



A STUDY ON IMPACT OF AUTOMATION IN JOB SATISFACTION AMONG MID-LEVEL MANAGERS IN MANUFACTURING INDUSTRY

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Article DOI: <https://doi.org/10.36713/epra22828>

DOI No: 10.36713/epra22828

ABSTRACT

The research investigates how automation influences satisfaction levels of mid-level manufacturing managers. The research continues existing studies about human-centered automation (Villani et al., 2021; Bhargava et al., 2020) by filling essential empirical validation gaps while analyzing the effects within middle-management positions. This research examines the effects automation technologies have on employee satisfaction through their compatibility with job responsibilities in combination with risk percepts and collaborative work patterns. A structured questionnaire obtained responses from mid-level managers who worked in different firms. Automated systems enhance performance quality and create better team relations if managers properly integrate the technology. Most participants who first feared automation consequences discovered that their jobs remained unaffected or improved according to their actual experiences. This showed the existence of this psychological divide between their fears and reality. The key elements which helped minimize employee concerns about automation implementation were open communication channels alongside employee involvement and participatory planning practice. The study reveals organizations must put human potential first when deploying automation systems as a part of their operations. The establishment of structured automation models helps create better relationships between workers and boost morale in teams. Research successively addresses a large knowledge deficit between private automation risk evaluations and corporate implementation practices. Employee success demands organizations to run ongoing training initiatives and implement programmatic communication methods when new technology emerges. The research findings demonstrate useful insights for all industries which experience digital transformation but concentrates its analysis on the manufacturing sector. Future research should apply a longitudinal design to properly study the developing effects of automation throughout time. With proper management automation provides organizations with both enhanced operational efficiency and satisfied employees and organizational resilience.

KEYWORDS

1. Automation
2. Job satisfaction
3. Mid-level managers
4. Manufacturing industry
5. Technological change

INTRODUCTION

The fast development of automated systems altered operational patterns in manufacturing production and multiple industrial segments. Research must tackle how automation affects organizational workers particularly in the mid-level management positions despite its potential to boost organizational efficiency and productivity and reduce costs. The executive abilities of mid-level managers who connect corporate directives to operational requirements strongly impact organizational achievements since automation directly affects them. Human-centered automation represents the key paradigm in existing literature because technology serves to enhance human abilities instead of taking over human responsibilities (Villani et al., 2021; Bhargava et al., 2020). Most studies of automation effects on job satisfaction have studied frontline staff and executives while neglecting understanding what happens in middle management. Previous studies based their findings on theoretical models using small local samples which prevents their applications across

manufacturing sectors because they lack sufficient empirical evidence.

The research aims to solve existing knowledge gaps through empirical assessment of automation technology-job role integration effects alongside job security dangers and workplace collaboration changes on mid-level management satisfaction levels. The research investigates to what extent well-planned automation strategies affect employee satisfaction together with organizational morale levels. The investigation examines automation's detailed consequences within the manufacturing sector by studying mid-level management exclusively. The research ultimately delivers tangible recommendations for organizations that wish to combine automation solutions with human benefits and technological developments.



LITERATURE REVIEW

1. The research brings forward a theoretical model to analyze shop floor employee satisfaction toward adaptive automation by combining psychosocial aspects and organizational variables. Pilot testing demonstrated that work-related elements including employee trust together with sense of autonomy and workload adaptation have vital roles. The designed model together with questionnaire provides organizations with a standardized method for evaluating and enhancing adaptive automation execution. Multiple studies need to validate the current research findings to confirm their universal nature across different contexts.

2. The research uses qualitative methods to discover how workers experience industrial automation adoption with specific focus on the significance of human connection and soft abilities within automated settings. Workers demanded clear communication together with engagement and assistance from management while implementing automation systems at their workplaces. The study delivers significant data points which organizations can use to cultivate positive automation perceptions among their staff. However, small sample size and lack of generalizability limit broader application.

3. The study evaluates the relationship between career orientation of IT professionals and their job satisfaction while utilizing CASE tools in automated platforms. Career orientation maintains satisfaction levels or improves it while automation processes take over work tasks. The research indicates that organizations should match automation programs with employee career objectives to keep workers engaged. Early-stage automation serves as a barrier to extend the research results beyond advanced automated systems.

4. A research study based on empirical methods investigates the performance effects of automation systems upon Singaporean electronics companies. Automated processes yield enhanced operational functions combined with reduced costs and stronger market positions for businesses that link automation to their organizational targets. Strategic automation integration proves effective in producing positive business results according to the research study. The results should be interpreted as specific to Singaporean circumstances since they lack broader global applicability.

5. The research investigates how AI-automated work processes create job segmentification along with its consequences on worker job commitment and satisfaction. The initial study results indicate that temporary job satisfaction increases from gified work yet such gains may disappear if organizations fail to maintain continuous support. Gig-based work environments must be designed to maintain sustainability according to research findings. The research findings remain sensitive to their short-term nature along with restricted study areas regarding industry

and geography which reduce general application across different settings.

6. This paper studies the double effect of automation through its danger to workplace security and simultaneous growth potential by focusing on leadership and communication. Transparent leadership combined with reskilling programs enables employees to overcome their apprehensions thereby leading to better acceptance. Optimal preparation allows employees to understand technological evolution in relation to their expectations. Additional data collection needs to occur to validate the existing conceptual research findings.

7. The research investigates digital strategy effects on both staff contentment and performance in industrial workplace environments. When digital tools match the abilities and competencies of employees both performance and employee engagement increase remarkably. Digital literacy importance and participative planning emerge as primary factors in every section of the research findings. The research presents mostly exploratory findings without establishing a link to time-based data collection.

8. The study examines ethical aspects related to automated human resource management operations in recruitment applications and performance review procedures. Employee trust together with acceptance face negative effects from opaque algorithms and inadequate transparency. The authors suggest combining ethical guidelines and human supervision for properly integrating AI systems. The paper approaches its subject through theoretical means with no evidence gathered directly from real-world scenarios.

9. Research examines modern management practice changes that result from automation and digital tools which operate in manufacturing industries. Analysis demonstrates that employees who receive digital skill updates with real-time data accomplish better operational decisions that also enhance their decision-making freedom. The research demonstrates that organizations are changing their management style from conventional hierarchical models toward data-based agile systems. Large enterprises are the main focus of the study while production outcome analysis for small and medium enterprises remains absent.

10. A systematic evaluation studies the mental responses of workers when robots assist them in industry settings while examining their subjective measures of security and faith and their degree of influence. According to the research teams perform at higher levels and experience lower anxiety when boundaries exist between robotic and human responsibilities. The research analysis demonstrates the significance of human involvement during robot-human interface development. The research conclusions stem from virtual testing though complete validation requires direct application in industrial settings.



11. The study investigates Industry 4.0 technology effects on work practices through an analysis of digital transformation on jobs and necessary abilities. This research proves that automation systems lower physical requirements at work yet these technologies make workers experience enhanced cognitive responsibilities combined with elevated pressure levels. Workers who actively participate in adaptation programs together with appropriate training achieve successful results. The research outcomes demonstrate distinctive characteristics because they focus on companies that implement Industry 4.0 frameworks at initial stages.

12. The research explores the connection between smart factory transformations and employee work commitment together with the central position of communication and inclusion within digital transition procedures. Workers display greater participation and reduced opposition after taking part in planning activities along with training. The successful deployment depends heavily on the presence of organizational culture. The research requires additional verification across various industries.

13. This research investigates the impact of automation on the workplace identities as well as occupational meaning of personnel who work in high-tech settings. Some employees consider automation a danger to their professional functions but other workers see it as an occasion to develop new skills and foster innovative solutions. Company backing together with how information is presented strongly affects how workers perceive things. Yet the qualitative research design reduces the ability to make research findings applicable in other situations.

14. The investigation investigates how robotics and AI influence job satisfaction together with performance output in different occupational sectors. Job satisfaction levels among workers positively relate to their perceptions about how useful and easy it is to use automation systems. The research data highlights the importance of developing solutions from a human perspective for achieving good mental health results. The study does not include data that shows how the variables change throughout the duration of study.

15. The research evaluates government policies that work to reduce social effects on workers caused by automation. Research demonstrates that job security protection stemming from public programs provides workers with assistance against employment losses. The authors suggest that a collaborative approach between multiple stakeholders should develop new policies. The current study Concentrates most of its analysis on developed nations while neglecting low-income regions.

16. The research examines emotional intelligence as a factor that influences the connection between work-related stress caused by automation and job satisfaction. People with higher emotional intelligence between colleagues

demonstrate better ability to adapt to changes from automation technology while also maintaining positive job satisfaction. Organizations receive encouragement to train emotional skills along with their existing technical retraining initiatives. The research findings have limited application because the sample included participants from only one sector.

17. This study investigates how adaptive automation modifies the choices and operator trust systems in high-risk industrial control centers. Standards demonstrate that operators develop more trust toward automation systems when automation displays dependable processes and transparent operations especially during periods of busy workloads. The research results support maintaining equilibrium between automated functions and human control systems. The implementation of simulations instead of actual work scenarios reduced the paper's ecological validity.

18. The research examines how robotic process automation (RPA) affects service-industry workload together with employee performance effectiveness. RPA automation technologies eliminate repetitive work tasks that create space for employees to perform analytical and customer-related work. The workforce showed better satisfaction levels and work performance results to the implementation. The research avoids examining how RPA implementation will affect the organization over an extended period.

19. The research investigates logistics-based human-robot collaboration through an evaluation of performance and satisfaction responses related to shared task structures. The research indicates that when robots follow well-defined roles and use user-friendly interfaces trust between humans and robots increases together with team cooperation. The research provides evidence to support combining ergonomic methods together with cognitive approaches in robot development processes. The research only evaluates warehouse applications for this scope.

20. The study investigates how men and women differently understand industrial automation when performing manufacturing tasks. The study discovers that women working with machinery link automation processes to job security threats yet demonstrate stronger willingness to obtain relevant skills. Evidence indicates that specific training and appropriate workplace communication effectively address concerns of workers. The research contains a small number of participants as well as restricted cultural representation.

21. This research evaluates the relationship between the speed of automation deployment and employee morale apart from organizational results. The pace at which automation is deployed either generates worker resistance or helps employees accept the changes. Staff involvement together with open communication channels stand as



essential aspects for success. A quantitative analysis is absent from the study to validate its proposed findings.

22. The analysis looks at the safety beliefs of factory workers while working together with semi-autonomous machines. The evaluation demonstrates that physical design picking together with warning systems along with how smart workers perceive robots will impact both safety comfort and willingness to share work. The workers preferred robots that displayed consistent and easily understandable activities. Analysis used laboratory installations as the main source of data while real-time observations remained scarce.

23. The research explains how organizations need to prepare for AI implementation through studying employee skills and technological system frameworks. Organizationwide success in transitioning depends on outstanding leadership and continuous learning teamed with direct communication approaches. The rollout of automation caused less disruption to organizations that had successful digital culture implementation. Nevertheless the data provided by participants indicates possible distortions in results.

24. The introduction of AI into human resource practices delivers this research the opportunity to study impacts on employee trust levels together with fairness perceptions. The use of algorithms for hiring and performance evaluations tends to diminish trust levels if humans do not supervise these decisions. A company needs transparent AI policies together with clear ethical frameworks as critical foundation. The study fails to provide empirical evidence regarding the proposed solutions.

25. The study explores middle manager participation during automation changes while demonstrating their impact on worker adjustment. Managing staff issues between strategic priorities leads to better employee acceptance and decreases work-related conflicts. Leadership development represents an additional solution which researchers recommend to support new technologies deployment. The research results derive from a restricted industrial sector.

26. Manufacturing sectors serve as the research domain to study how automation relates to employee motivation together with workplace adaptability. Employee motivation achieves improvement through automation technology when workers detect positive effects for themselves alongside their organization. This benefit gets stronger when leaders provide support and maintain simple yet strong communication. The evaluation exclusively included medium-sized businesses what restricts its potential broader use.

27. This paper examines industrial automation applications of digital twins and their effects on developing employee capabilities. The analysis demonstrates that digital twin systems boost production

operation yet need highly trained personnel because of complex system requirements. Companies that provide employee upskilling encounter less implementation hurdles and lower workforce opposition. Researchers have not collected enough data to understand fully how digital twins affect the workforce during extended periods.

28. The study investigates moral complexities connected to workplace AI surveillance programs focusing on worker privacy issues. The study reveals that when managers closely watch workers their team spirit weakens yet employees try to leave the organization unless they receive clear leadership clarity. The paper argues there is a necessity to create policy structures which balance employee rights with organizational oversight. The research utilizes hypothetical settings as it lacks practical deployment data regarding employee workforce impact.

29. The research assesses cobots' application within SMEs while examining how these robots affect workplace labor structure together with required skill levels. According to the findings cobots function optimally within systems that include worker contributions during task development and task-specific design decisions. Workers experienced increased job satisfaction due to labors being allocated repetitive tasks by cobots which maintained direct human supervision. The research contained an insufficient number of participants in a restricted geographical area.

30. The research examines the impact of automation at work environments on transmission of knowledge between different generations. Research indicates that digital tools can be learned more quickly by younger workers although older workers share their practical experience to help both generations learn from each other. Combining teams with mutual training enables them to function more efficiently. Only a limited number of organizations maintain organized systems that support such collaborative efforts.

31. The research investigates how industrial environments with hybrid teams respond to intelligent automation regarding employee autonomy and work role definitions. The integration and visibility of automation systems lead workers to gain better clarity about their responsibilities and demonstrate increased control of their work processes. Higher job satisfaction and enhanced performance arise from better understanding of roles for employees. The study needs additional empirical data across different sectors to be considered comprehensive.

RESEARCH GAP

1. Many studies propose theoretical frameworks or models but do not validate them with empirical data. This limits the credibility and practical applicability of their findings.
2. Results from narrow samples or single case studies cannot be applied broadly across industries, regions, or cultures.



- Most studies use cross-sectional data, making it hard to assess long-term impacts or draw cause-effect relationships between automation and workforce outcomes.
- Several studies assess perceived risk or satisfaction, but do not link those perceptions with objective performance or behavioral data.
- Conceptual or narrative studies often lack quantitative analysis, reducing their ability to support strong conclusions or policy recommendations.

OBJECTIVES

- To empirically validate theoretical models of automation and workforce interaction through large-scale, multi-industry data collection.
- To conduct a longitudinal analysis examining the causal effects of automation technologies on employee performance, satisfaction, and organizational outcomes.
- To quantitatively measure the relationship between perceived risks of automation and actual workforce performance using objective organizational metrics.

HYPOTHESES

1. The goal consists of gathering extensive multi-industry data to prove theoretical explanations of automation-workforce dynamics.

Hypothesis 1 (H1):- Research demonstrates that every industry shows a measurable statistical connection between organizational automation rate and employee belief in automated operations.

Hypothesis 2 (H2):- The implementation of adaptive automation system leads to enhanced employee engagement throughout different industries but requires appropriate organizational support systems to maximize this effect.

2. The research study aims to track automation technology effects on employee results together with job fulfillment along with business outputs through time.

Hypothesis 3 (H3):- The use of automation technologies throughout time results in substantial enhancements of performance metrics that exceed initial pre-automation worker abilities.

ANALYSIS

RELIABILITY TEST

Case Processing Summary

		N	%
Cases	Valid	250	99.6
	Excluded ^a	1	.4
	Total	251	100.0

a. Listwise deletion based on all variables in the procedure.

The reliability check for the 12-item scale shows a **Cronbach's Alpha of 0.829**, which is a solid indication that the items in the questionnaire are consistent with each other. In simpler terms, the people who responded seemed to answer the questions in a steady, reliable way, which gives us confidence that the scale is

Hypothesis 4 (H4):- The initial implementation of automation results in decreased job satisfaction for employees who recover their satisfaction levels one year after adjustment.

Hypothesis 5 (H5):- Organizations which offer training experience better long-term effects from automation on their workforce than organizations which do not support training initiatives.

3. The research objective established quantitative methods to evaluate how subjective automation-related risks impact work team productivity measured through organizational performance indicators.

Hypothesis 6 (H6):- The presence of high job displacement fear from automation directly results in decreased employee productivity levels.

Hypothesis 7 (H7):- People who view automation as a performance enhancer achieve higher actual outcome results than workers who fear automation whenever it is confronted.

RESEARCH METHODOLOGY

A quantitative research approach was used to evaluate employee views about workplace automation through this study. The data collection instrument featured 12 closed-ended questionnaire items rated from 1 to 5 on a Likert scale for agreement or disagreement. The research obtained 251 surveys from which 250 usable responses remained after conducting listwise deletion. The research instrument reached adequate reliability levels as proved by Cronbach's Alpha measurement which indicated a value of 0.829. This demonstrates suitable conditions for additional analytic procedures. Throughout the study the participants demonstrated a positive stance towards automation as indicated by means scores ranging from 4.1-4.3 on each of the measurement items. The evaluated scale performed well through inter-item correlation tests combined with item-total statistics which demonstrated that each specific metric supported the comprehensive measure while not introducing substantial reliability reduction. The analysis employed SPSS software for thorough statistical processing which strengthened the validity along with dependability of research results from varied industries across a large respondent group. The applied methodology delivers a solid framework to study both employee perspectives about automation and its effects on the organization.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.829	.830	12

measuring what it's supposed to. The small difference between the alpha based on raw scores and the one based on standardized items suggests that the responses were fairly balanced across questions. Overall, the data looks clean and the scale appears dependable, making it a strong foundation for further analysis.



Descriptive Statistics

Descriptive Statistics

	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Std. Error	Statistic	Std. Error
Industry Sector	3.894	-.047	.154	-1.187	.307
Job Role	2.869	-.047	.154	-1.289	.307
Experience	2.035	-.033	.154	-1.317	.307
Age Group	1.910	.127	.154	-1.218	.307
Valid N (listwise)					

The descriptive statistics provided an overview of key demographic variables, including industry sector, job role, experience, and age group. All these variables exhibited relatively low skewness and negative kurtosis, suggesting that the data is approximately symmetrically distributed but slightly flatter than a normal distribution. For instance, "industry sector" showed a skewness of -0.047 and kurtosis of -1.187, indicating a modestly flat and symmetric distribution. The consistency across variables supports the assumption that the demographic responses are evenly spread without significant bias or outliers.

Confirmatory Factor Analysis (CFA)

1. Automation Alignment & Model Validation (AMV)

The KMO value of 0.781 and a highly significant Bartlett's test ($p < 0.001$) indicate that the dataset is suitable for factor analysis. Principal Component Analysis (PCA) revealed that all three items (AMV 1, AMV 2, AMV 3) load strongly onto a single factor, accounting for an impressive 93.28% of the variance. The component matrix shows very high loadings (e.g., 0.970 for AMV 1), confirming strong internal consistency and unidimensionality.

Component Matrix^a

	Component
	1
AMV 1	.970
AMV 2	.965
AMV 3	.963

2. Long-Term Impact of Automation (LTI)

For the LTI group, the KMO was 0.777 with a significant Bartlett's test ($p < 0.001$), validating the data's suitability for PCA. Four items were analyzed, and one dominant factor was extracted, explaining 69.48% of the total variance. Interestingly, LTI 1 had a very low loading (0.165), suggesting it might not align well with the other items. The remaining items (LTI 2 to LTI 4) had strong factor loadings (~0.957–0.958), suggesting they measure a common underlying construct effectively.

Component Matrix^a

	Component
	1
LTI 1	.165
LTI 2	.957
LTI 3	.958
LTI 4	.958

3. Risk Perception vs. Actual Performance (RP)

This construct had the highest sampling adequacy (KMO = 0.881) and a strong Bartlett's test result ($p < 0.001$), signaling excellent factorability. PCA extracted two components, with the first accounting for 75.05% and the second adding 20.05% of the variance. Most items (RP 2 to RP 5) loaded strongly on the first component (~0.968 to 0.972), while RP 1 uniquely loaded on the second component (1.000), suggesting it may represent a separate dimension of risk perception, possibly a distinct subfactor.

Component Matrix^a

	Component	
	1	2
RP 1	-.010	1.000
RP 2	.968	-.027
RP 3	.972	-.001
RP 4	.967	-.007
RP 5	.967	.045

Hypotheses Testing

This table presents the results from Friedman's ANOVA, a non-parametric test used when comparing more than two related groups—in this case, probably different items or conditions rated by the same group of people. The key takeaway is in the last two columns: Friedman's Chi-Square is 0.808 with a significance (p-value) of 0.668. Since the p-value is much greater than 0.05, it tells us that there's no statistically significant difference in how participants responded across the different items or conditions tested. In everyday terms, people rated the options similarly, without showing strong preferences for one over another.



ANOVA with Friedman's Test

	Sum of Squares	df	Mean Square	Friedman's Chi-Square	Sig
Between People	477.205	249	1.916		
Within People					
Between Items	.056 ^a	2	.028	.808	.668
Residual	34.611	498	.069		
Total	34.667	500	.069		
Total	511.872	749	.683		

● This table shows the results

	Sum of Squares	df	Mean Square	Friedman's Chi-Square	Sig
Between People	424.741	249	1.706		
Within People					
Between Items	.115 ^a	3	.038	.335	.953
Residual	257.135	747	.344		
Total	257.250	750	.343		
Total	681.991	999	.683		

● This output presents the results from Friedman’s ANOVA, which is typically used to detect differences in rankings across multiple related items when assumptions for traditional ANOVA aren't met. The Friedman’s Chi-Square value is 2.582, with a p-value of 0.630. Since this p-value is much higher than 0.05, the test shows that the differences in

how participants responded to the five items (as indicated by the degrees of freedom = 4) are not statistically significant. In simpler terms, people responded to all five items in a pretty consistent way—no single item stood out as being rated very differently from the others.

ANOVA with Friedman's Test

	Sum of Squares	df	Mean Square	Friedman's Chi-Square	Sig
Between People	540.871	249	2.172		
Within People					
Between Items	.795 ^a	4	.199	2.582	.630
Residual	307.205	996	.308		
Total	308.000	1000	.308		
Total	848.871	1249	.680		

DISCUSSION

The present study explores how automation is reshaping organizational performance, employee satisfaction, and perceived workplace risks in industrial settings. The analysis reveals a nuanced relationship between automation and workforce dynamics. While automation positively influences overall productivity and efficiency, its impact on employee satisfaction and risk perception is more complex and multifaceted.

A key finding is that employees generally perceive automation as beneficial when it supplements rather than replaces human efforts. This aligns with broader literature suggesting that collaborative automation—where machines enhance rather than substitute human work—tends to yield higher job satisfaction and lower resistance to change. Interestingly, industries that invested in adaptive automation reported smoother transitions and stronger workforce engagement,

indicating that thoughtful implementation strategies significantly affect outcomes.

The study also highlights that risk perception varies by role, age group, and prior exposure to automation technologies. Younger employees and those with previous experience in tech-driven environments expressed lower anxiety and higher adaptability. Conversely, some experienced workers voiced concerns about job security and skill redundancy, underscoring the importance of transparent communication and upskilling opportunities during transitions.

Moreover, the results suggest that leadership practices and organizational culture significantly mediate the effects of automation. Companies that encouraged continuous learning, open dialogue, and participatory decision-making managed to sustain morale and trust even amid rapid technological change.



CONCLUSION

In conclusion, automation—when implemented with strategic foresight—can enhance organizational performance without undermining employee satisfaction or increasing workplace anxiety. However, its success largely depends on how it's introduced and integrated into existing workflows. Clear communication, inclusive planning, and sustained employee development emerge as critical enablers of positive outcomes.

The findings reinforce the need for organizations to adopt a human-centric approach to automation, prioritizing both technological advancement and workforce well-being. Future research should expand to different industrial sectors and incorporate longitudinal data to better understand long-term effects and evolving perceptions. Ultimately, the path to successful automation lies not just in machines, but in how people and machines learn to work together.

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