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Implementing Big Data Analysis Platform and Risk Management Resilience in A Manufacturing Industry in Beijing, China

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ABSTRACT: This study examined the implementation of Big Data Analysis Platforms and the level of Risk Management Resilience among employees in manufacturing companies in China. Using a quantitative descriptive-correlational research design, data were gathered from 256 employee-respondents through a structured questionnaire measured on a four-point Likert scale. The respondents were mostly staff, employees with 1 to 3 years of service, and those assigned to the Production Department. Findings revealed that the implementation of the Big Data Analysis Platform was evident, with an overall mean of 3.04. Among its dimensions, Business Alignment and Value Framing obtained the highest mean of 3.12, while Storage and Modeling obtained the lowest mean of 2.91, suggesting that data infrastructure and modeling systems may still require improvement. Risk Management Resilience was likewise assessed as evident, with an overall mean of 3.10. Exposure and Vulnerability Baseline received the highest mean of 3.15, while Absorptive Capacity and Continuity Performance obtained the lowest mean of 3.05. ANOVA results showed no significant differences in the assessments when grouped according to position. However, significant differences were found according to length of service in selected dimensions of both Big Data Analysis Platform implementation and Risk Management Resilience. Departmental differences were observed only in Business Alignment and Value Framing. Correlation analysis revealed a very strong positive and significant relationship between Big Data Analysis Platform implementation and Risk Management Resilience, with $r = 0.85$ and $p < .001$. The findings suggest that stronger data platform implementation is closely associated with better organizational resilience. The study recommends improving data storage and modeling, strengthening business continuity systems, enhancing employee data literacy, and integrating big data tools into risk monitoring and resilience planning.

KEYWORDS: Big Data Analysis Platform, Risk Management Resilience, manufacturing companies, data analytics, business continuity, organizational resilience

1. INTRODUCTION

The global manufacturing industry is moving into an era where changes, digital tools and environmental challenges overlap. This overlap is most obvious in China a country often called "the world's factory." China's factories are dealing with deep technology changes while also facing markets the lingering effects of the pandemic and shifting political tensions. Because the industry is huge and all parts are linked it is especially vulnerable to risks such as supply line slowdowns, cyber attacks, new rules and shortages of resources. In this situation using data analysis platforms has become a key way to strengthen risk management resilience. Big data analysis platforms let firms turn amounts of information into useful predictions, faster actions and lasting competitiveness (Grover, Chiang, Liang, & Zhang 2018; Lee, Yoon, & Kim 2017).

Even though many people are excited about transformation studies show that how well the systems are put in place matters more than simply having the technology. In China's manufacturing scene, where production's spread across the world and also relies on local suppliers companies face special problems when trying to match big data platforms to their daily work and their rules for decision making. Bonnard and colleagues (2019) say that small and medium firms often pick "or cloud-based BDAP solutions. These solutions can be set up quickly. They are hard to tailor so the benefits are uneven in the industry. At the time problems with cyber safety and data privacy have become a core part of measuring resilience. Because digital links are growing and production data can be easily stolen these issues matter a lot (Lee, 2021; Marquez-Tejon, Jimenez-Partearroyo & Benito-Osorio 2021).

Alongside these changes the idea of risk management resilience (RMR) has grown into an idea that includes being ready staying strong changing and transforming (Galaitsi et al. 2023; Goessling-Reisemann & Thier 2019). RMR goes beyond lowering risk. It looks at whether a company can keep running and get back to normal when a crisis happens (Niemimaa, Järveläinen, Heikkilä, & Heikkilä, 2019). In life RMR brings together many parts—enterprise risk management, business continuity planning, knowledge management and sustainability governance—into one big plan (Han & Um 2024; Durst, Hinteregger, & Zieba 2023). More and

more industries use resilience indices to measure how well they recover, stay up and innovate when things change (Al-Yaeeshi & Al-Ansari 2022). In China's factories, where how digital skill a firm has and how complex its production is differ a lot measuring resilience is still a top goal for policy makers and managers who want to modernize the industry.

Even though many papers talk about data analytics and risk management big gaps are still there. Most studies look at data adoption from a tech angle, such as how the system is built how big it can grow or how fast its algorithms run. They miss how people behave and how the organization changes (Grover, Chiang, Liang, & Zhang 2018; Hsu, 2022). On the hand studies on resilience and enterprise risk management have looked at culture and rules but rarely have they added how data infrastructure helps build resilience (Galaitsi et al. 2023; Goessling-Reisemann & Thier 2019). In China there are real-world studies that show how big data analysis platforms make manufacturing firms more risk resilient. This is especially true for how firms adapt and transform. Also few papers have put both the tech side and the risk side together in one plan. This gap is what the present study wants to address.

By filling this gap this research looks at how using data analysis platforms relates to risk management resilience in China's manufacturing industry. It looks at how digital analytics tools affect a company's ability to predict stay strong and change when problems come. The results want to help policy makers and industry leaders build resilience make better decisions with data and shape a sustainable industry even when the world is uncertain. In a world where data streams decide who wins the skill to turn data into resilience could decide China's success, in manufacturing.

2. METHODS

Research Design

This study employed a quantitative comparative-correlational research design. This design aimed to determine the relationship between the implementation of Big Data Analysis Platforms (BDAP) and Risk Management Resilience (RMR) among employees in the manufacturing industry in China.

Research Locale/Setting

The study was conducted in selected manufacturing companies located in Beijing, China, a city that has steadily evolved into one of the country's major centers for high-end and innovation-driven manufacturing. Beijing hosts a diverse mix of industries—including electronics, precision machinery, automotive components, chemical processing, and smart-technology production—which positions it as an appropriate site for examining the adoption of Big Data Analysis Platforms (BDAP) and the strengthening of Risk Management Resilience (RMR). Because these enterprises operate in highly competitive and technologically intensive environments, they offer conditions that may reveal how data systems influence organizational preparedness and stability.

Participants/Respondents of the Study

The participants of this study consisted of 256 employees who worked in selected manufacturing companies in China. They were purposefully selected based on their direct involvement in operations, production management, data processing, logistics, and administrative functions that engaged with risk management or data-driven decision-making systems. The inclusion of employees from multiple departments provided a balanced understanding of how Big Data Analysis Platforms (BDAP) were implemented across different functional areas and how these practices contributed to Risk Management Resilience (RMR) within the organization.

Sampling Technique

The participants were chosen using purposive sampling, as this approach allowed the researcher to select individuals who possessed relevant experience and knowledge about data analytics and organizational risk practices. The study aimed to include a diverse group of respondents to represent various organizational levels, including technical staff, supervisors, and middle managers. This diversity helped ensure that the results reflected multiple perspectives on how big data systems influenced workplace resilience and operational continuity.

Research Instrument

The primary instrument of this study was a researcher-made questionnaire that gathered quantitative data from employees in selected manufacturing companies in China. It was developed based on a synthesis of current literature on Big Data Analysis Platforms (BDAP) and Risk Management Resilience (RMR) to ensure theoretical alignment and content relevance. The instrument was divided into three main parts and used a four-point Likert scale to measure the degree of agreement among respondents, where 4 meant Strongly Agree, 3 meant Agree, 2 meant Disagree, and 1 meant Strongly Disagree. This type of scale was chosen to promote clarity and reduce respondent bias toward neutral choices, allowing for more precise interpretation of attitudes and perceptions. The first part of the questionnaire gathered the profile of the respondents, which included demographic variables such as position, length of service, and department. These characteristics were analyzed as potential test factors to determine whether variations in employee background influenced their assessment of big data platform implementation and organizational resilience.

The second part measured the implementation of the Big Data Analysis Platform (BDAP). This section included statements addressing the extent to which big data systems were aligned with organizational strategies, the quality of data acquisition and

integration, and the efficiency of storage, processing, and modeling functions. It also included items on analytics and decision support, governance and security mechanisms, and the organization's capacity to develop skills and sustain data-driven operations. These constructs assessed how well companies utilized big data infrastructure to support operational and strategic goals.

The third part assessed Risk Management Resilience (RMR). It included items related to exposure and vulnerability baseline, absorptive capacity and continuity performance, adaptive capacity and learning, and transformative capacity and strategic renewal. These dimensions reflected how manufacturing firms identified risks, absorbed the impact of disruptions, adapted through learning, and transformed to achieve long-term stability. Each construct helped determine how well employees perceived their organization's preparedness and responsiveness to risk.

Data Analysis/Statistical Treatment

The collected data was analyzed using descriptive and inferential statistical methods to address the research objectives and test the hypotheses of the study. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to summarize the demographic profile of respondents and to describe their assessments of the implementation of the Big Data Analysis Platform (BDAP) and the level of Risk Management Resilience (RMR) within their organizations. These measures provided a clear overview of how employees perceived the technological and resilience practices that operated in their workplace.

For inferential analysis, several statistical tests were applied using the Statistical Package for the Social Sciences (SPSS) software. To determine whether there were significant differences in respondents' assessments when grouped according to their demographic profile variables, the study employed t-tests and Analysis of Variance (ANOVA), depending on the number of comparison groups. The Pearson Product-Moment Correlation Coefficient (r) was used to test for significant relationships between the components of the Big Data Analysis Platform and the dimensions of Risk Management Resilience. A significance level of 0.05 ($p < 0.05$) was adopted to determine statistical significance in all hypothesis tests.

Ethical Considerations

The conduct of this study adhered to established ethical research standards to protect the rights, privacy, and welfare of all participants. Prior to data collection, the researcher obtained formal approval from the management of the participating companies and ensured that all respondents were fully informed about the purpose, scope, and procedures of the study. Each participant received an informed consent form, clearly stating that participation was voluntary and that they could withdraw at any stage without penalty or consequence. Confidentiality and anonymity were strictly maintained throughout the research process. No identifying information, such as names or employee numbers, was included in the questionnaire or data reports. All responses were treated as confidential and were stored securely in password-protected files accessible only to the researcher. The data was used solely for academic purposes and was not disclosed to any third party. The study ensured that participants were not exposed to any form of physical, psychological, or professional risk. The researcher remained transparent about the intent of the study and presented findings objectively, without fabrication, manipulation, or misrepresentation of data. By upholding these ethical standards, the study guaranteed that the research process respected participants' rights, ensured the credibility of findings, and contributed responsibly to the growing field of digital transformation and risk management resilience in China's manufacturing industry.

3. RESULTS

Profile of the Employee-Respondents

In terms of profile, the study involved 256 employee-respondents from manufacturing companies in China. Most of the respondents were staff, with 77 or 30.1 percent, followed by technicians with 59 or 23.0 percent, supervisors with 47 or 18.4 percent, operators with 42 or 16.4 percent, and managers with 31 or 12.1 percent. As to length of service, the largest group had served for 1 to 3 years, with 83 or 32.4 percent, followed by those with 4 to 6 years at 73 or 28.5 percent, 7 years and above at 69 or 27.0 percent, and less than 1 year at 31 or 12.1 percent. In terms of department, Production had the highest representation with 93 or 36.3 percent, while IT/Data had the lowest with 32 or 12.5 percent. Overall, the profile suggests that the responses came largely from employees who are directly exposed to operational processes, which may provide a practical view of big data implementation and risk management resilience.

Table 1. Respondents' Demographic Profile

Indicators	Classification	Frequency	Percentage (%)
Position	Manager	31	12.1
	Supervisor	47	18.4
	Staff	77	30.1
	Technician	59	23.0
	Operator	42	16.4

	Total	256	100.0
Length of Service	Less than 1 year	31	12.1
	1–3 years	83	32.4
	4–6 years	73	28.5
	7 years and above	69	27.0
	Total	256	100.0
Department	Production	93	36.3
	Quality Control	44	17.2
	Maintenance	44	17.2
	IT/Data	32	12.5
	Administration	43	16.8
	Total	256	100.0

Implementation of Big Data Analysis Platform

The respondents assessed the implementation of the Big Data Analysis Platform as evident, with an overall mean of 3.04 and a standard deviation of 0.244. Among the sub-variables, Business Alignment and Value Framing obtained the highest overall mean of 3.12, suggesting that the organization's big data initiatives are generally perceived as aligned with strategic objectives and business outcomes. Governance, Security, and Trust followed with a mean of 3.08, while Analytics and Visualization obtained 3.06. The lowest sub-variable was Storage and Modeling, with a mean of 2.91, although it was still interpreted as Agree or Evident. This may suggest that while the company has working practices related to big data use, storage infrastructure and modeling capacity may still require closer attention, especially since scalable and secure data storage is foundational to sustainable analytics implementation.

Differences in Big Data Analysis Platform by Profile

The test of difference in the assessment of the Big Data Analysis Platform showed that position did not produce significant differences across all sub-variables and the overall assessment, as all Sig. values were greater than 0.05. However, significant differences were found when respondents were grouped according to length of service, particularly in Data Acquisition and Integration, with Sig. of 0.01; Storage and Modeling, with Sig. of 0.02; Analytics and Visualization, with Sig. of 0.01; Governance, Security, and Trust, with Sig. of 0.02; and Overall Big Data Analysis Platform, with Sig. of 0.00. Respondents with 1 to 3 years of service generally gave the highest overall BDAP assessment, with a mean of 3.11, while those with less than 1 year gave the lowest, with a mean of 2.94. In terms of department, only Business Alignment and Value Framing showed a significant difference, with Sig. of 0.00, while the overall BDAP assessment was not significantly different across departments.

Risk Management Resilience

The respondents also assessed Risk Management Resilience as evident, with an overall mean of 3.10 and a standard deviation of 0.235. The highest-rated sub-variable was Exposure and Vulnerability Baseline, with a mean of 3.15, indicating that the organization is perceived to have visible practices for identifying risks, assessing vulnerabilities, and monitoring emerging threats. Adaptive Capacity and Learning followed with a mean of 3.13, suggesting that the company appears able to adjust its risk management practices based on changing conditions and prior experiences. Transformative Capacity and Strategic Renewal obtained a mean of 3.06, while Absorptive Capacity and Continuity Performance had the lowest mean of 3.05. Although all dimensions were interpreted as Agree or Evident, the lower score for absorptive capacity may suggest that continuity plans, redundancy measures, and backup systems still need improvement to strengthen operational stability during disruptions.

Differences in Risk Management Resilience by Profile

The test of difference in the assessment of Risk Management Resilience showed that position and department did not significantly affect the respondents' assessment, as all Sig. values were greater than 0.05. This suggests that employees, regardless of position or departmental assignment, tended to view the organization's resilience practices in a generally similar way. However, length of service produced significant differences in Absorptive Capacity and Continuity Performance, with Sig. of 0.04; Adaptive Capacity and Learning, with Sig. of 0.01; Transformative Capacity and Strategic Renewal, with Sig. of 0.02; and Overall Risk Management Resilience, with Sig. of 0.01. The highest overall RMR mean was recorded among respondents with 1 to 3 years of service at 3.15, while the lowest was among those with less than 1 year of service at 3.00. This may suggest that familiarity with organizational routines and risk practices influences how employees assess resilience.

Relationship Between Big Data Analysis Platform and Risk Management Resilience

The correlation results revealed significant positive relationships between the Big Data Analysis Platform and Risk Management Resilience. All paired relationships were significant at Sig. < .001, leading to the rejection of the null hypothesis. The overall

correlation between Big Data Analysis Platform and Risk Management Resilience was very strong and positive, with a computed r of 0.85. This indicates that higher implementation of big data platform practices is strongly associated with higher risk management resilience. Among the sub-variable relationships, notable strong correlations included Storage and Modeling with Absorptive Capacity and Continuity Performance, r = 0.64; Governance, Security, and Trust with Absorptive Capacity and Continuity Performance, r = 0.63; and Operating Model and Capability Building with Adaptive Capacity and Learning, r = 0.61. Overall, the findings may suggest that data infrastructure, governance, analytics capability, and employee data competence are closely linked with the organization's ability to identify, absorb, adapt to, and transform from operational risks.

Table 2. Correlation in the Assessment of the Respondents on the Big Data Analysis Platform and Risk Management Resilience

Big Data Analysis Platform	Risk Management Resilience	Computed r	Sig.	Decision	Interpretation
Business Alignment and Value Framing	Exposure and Vulnerability Baseline	0.56	<.001	Reject Ho	Significant
	Absorptive Capacity and Continuity Performance	0.59	<.001	Reject Ho	Significant
	Adaptive Capacity and Learning	0.57	<.001	Reject Ho	Significant
	Transformative Capacity and Strategic Renewal	0.54	<.001	Reject Ho	Significant
Data Acquisition and Integration	Exposure and Vulnerability Baseline	0.58	<.001	Reject Ho	Significant
	Absorptive Capacity and Continuity Performance	0.56	<.001	Reject Ho	Significant
	Adaptive Capacity and Learning	0.54	<.001	Reject Ho	Significant
	Transformative Capacity and Strategic Renewal	0.56	<.001	Reject Ho	Significant
Storage and Modeling	Exposure and Vulnerability Baseline	0.55	<.001	Reject Ho	Significant
	Absorptive Capacity and Continuity Performance	0.64	<.001	Reject Ho	Significant
	Adaptive Capacity and Learning	0.59	<.001	Reject Ho	Significant
	Transformative Capacity and Strategic Renewal	0.56	<.001	Reject Ho	Significant
Processing and Orchestration	Exposure and Vulnerability Baseline	0.54	<.001	Reject Ho	Significant
	Absorptive Capacity and Continuity Performance	0.59	<.001	Reject Ho	Significant
	Adaptive Capacity and Learning	0.55	<.001	Reject Ho	Significant
	Transformative Capacity and Strategic Renewal	0.56	<.001	Reject Ho	Significant

Analytics and Visualization	Exposure and Vulnerability Baseline	0.47	<.001	Reject Ho	Significant
	Absorptive Capacity and Continuity Performance	0.53	<.001	Reject Ho	Significant
	Adaptive Capacity and Learning	0.50	<.001	Reject Ho	Significant
	Transformative Capacity and Strategic Renewal	0.40	<.001	Reject Ho	Significant
Governance, Security, and Trust	Exposure and Vulnerability Baseline	0.55	<.001	Reject Ho	Significant
	Absorptive Capacity and Continuity Performance	0.63	<.001	Reject Ho	Significant
	Adaptive Capacity and Learning	0.61	<.001	Reject Ho	Significant
	Transformative Capacity and Strategic Renewal	0.54	<.001	Reject Ho	Significant
Operating Model and Capability Building	Exposure and Vulnerability Baseline	0.56	<.001	Reject Ho	Significant
	Absorptive Capacity and Continuity Performance	0.60	<.001	Reject Ho	Significant
	Adaptive Capacity and Learning	0.61	<.001	Reject Ho	Significant
	Transformative Capacity and Strategic Renewal	0.57	<.001	Reject Ho	Significant
Overall Big Data Analysis Platform	Risk Management Resilience	0.85	<.001	Reject Ho	Significant

Strategic Business Program

The proposed strategic business program is designed to strengthen the implementation of Big Data Analysis Platforms and improve Risk Management Resilience among manufacturing companies in China. The study results showed that the Big Data Analysis Platform was generally evident, with an overall mean of 3.04, while Risk Management Resilience was also evident, with an overall mean of 3.10. These results suggest that the companies already have existing data-driven and risk-related practices. However, the findings also point to specific areas that require attention, particularly Storage and Modeling, which obtained the lowest BDAP mean of 2.91, and Absorptive Capacity and Continuity Performance, which obtained the lowest RMR mean of 3.05.

4. DISCUSSION

Implementation of Big Data Analysis Platform

Overall, Table 4 suggests a mixed condition in storage and modeling. The organization appears to perform better in data retrieval, but it seems less confident in the strength, scalability, and security of the storage infrastructure itself. The results may indicate that employees can access data for immediate reporting, yet the underlying technical infrastructure may still require improvement. In summary, storage and modeling are evident, but this is one of the more sensitive areas in the BDAP assessment because its lowest indicator points to a possible infrastructure gap that could affect future analytics expansion, data protection, and system reliability.

Overall, Table 7 suggests that governance, security, and trust are evident, but the pattern of results points to a difference between policy awareness and security execution. The strongest ratings were given to ethical training and strict governance policies, while the weakest rating was given to security updates. This is worth emphasizing because a data governance system may appear strong on paper but still require continuous technical maintenance, monitoring, and user confidence. In summary, the organization seems

to have established a governance foundation, but it may need to make data security practices more visible, current, and consistently communicated to employees.

Differences in Big Data Analysis Platform by Profile

Overall, Table 15 indicates that length of service has a significant effect on several dimensions of Big Data Analysis Platform implementation, particularly data integration, storage and modeling, analytics and visualization, governance and trust, and the overall platform assessment. However, Business Alignment and Value Framing, Processing and Orchestration, and Operating Model and Capability Building did not show significant differences, with Sig. values of 0.08, 0.16, and 0.09, respectively. This mixed result is important. It may mean that strategic alignment and workflow processes are perceived similarly across tenure groups, while more technical and experiential aspects of big data use differ depending on how long employees have been with the organization.

This pattern may suggest that departments differ more in how they understand the strategic value of big data than in how they experience its technical or operational components. IT/Data and Administration may be more exposed to planning, reporting, and system-level discussions, which could explain their higher means in business alignment. Maintenance, on the other hand, may experience big data more through equipment records, service logs, or operational support activities, making the strategic framing less visible. The RRL notes that successful analytics implementation requires cross-functional understanding, and this result seems to support that point.

Risk Management Resilience

Overall, Table 10 indicates that absorptive capacity and continuity performance are evident, but the results also suggest some unevenness. The highest rating points to trained crisis response teams, while the lowest rating points to redundancy measures for critical data and infrastructure. This may mean that the organization is reasonably prepared to respond to emergencies, yet its technical continuity safeguards may still need reinforcement. In summary, the company appears to have a working continuity foundation, but stronger attention to redundancy, backup reliability, and regular plan updating could improve its ability to absorb disruptions without major operational losses.

Overall, Table 11 suggests that adaptive capacity and learning are evident in the organization, especially in the ability to adjust risk management practices and adopt new technologies. The lowest result on post-incident reviews, however, points to a possible gap in systematic learning. The findings may suggest that the company is responsive to changing conditions but could improve how it captures and institutionalizes lessons after disruptions. In summary, adaptive capacity is a promising area for the organization, although formal review mechanisms and employee feedback systems may need strengthening so that learning becomes more consistent and less dependent on informal experience.

Differences in Risk Management Resilience by Profile

Overall, Table 16 shows that length of service significantly affects most dimensions of Risk Management Resilience, except Exposure and Vulnerability Baseline, which recorded an F value of 1.62 and Sig. of 0.19. This means that basic risk awareness and vulnerability recognition may be similarly perceived regardless of tenure, while continuity performance, adaptive learning, strategic renewal, and overall resilience differ across service groups. In summary, the findings suggest that tenure matters more in assessing deeper resilience capabilities than in assessing basic risk awareness. This gives the organization a practical reminder that resilience orientation may need to be reinforced among newer employees through onboarding, drills, incident reviews, and mentoring.

Overall, Table 18 indicates that department does not significantly influence the respondents' assessment of Risk Management Resilience. This finding may be taken as a positive sign of consistency, although it should not be interpreted as proof that all departments have the same preparedness level. It only means that their assessments did not differ significantly based on the ANOVA results. In summary, the organization appears to have a relatively shared perception of resilience across departments, but the slightly higher means among IT/Data respondents may suggest that technology-related units have somewhat stronger awareness of adaptive and transformative risk practices.

Relationship Between Big Data Analysis Platform and Risk Management Resilience

Across the specific dimensions, most correlation coefficients fell within the moderate to strong positive range. Business Alignment and Value Framing was significantly correlated with Exposure and Vulnerability Baseline at r = 0.56, Absorptive Capacity and Continuity Performance at r = 0.59, Adaptive Capacity and Learning at r = 0.57, and Transformative Capacity and Strategic Renewal at r = 0.54. These findings may suggest that when big data initiatives are aligned with business goals and clearly valued by the organization, employees are also more likely to perceive stronger risk identification, continuity preparation, learning, and strategic renewal. The RRL supports this connection because data-driven alignment allows organizations to recognize risks earlier and connect risk information with planning decisions.

The strongest paired correlations among the sub-variables were observed between Storage and Modeling and Absorptive Capacity and Continuity Performance at r = 0.64, Governance, Security, and Trust and Absorptive Capacity and Continuity Performance at r = 0.63, Governance, Security, and Trust and Adaptive Capacity and Learning at r = 0.61, and Operating Model

and Capability Building and Adaptive Capacity and Learning at r = 0.61. These results are quite meaningful. They may suggest that technical infrastructure, secure data governance, and employee capability building are closely connected with the organization's ability to continue operations, learn from disruptions, and adjust to change. In a manufacturing context, this makes practical sense because continuity and learning depend on reliable data, protected systems, trained personnel, and clear accountability.

The lowest correlation was found between Analytics and Visualization and Transformative Capacity and Strategic Renewal, with r = 0.40, although it remained statistically significant. This may suggest that visualization tools are related to strategic renewal, but the relationship is weaker compared with other pairings. It is possible that dashboards and analytics outputs are being used more for monitoring and reporting than for deeper strategic transformation. Overall, Table 19 strongly suggests that Big Data Analysis Platform implementation and Risk Management Resilience move together in a positive direction. However, correlation does not prove causation. The findings indicate association, meaning that stronger big data practices are linked with stronger resilience perceptions, but further analysis would be needed to establish direct causal influence.

CONCLUSION

The respondents' profile shows that the study was participated in mostly by employees who are directly involved in operational and technical functions, particularly staff, technicians, and production employees. It may be concluded that the findings largely reflect the perspectives of employees who encounter actual manufacturing processes, workplace data, operational routines, and risk-related activities. Although managers and IT/Data personnel were represented in smaller numbers, the profile still provides a practical basis for understanding how Big Data Analysis Platform implementation and Risk Management Resilience are experienced across different work units.

The implementation of the Big Data Analysis Platform was found to be evident among the respondent companies. This indicates that big data practices are already present in terms of business alignment, data acquisition, processing, analytics, governance, and capability building. However, the comparatively lower result in Storage and Modeling suggests that the technical foundation of the platform may still need improvement, particularly in relation to scalable and secure data storage infrastructure. It may be concluded that the organization has started to integrate big data into its operations, but stronger investment in infrastructure, modeling systems, and storage reliability is still necessary.

Risk Management Resilience was also assessed as evident by the respondents. This suggests that the organization has existing practices for identifying vulnerabilities, sustaining operations during disruptions, adapting to changing conditions, and using risk insights for strategic renewal. The highest assessment in Exposure and Vulnerability Baseline indicates that the company appears more confident in identifying and monitoring risks. However, the relatively lower rating for Absorptive Capacity and Continuity Performance may imply that continuity planning, redundancy measures, backup systems, and operational safeguards still need further strengthening.

The assessment of the Big Data Analysis Platform did not significantly differ when respondents were grouped according to position, which suggests that employees across different organizational levels generally shared similar perceptions of big data implementation. However, significant differences were found according to length of service in several dimensions, including data acquisition, storage and modeling, analytics and visualization, governance and trust, and the overall platform assessment. Department also showed a significant difference only in Business Alignment and Value Framing. It may be concluded that tenure and departmental exposure influence selected aspects of big data perception, while position alone does not appear to create meaningful variation.

The assessment of Risk Management Resilience did not significantly differ according to position and department, suggesting that resilience practices are perceived with some consistency across organizational roles and work units. However, significant differences were found according to length of service in absorptive capacity, adaptive capacity, transformative capacity, and overall risk management resilience. This may suggest that employees' familiarity with organizational routines, risk procedures, and continuity practices affects how they view the company's resilience. It may be concluded that newer employees may need stronger orientation, training, and exposure to resilience-related systems.

The Big Data Analysis Platform was significantly and positively correlated with Risk Management Resilience. The very strong overall correlation indicates that better implementation of big data practices is closely associated with stronger organizational resilience. This means that data alignment, integration, storage, processing, analytics, governance, and capability building may contribute meaningfully to the company's ability to identify risks, absorb disruptions, adapt to changes, and pursue strategic renewal. It may be concluded that strengthening the Big Data Analysis Platform is likely to support more effective and sustainable Risk Management Resilience in manufacturing companies.

RECOMMENDATIONS

The company may prioritize the improvement of its Big Data Analysis Platform, particularly in the area of Storage and Modeling, which obtained the lowest mean among the BDAP dimensions. Management should consider upgrading scalable and secure data

storage infrastructure, improving data backup systems, and ensuring that data models are regularly updated according to operational needs. It may also be useful to review whether departmental data are already consolidated into a unified system, since data integration remains necessary for reliable analytics. These actions can help reduce fragmented records, improve retrieval speed, and support more accurate production and risk-related analysis.

The organization may further strengthen its Risk Management Resilience by improving absorptive capacity and continuity performance. Since this dimension obtained the lowest mean among the RMR areas, the company should review and update its business continuity plans, backup systems, redundancy measures, and emergency response procedures. Regular simulation drills, recovery exercises, and stress tests may help employees understand what to do during disruptions. The company should also maintain a more visible registry of high-impact and low-probability risks so that rare but serious threats are not overlooked in planning.

The company may design training programs based on length of service, since significant differences were found in both BDAP and RMR assessments when respondents were grouped according to tenure. Newly hired employees, especially those with less than one year of service, should receive structured onboarding on data systems, analytics tools, risk identification, continuity procedures, and reporting protocols. Employees with longer service may benefit from advanced training on predictive analytics, dashboard interpretation, data governance, and resilience planning. This layered approach may help reduce perception gaps and improve the consistency of data-driven and risk-responsive practices across the workforce.

Department heads and data governance teams may improve cross-departmental communication on the business value of big data, especially because departmental differences were found in Business Alignment and Value Framing. The organization should explain how data initiatives support specific departmental concerns such as production efficiency, quality improvement, maintenance scheduling, inventory control, and administrative reporting. Dashboards and visualization tools should also be linked more clearly with key performance indicators so that employees can see how analytics results connect with actual work targets. This may make big data use more meaningful and less technical or abstract for non-IT departments.

The company may use the strong positive relationship between Big Data Analysis Platform and Risk Management Resilience as a basis for integrated improvement planning. Since stronger big data implementation was significantly associated with stronger risk management resilience, data analytics should be embedded in risk mapping, vulnerability monitoring, continuity planning, post-incident review, and strategic renewal. Future researchers may also extend the study by using qualitative interviews, longitudinal data, or structural equation modeling to examine how specific big data practices influence resilience outcomes over time. This would provide a deeper explanation of how data systems help manufacturing companies prepare for, respond to, and learn from operational risks.

REFERENCES

1) Al-Yaeeshi, A. A., & Al-Ansari, T. (2022). Developing operational resilience within CO_2 utilisation networks: Towards ensuring business continuity through risk management. Computers & Chemical Engineering, 163, 107810.
2) Bonnard, R., Vieira, K. M. M., Arantes, M. da S., Lorbieski, R., Nunes, M. C., & Mattei, A. P. (2019). A big data/analytics platform for Industry 4.0 implementation in SMEs. In *Proceedings of the 13th International Conference CIGI QUALITA 2019*, Montreal, Canada.
3) Durst, S., Hinteregger, C., & Zieba, M. (2023). The effect of environmental turbulence on cybersecurity risk management and organizational resilience. Computers & Security.
4) Fraser, J., & Simkins, B. J. (2016). The challenges of and solutions for implementing enterprise risk management. Business Horizons, 59(6), 689–698.
5) Galaitsi, SE; Pinigina, Elizaveta; Keisler, Jeffrey M; Pescaroli, Gianluca; Keenan, Jesse M; Linkov, Igor; (2023) Business Continuity Management, Operational Resilience, and Organizational Resilience: Commonalities, Distinctions, and Synthesis. International Journal of Disaster Risk Science 10.1007/s13753-023-00494-x.
6) Goessling-Reisemann, S., & Thier, P. (2019). On the difference between risk management and resilience management for critical infrastructures. In Handbook on Resilience of Socio-Technical Systems (pp. 1–18).
7) Grover, V., Chiang, R. H. L., Liang, T.-P., & Zhang, D. (2018). Creating strategic business value from big data analytics: A research framework. Journal of Management Information Systems.
8) Han, N., & Um, J. (2024). Risk management strategy for supply chain sustainability and resilience capability. Risk Management. Advance online publication.
9) Hsu, K. (2022). Big data analysis and optimization and platform components. *Journal of King Saud University – Science*, *34*(3), 101886. doi.org
10) Lee, I. (2021). Cybersecurity: Risk management framework and investment cost analysis. *Business Horizons*, *64*(5), 607–618.

11) Lee, J. Y., Yoon, J. S., & Kim, B. H. (2017). A big data analytics platform for smart factories in small and medium-sized manufacturing enterprises: An empirical case study of a die casting factory. International Journal of Precision Engineering and Manufacturing.
12) Marquez-Tejon, J., Jimenez-Partearroyo, M., & Benito-Osorio, D. (2021). Security as a key contributor to organisational resilience: A bibliometric analysis of enterprise security risk management. Security Journal, 34(4), 1085–1109.
13) Niemimaa, M., Järveläinen, J., Heikkilä, M., & Heikkilä, J. (2019). Business continuity of business models: Evaluating the resilience of business models for contingencies. International Journal of Information Management, 49, 208–216.

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