

Regression equation (2) :

$$Y = 0.571X + 21.768 \quad (2)$$

Where:

- Y; is the Moderating Role of Resistance to Technological Change.
- X; is the Big Data Analytics.

Results:

- $R^2 = 0.154$, indicating that Big Data Analytics explains 15.4% of the variance in the Moderating Role of Resistance to Technological Change
- The regression model is statistically significant ($F = 69.699$, $p < .001$)
- The regression equation is: $Y = 0.571X + 21.768$, where Y is the Moderating Role of Resistance to Technological Change and X is Big Data Analytics

This suggests that Big Data Analytics has a significant positive impact on the Moderating Role of Resistance to Technological Change, although other factors not included in this model likely explain the remaining variance.

In conclusion, this statistical analysis provides evidence for significant relationships between Big Data Analytics, Resistance to Technological Change, and Telecommunications Company Performance. It also highlights differences across gender and management levels, offering insights into the complex dynamics of technological adoption and performance in the telecommunications sector.

Results:

The study reached several conclusions based on the outcomes of the data analysis, the most significant of which are as follows:

1. The gender imbalance may necessitate consideration in gender-related analyses or when concluding gender-specific aspects of the study.

2. The relatively even distribution among companies allows for meaningful comparisons between different telecommunications providers in Egypt.

3. The predominance of middle management in the sample could provide robust insights into this particular organizational level, while potentially limiting the generalizability of findings to other management levels.

4- The overall correlation between Big Data Analytics and the Moderating Role of Resistance to Technological Change (combining both Resistance to Technological Change and Telecommunications Company Performance) is strong and positive.

5- The findings suggest that gender is an important factor to consider when implementing Big Data Analytics strategies or managing resistance to technological change within organizations. The higher mean scores for males in both variables might indicate that males have a more positive perception of Big Data Analytics and are potentially less resistant to technological change compared to their female counterparts.

6- higher management levels are associated with greater Big Data Analytics capabilities and, interestingly, higher resistance to technological change.

7- The statistical analysis provides evidence for significant relationships between Big Data Analytics, Resistance to Technological Change, and Telecommunications Company Performance. It also highlights differences across gender and management levels, offering insights into the complex dynamics of technological adoption and performance in the telecommunications sector.

-The Survey forms were distributed to 385 individuals from various mobile phone companies across several governorates in Egypt. The respondents answered the survey questions willingly, providing responses characterized by high precision and clarity, unbiased and free from any pressure or conflict They also included their names and the branches in which they are employed. Their responses demonstrated a commitment to maintaining the confidentiality and privacy of their proprietary data.

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