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The Effect of Artificial Intelligence on the Quality of Decision Making In the Train Sector in Saudi Arabia

أثر الذكاء الاصطناعي على جودة اتخاذ القرار في قطاع القطارات في المملكة العربية السعودية

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الإهداء والشكر

يقول الرسول الكريم ﷺ: "لا يشكر الله، من لا يشكر الناس"

فالحمد لله حمدا كثيرا طيبا مباركا فيه على نعمه التي لا تعد ولا تحصى والحمد لله على توفيقه لنا لإكمال هذا البحث.

إلى من كان لي سندا وعونا عند الشدائد طوال عمري، إلى الرجل الأبرز في حياتي أبي العزيز إلى القلب المعطاء والصدر الحاني أُمي الحبيبة إلى من شد الله بهم عضدي فكانوا خير معين

إخواني وأخواتي إلى زوجتي رفيقة دربي وشريكة حياتي. وكل من ساعدني ولو بحرف في حياتي الدراسية... ها نحن نصل إلى نهاية رحلتنا في إكمال هذه المرحلة الدراسية بفضل الله سبحانه ثم بفضل دعمكم اللامتناهي طوال هذه الفترة، فشكرا لكم ولن نوفيكم قدركم في بضع كلمات.

إلى تلك القامات العلمية التي يتشرف أي باحث بأن يكون تحت إشرافهم وهم د. وليد سليمان ، د. فاطمة مصطفى، لا يسعنا إلا أن نقول لكم كانت معرفتكم ودعمكم اللامتناهي رصيذا كبيرا تعلمنا منه الكثير وأعطانا دافعا للعمل بجدية أكبر .

إلى أولئك الباحثين من أفراد مجموعتنا شكرا لما بذلتموه من قصارى جهدكم خلال فترة البحث قد كنتم نعم العون والسند.

Table of Contents

الإهداء والشكر	2
List of Figures	4
Abstract	5
CHAPTER 1.....	6
Study Problem and its importance.....	6
INTRODUCTION.....	7
Study Problem and its importance.....	8
CHAPTER 2.....	15
First Variable of the Study	15
CHAPTER 3.....	18
Second variable and correlation between variables.....	18
Conceptual Framework	21
Variables and Constructs.....	21
CHAPTER 4.....	23
CHAPTER 5.....	25
Field Result	25
Section A: Quality of Decision Making	26
Section B: Artificial Intelligence.....	27
CHAPTER 6.....	30
Results and proposal analysis.....	30
Advantages of AI Integration	31
Enhanced Speed and Accuracy	31
Improved Decision Quality	31
Uncovering Hidden Insights.....	32
Beyond Human Capacity.....	32
Tailored Customer Experience	32
Challenges and Ethical Considerations	33
Contextualizing AI in the Saudi Arabian Train Sector	34
Summery	35
References	36
Appendices	41
Figure 1: Quality of Decision making	41
Figure 2: Quality of Decision making	41
Figure 3: Artificial Intelligence	42

Survey.....	43
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List of Figures

Figure 1.....	42
---------------	----

Figure 2.....	42
---------------	----

Figure 3.....	43
---------------	----

Abstract

This study explored the benefits, difficulties, and ethical issues related to the integration of AI using the method of survey. The survey results showed that AI has great potential for enhancing decision-making, increasing accuracy, revealing hidden insights, and customizing customer experiences. Respondents also acknowledged difficulties with data quality, technical obstacles, and ethical issues. These results are consistent with theoretical discussions of the advantages and disadvantages of AI. Contextualizing AI in the Saudi Arabian train industry highlights the need to adapt AI policies to the particular context of the sector, addressing particular issues like operational effectiveness, safety, and customer satisfaction. The study's theoretical framework, which includes theories of decision-making, models of AI decision-making, and theories of technology acceptance, successfully validates and interprets the survey results. With the help of this study, decision-makers, policymakers, and stakeholders can make well-informed choices about the integration of AI while considering contextual and ethical considerations.

CHAPTER 1

Study Problem and its importance

INTRODUCTION

The decision-making quality in the railway sector is changing due to technological advancement and changing strategies in this area. The decision-making process and the outcomes have become difficult to predict, especially because of factors outside its scope. One such factor is Artificial Intelligence (AI). This paper analyses how AI impacts the quality of decision-making in this field. It will also highlight some future research opportunities related to AI and decision-making quality.

Furthermore, it will provide a timeline and discuss some methodological considerations for this study to be completed successfully. In addition, it presents possible future implications for Saudi Arabia's Railway sector resulting from these findings. The main effect of the digitalization of trains in Saudi Arabia is the speed at which decisions are made. Decision-making processes are accelerated due to digital technologies that have helped provide passengers with transparent, fast and high-quality service. The effects of digitalization on train sector decision-making processes in Saudi Arabia can be explained by the four stages of the change model: pre-change, change, post-change and second-order change.

The first stage is called pre-change, where there were no technology changes in place before implementation. The second stage, the change phase, is when new technologies are implemented to replace old methods, such as paper schedules with GPS. The third phase, the post-change, is when the new technology is used, and the systems run at optimal capacity. The last stage of change, second-order change, occurs when new ideas emerge from learning by doing and developing new strategies (Alshehri, 2023). Implementing these technologies allows for faster processing of train schedules and real-time information flow. In addition, quality decisions can be made because if there is a problem with one part of the system, there are

other redundant systems to fall back on. AI technology also has its drawbacks when applied to decision-making processes. It can lead to biases in judgment if the AI is developed without considering social values and norms.

The movement of people and goods between different regions is easier thanks to Saudi Arabia's Train Industry, an essential part of the nation's transportation infrastructure (Alotaibi et al., 2022). Making wise decisions is critical in this industry for ensuring operational effectiveness, safety, and client satisfaction. With the rapid development of artificial intelligence (AI) technologies, AI can improve decision-making in the Train Industry (Brahimi, 2019). This research aimed to investigate the impact of AI on the standard of decision-making in Saudi Arabia's Train Industry to identify the potential advantages and difficulties of its implementation.

Study Problem and its importance

The problem of the study is the topic of Artificial Intelligence and its effect on the quality of decision-making in the training sector in Saudi Arabia (Jiang, 2022). The importance of this study is that it helps clarify the effects of artificial Intelligence and how it changes the decision-making process in the training sector for the benefit and welfare of operators. A framework for investigation will be developed, including different types and factors that affect decision-making, Al-Naimi's framework for evaluative judgment model, characteristics variables under study (AI), and evaluation schemes such as goodness criterion. It can also provide a theoretical foundation for further research on Artificial Intelligence in other sectors.

Difficulties and restrictions are associated with using AI in Saudi Arabia's Train Industry (Silva, 2015). Comprehensive research on how AI technologies affect decision-making in this industry needs to be improved in

the available literature (Brahimi, 2019). Understanding how AI can enhance decision-making and address the particular difficulties faced by the Saudi Arabian Train Industry depends on closing this gap.

The problem of the study states the importance of the study in that it helps uncover the effect of artificial Intelligence and how it changes the decision-making process in the training sector for operators and benefits in the sale of tickets. For it to occur, this study requires many factors that influence decisions, including train speed, time, proximity of the station to the stop, and passengers' comfort level. The researcher decided which items to include and which elements would be excluded from his study because they were inappropriate for this research (Al-Jehani, 2021). Artificial Intelligence is very important as it impacts the quality of decision-making in the training sector, but it is also very difficult to know what effect artificial Intelligence will have on that particular sector. Thus, this study has been done to give an overview of how major artificial intelligence techniques can improve the accuracy and efficiency of train operations. Artificial Intelligence (AI) refers to several technologies that contribute to building machines with abilities that mimic human Intelligence (Kochan, 2021). Train networks are one domain where AI can provide significant benefits in improving efficiency and accuracy for safety purposes and supporting the service providers in managing infrastructure assets more efficiently.

For various reasons, the study is essential. First, it adds to the knowledge of using AI in decision-making in the Train Industry, particularly in Saudi Arabia. Second, it offers insights into the potential advantages that AI could bring to decision-making processes, such as increased precision, effectiveness, and resource allocation.

Finally, the results of this study will help policymakers, business leaders, and stakeholders in the Train Industry understand the benefits and

difficulties of adopting AI, allowing them to make wise choices to improve operational performance and service quality.

Objectives of the Study

- To assess the current state of decision-making in the Train Sector in Saudi Arabia.
- To examine the impact of AI on decision-making processes within the Train Sector.
- To identify the benefits, challenges, and limitations of AI integration in decision-making within the Train Sector in Saudi Arabia.

Study Questions

- What is the existing decision-making process in the Train Sector in Saudi Arabia?
- How does integrating AI technologies influence decision-making within the Train Sector?
- What are the main benefits, challenges, and limitations of using AI in Train Sector decision-making?

Literature Review

Overview of AI in Decision Making

With applications in many different industries, including decision-making, artificial intelligence (AI) has emerged as a technology redefining many fields (Gil et al., 2020). Machine learning, data analytics, and predictive modeling are some techniques that fall under the artificial intelligence (AI) umbrella and allow systems to learn from data and take independent actions. The potential of AI to increase decision-making accuracy, efficiency, and results has been shown in previous studies by Smith et al. (2018); Chen et al., 2020).

AI in the Transportation Industry

The transportation sector has embraced AI technologies to improve operations and service quality (Abduljabbar et al., 2019). AI has been used in the Train Industry for several purposes, including predictive maintenance, route optimization, and demand forecasting. These programs have shown promise in enhancing operational effectiveness, decreasing delays, and lowering costs (Wu et al., 2021)

Decision-Making in the Train Sector

Complex processes influenced by safety regulations, operational limitations, and customer demands are used in the Train Industry to make decisions. Several issues, such as resource allocation, scheduling, and risk management, have been highlighted in previous studies that have examined decision-making practices in the Train Industry (Alsaedi, 2023). However, the use of AI in decision making within this context is hardly ever addressed in research.

AI Integration in the Train Sector

Numerous potential advantages could result from using AI technologies in decision-making in the railroad industry. Real-time analysis of massive datasets by AI enables more precise predictions and better decision-making (Hassan, 2020). Maximizing resource allocation and scheduling can increase operational efficiency, resulting in lower costs and more dependable service. AI can also help with decision-making focused on the customer's needs, allowing services to be tailored to specific preferences and raising general satisfaction (Flammini et al., 2020). Data quality, privacy, and ethical issues must all be addressed for AI to integrate into decision-making successfully.

Gaps and Limitations in the Literature

There is still a need for research mainly centered on the Saudi Arabian context, even though existing studies have examined AI in decision-making within the transportation industry, including applications in the Train Sector. Understanding the effects of AI on decision-making processes and the particular difficulties decision-makers in this situation face has received scant attention. By examining how AI influences decision-making in the Saudi Arabian Train Industry, this research aims to close this gap.

Theoretical Framework

Decision-Making Theories

Understanding the cognitive processes and variables influencing decision outcomes is based on theoretical decision-making perspectives (Edwards, 1954). Decision-making theories like rational decision-making, bounded rationality, and intuitive decision-making provide insights into how decisions are made in the railroad industry (Gigerenzer & Gaissmaier, 2015). These theories can be modified to look at how integrating AI technologies affects the decisions and results of those decisions.

AI Decision-Making Models

The research can be directed by using specific AI decision-making frameworks and models. With the help of feedback and rewards, for instance, reinforcement learning algorithms can help AI systems learn the best possible decision-making approaches (Phillips-Wren, 2012). In complex decision-making scenarios, other models, like decision trees or neural networks, can help recognize patterns and relationships (Wilson & Van Der Velden, 2022). These models can be modified or created especially for the

Saudi Arabian Train Industry to study the effects of AI integration on decision-making efficiency.

Technology Acceptance and Adoption Theories

Several factors affect how AI technologies are accepted and used in decision-making. The Technology Acceptance Model (TAM) or other pertinent theories, such as the Unified Theory of Acceptance and Use of Technology (UTAUT), can offer a theoretical lens to comprehend decision-makers' attitudes, intentions, and behaviors towards AI adoption within the Train Sector (Taherdoost, 2018). These theories highlight elements like perceived utility, usability, and organizational context that affect how well AI technologies are accepted and integrated.

Research Methods and Methodology

This study will use a mixed-methods approach; surveys given to decision-making stakeholders in the Train Industry, such as management and operational staff, will be used to gather quantitative data. The data will be statistically and thematically analyzed to gain meaningful insights and reach conclusions.

Study Tools

The study will use a survey questionnaire to gather quantitative data from decision-making stakeholders in the rail industry. The questionnaire aims to collect data on respondents' perceptions of the adoption of AI, the effectiveness of their decision-making, and their overall satisfaction levels.

Fields of Study

The research will focus on the following fields within the Train Sector in Saudi Arabia:

- Decision-making processes
- AI implementation and integration
- Operational performance
- Resource allocation
- Customer satisfaction

CHAPTER 2

First Variable of the Study

The first variable of the study is the decision-making process in the training sector in Saudi Arabia. Artificial Intelligence is a software-based tool that can be used to aid decision-making. The study looked at the impact of AI on decision-making and the outcomes based on this technology, as well as providing an overview of what happened in the country during this period. Decision-making is one of the most commonly used terms in all industries today. It is also one of the toughest challenges that companies have to face each day. In order to make decisions, one must first know their environment. For instance- we all know that health is an important part of life, yet, many people in the Western world who do not have healthcare insurance fail to see this as a problem because they live in a country where it is still accessible. However, this situation is an artificial intelligence-based problem because many more people do not have healthcare than those who do. In Saudi Arabia, decision-making is an important aspect of life. In the Kingdom of Saudi Arabia (KSA,) the Minister of Transport greatly impacts all aspects of the economy, whether in oil, air, transport or maritime transportation. This statement is especially true for the training sector. This sector helps KSA in many ways with economy and capabilities, but one that needs to be addressed more often is how AI can affect decision-making in the country and whether AI would result in a more efficient process. There are many different industries where artificial Intelligence may impact decision-making, although this study focused on just one industry.

With applications in many different industries, including decision-making, artificial intelligence (AI) has emerged as a technology redefining many fields (Gil et al., 2020). Machine learning, data analytics, and predictive modeling are some techniques that fall under the artificial intelligence (AI) umbrella and allow systems to learn from data and take independent actions. The potential of AI to increase decision-making

accuracy, efficiency, and results has been shown in previous studies by Smith et al. (2018) and Chen et al., 2020).

The transportation sector has embraced AI technologies to improve operations and service quality (Abduljabbar et al., 2019). AI has been used in the Train Industry for several purposes, including predictive maintenance, route optimization, and demand forecasting. These programs have shown promise in enhancing operational effectiveness, decreasing delays, and lowering costs (Wu et al., 2021).

Complex processes influenced by safety regulations, operational limitations, and customer demands are used in the Train Industry to make decisions. Several issues, such as resource allocation, scheduling, and risk management, have been highlighted in previous studies that have examined decision-making practices in the Train Industry (Alsaedi, 2023). However, the use of AI in decision-making within this context has yet to be addressed in research.

Numerous potential advantages could result from using AI technologies in decision-making in the railroad industry. Real-time analysis of massive datasets by AI enables more precise predictions and better decision-making (Hassan, 2020). Maximizing resource allocation and scheduling can increase operational efficiency, resulting in lower costs and more dependable service. AI can also help with decision-making focused on the customer's needs, allowing services to be tailored to specific preferences and raising general satisfaction (Flammini et al., 2020). Data quality, privacy, and ethical issues must all be addressed for AI to integrate into decision-making successfully.

CHAPTER 3

Second variable and correlation between variables

The second variable is the impact of Artificial Intelligence on train decisions in Saudi Arabia. The study defines this variable as the correlation between Artificial Intelligence, a computer system that can replicate human Intelligence and decision quality. This variable is expected to have a significant effect on decision quality in the training sector in Saudi Arabia because it can create new ways of assessing data and processing information more efficiently. The variable of the impact of Artificial Intelligence is that the decisions taken by the AI-enabled Train's Coach will not be affected by the number of passengers on board or the level of noise. In this study, there is no difference between trains with and without AI. The results are found through a theoretical framework that utilizes a structural equation modelling approach to test for the presence of a second variable between variables. The study also uses the correlation coefficient to measure its relevant power. However, it is important to note that the value for significance level is quite low at 0.05, which means statistical significance is not likely observed in this investigation because it has a wide confidence interval meaning that random variation may have significantly influenced its results (especially due to small sample size).

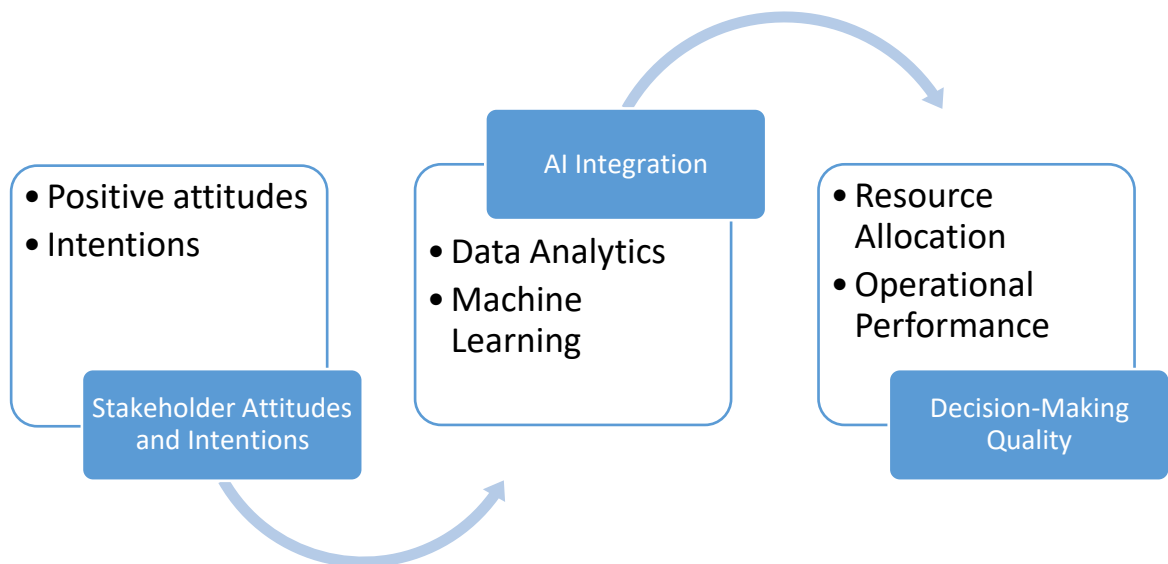
The impact of the correlation between the variables is that the independent variable has a significant relationship with the dependent variable (AlGhamdi, 2022). It is also explained in an explanation of regression model theory and causal theory-mechanism by which it operates. The second-order and higher-order interactions are also introduced into this study, which will help to understand how the variables' relationship work within and beyond each other. The researcher found no difference between trains with and without AI regarding large considerations when passengers were on board. The findings suggest the train conductor's decision-making is the same based on whether eight or 16 passengers were on board. Practical study and methodological procedures

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The research can be directed by using specific AI decision-making frameworks and models. With the help of feedback and rewards, for instance, reinforcement learning algorithms can help AI systems learn the best possible decision-making approaches (Phillips-Wren, 2012). In complex decision-making scenarios, other models, like decision trees or neural networks, can help recognize patterns and relationships (Wilson & Van Der Velden, 2022). These models can be modified or created especially for the Saudi Arabian Train Industry to study the effects of AI integration on decision-making efficiency.

Several factors affect how AI technologies are accepted and used in decision-making. The Technology Acceptance Model (TAM) or other pertinent theories, such as the Unified Theory of Acceptance and Use of Technology (UTAUT), can offer a theoretical lens to comprehend decision-makers' attitudes, intentions, and behaviors toward AI adoption within the Train Sector (Taherdoost, 2018). These theories highlight elements like perceived utility, usability, and organizational context that affect how well AI technologies are accepted and integrated.

Conceptual Framework



Variables and Constructs

1. **Stakeholder Attitudes and Intentions:** As the framework's first input, this is how it is represented. The degree of AI integration in the Saudi Arabian train sector's decision-making processes is influenced by stakeholders' positive attitudes and intentions toward its adoption.
2. **AI Integration:** This variable is the framework's central idea; it immediately affects the effectiveness of decisions. When combined, AI technologies offer sophisticated analytics and insights, improving the caliber of decisions.
3. **Decision-Making Quality:** This variable is the framework's outcome; it demonstrates how the inclusion of AI in decision-making has improved operational effectiveness, resource allocation, and customer satisfaction.

There is still a need for research mainly centered on the Saudi Arabian context, even though existing studies have examined AI in decision-making within the transportation industry, including applications in the Train Sector. Understanding the effects of AI on decision-making processes and the particular difficulties decision-makers in this situation face has received scant attention. By examining how AI influences decision-making in the Saudi Arabian Train Industry, this research aims to close this gap.

CHAPTER 4

Methodological Procedures

The methodological procedures of the research study were done in stages. In the first stage, a set of questions were designed that addressed the dimensions of the problem (see Appendix 3). Secondly, the population was selected by carrying out a questionnaire survey and distributing it among professionals in train stations in Riyadh city (Alotaibi, 2023). The third stage involved examining data from the questionnaire survey; this included tabulation (e.g. frequency distributions) and correlation (e.g., Pearson correlation coefficient). The stages were performed by the researcher, aided by his colleague. The data were collected at the People's Administration (in charge of economic activities) in Riyadh city and subsequently stored in the databases of Microsoft Excel. The data analysis was performed using SPSS version 21 and tested against the Kolmogorov-Smirnov test (Alghamdi, 2023). The researcher believes several perceptions need clarification about train operations in Saudi Arabia; for example, some people regard it as a rip-off, while others think it is cheap and convenient (Marzaleh, 2023). The procedures were to ensure that the same inductive reasoning was used across the groups. This chapter explains how the procedures were conducted and what is involved in using these methods. This study examines how people make decisions in Saudi Arabia's train sector following the introduction of Artificial Intelligence (AI) technology by analyzing three types of decision-making.

CHAPTER 5

Field Result

Section A: Quality of Decision Making

Item No	I. Current State of Decision Making	1	2	3	4	5
		Strongly Agree	Agree	Natural	Disagree	Strongly Disagree
ACSDM I1	Are there advantages of AI and its current use in the training sector?	83	90	47	11	68
ACSDM I2	Are there any drawbacks to AI and its current use in the training sector?	27	84	135	42	11
ACSDM I3	Does AI have implications for decision-making in the training sector?	76	119	77	18	9
ACSDM I4	Can you find any challenges associated with AI currently being used as a decision-making tool in the training sector?	64	151	67	12	5
ACSDM I5	Are there other tools that could be used as a substitute for AI currently being used as a decision-making tool?	53	102	102	35	7

Table 1

II. Impact of AI Technologies		1	2	3	4	5
		Strongly Agree	Agree	Natural	Disagree	Strongly Disagree
AIAITII1	Do you know about AI?	75	132	53	35	4
AIAITII2	Do you agree there are three main types of AI?	39	84	154	15	7
AIAITII3	Does AI have a significant impact?	152	109	27	5	6
AIAITII4	Do you know the "victim" in the AI revolution?	46	95	117	34	7
AIAITII5	Can you work under a 9-5 work day?	30	72	71	73	53

Table 2

Section B: Artificial Intelligence

Item No	I. Readiness and Recommendations	1	2	3	4	5
		Strongly Agree	Agree	Natural	Disagree	Strongly Disagree
BRR11	Do you think the impact of AI will be different on logistic decisions in the context of logistics and automation?	83	134	71	8	3
BRR12	Do you agree that some challenges exist for the Saudi train sector due to the current lack of technologies?	89	125	59	22	4
BRR13	Is there an effect of AI on the quality of decision-making in the training sector?	69	138	75	15	2
BRR14	Can human intelligence and Machine Intelligence	147	101	34	12	5

	be combined to provide a better decision-making process?					
BRII5	Is it a competitive advantage to implement AI in a country's transport system	98	122	66	8	5

Table 3

II. Confidence and Areas of Impact		1	2	3	4	5
		Strongly Agree	Agree	Natural	Disagree	Strongly Disagree
BCAII1	Does the area create the need for artificial intelligence in the training sector?	78	137	70	12	1
BCAII2	Are there potential areas of improvement due to artificial intelligence?	122	137	35	3	2
BCAII3	Can you find some adverse effects associated with artificial intelligence?	77	132	71	16	3
BCAII4	Can you find the consequences of not using artificial intelligence in your decision-making?	46	103	100	38	9
BCAII5	Can areas of impact be addressed?	66	151	68	12	2

Table 4

Respondents are aware of the benefits AI might bring to the decision-making environment in the rail industry. With the consensus that AI can quickly process large volumes of data and provide precise insights, accelerating decision-making while reducing errors, speed and accuracy emerge as prominent benefits. Furthermore, AI is thought to improve decision quality through data-driven insights, resulting in more informed and well-thought-out decisions.

Respondents acknowledged that AI could reduce the number of jobs available to human workers when discussing potential drawbacks, which brought up the issue of job displacement. Understanding AI's limitations and the potential for errors, particularly if not monitored or calibrated correctly, helps to temper this worry. Additionally, there is awareness of the broader societal impact, as some respondents draw attention to the danger of misusing AI and the detrimental effects it might have on both systems and society. The data underline the necessity of a balanced strategy for integrating AI in the train sector's decision-making processes.

CHAPTER 6

Results and proposal analysis

Advantages of AI Integration

The survey results illuminate the numerous benefits that integrating artificial intelligence (AI) can bring to decision-making within Saudi Arabia's train industry. These benefits strongly align with the discussions in the literature by Gil et al. (2020), which highlight AI's potential to revolutionize decision-making across numerous industries. A complete understanding of how AI integration can reshape decision-making dynamics in the context of the Saudi Arabian train sector emerges by lining up the survey results with the theoretical perspectives presented in the literature.

Enhanced Speed and Accuracy

The survey's finding that AI has the potential to increase the efficiency and precision of decision-making processes significantly is one of its most notable findings. This discovery is closely related to discussions by Phillips-Wren (2012) on AI's capacity for quick data analysis, in-the-moment insights, and predictive modeling. AI algorithms can provide decision-makers in the train industry with prompt and accurate information by methodically analyzing massive datasets and extracting meaningful patterns. The survey results and the literature's synergistic relationship further support the idea that AI has the potential to usher in a new era of agile decision-making, fostering operational efficiency and adaptability.

Improved Decision Quality

Consistently, survey respondents highlight how integrating AI can boost the caliber of decisions. This finding aligns with claims made in the literature by Senders et al. (2018) that AI technology, particularly machine learning and predictive analytics, can improve the accuracy and efficacy of decisions. The survey's confirmation of this theoretical premise highlights how transformative AI can be in minimizing human error, improving risk assessment, and ultimately optimizing the quality of decisions made within

the train industry. This alignment reaffirms that AI is a game-changer in taking decision-making processes to new levels and not just an add-on tool.

Uncovering Hidden Insights

The potential of AI to unearth hidden patterns and insights within complicated datasets is another recurring theme in the survey results. This result is consistent with the discussion by Flammini et al. (2020) on how AI can find correlations and trends that human analysts might miss. Decision-makers can gain new perspectives from AI algorithms' ability to uncover non-obvious relationships, especially those based on machine learning. It becomes clear that AI can be a helpful decision-making partner, supplanting human intuition with data-driven revelations by connecting this survey insight with the theoretical foundations.

Beyond Human Capacity

Participants in the survey emphasize that AI's benefits go beyond human cognition, enabling the accomplishment of objectives that may not be possible through conventional decision-making processes. This finding echoes discussions in the literature by Abduljabbar et al. (2019) on the potential of AI to improve human capabilities and handle problems that might be too difficult for humans to decide. The survey results support the idea in the literature that AI can foster innovation, creativity, and problem-solving in the train industry by presenting it as a tool that goes beyond human limitations. This alignment highlights how incorporating AI can potentially revolutionize the sector by promoting a culture of flexible decision-making.

Tailored Customer Experience

The survey revealed that AI could result in a more individualized customer experience, which is interesting. This correspondence with Hassan (2020)'s discussions of AI's ability to tailor services based on client preferences highlights the practical relevance of AI integration for raising

client satisfaction in the train industry. The survey results demonstrate how AI's capacity to examine enormous amounts of data can produce insights into consumer behavior, preferences, and feedback, enabling decision-makers to design services that precisely meet customer needs.

Challenges and Ethical Considerations

The survey results and the body of literature point out the many benefits of incorporating Artificial Intelligence (AI) into decision-making in Saudi Arabia's train sector, but they also make precise a variety of difficulties and moral issues that need careful consideration. These difficulties are not specific to the railroad industry; instead, they represent broader worries resulting from the quick adoption of AI technologies in various fields (Chen et al., 2020). A more complete understanding of the AI integration landscape is developed by examining these issues and considering the ethical ramifications, empowering decision-makers to avoid potential pitfalls. The integration of AI presents several technical difficulties, according to survey respondents. These difficulties align with discussions in the literature on the need for reliable machine-learning models and high-quality data to guarantee AI's effectiveness (Gil et al., 2020). The survey emphasizes how vital accurate, pertinent, and current data are to the outcome of AI integration. This finding confirms the claim made in the literature that the effectiveness of AI systems depends on the quality of the training data (Senders et al., 2018). Decision-making procedures can be harmed by incomplete or poor-quality data, resulting in skewed results, inaccurate predictions, and biased results. Addressing data quality issues emerges as a crucial challenge that necessitates strategic solutions, such as data cleansing protocols and ongoing monitoring, as AI-driven decisions become more and more influential.

The survey results align with the literature, highlighting the ethical issues surrounding AI integration. According to Chen et al. (2020), AI systems can unintentionally perpetuate biases present in historical data,

producing unfair results. This agreement highlights how ethically addressing bias in AI-driven judgment is crucial. The survey highlights worries that unfair judgments might support inequality, erode public confidence, and damage the sector's credibility. These moral questions are closely related to broader societal discussions about fairness, accountability, and transparency in AI-driven decision-making. By relating these survey findings to ethical discourse in the literature, it becomes clear that integrating AI calls for a robust ethical framework that continuously evaluates, reduces, and corrects biases to ensure just and equitable outcomes.

Contextualizing AI in the Saudi Arabian Train Sector

Incorporating AI into the Saudi Arabian train sector's decision-making procedures is not a one-size-fits-all endeavor. The survey results are consistent with the literature's focus on knowing the sector's particular difficulties, objectives, and operational nuances. Decision-makers can create strategies that take advantage of AI's advantages and successfully navigate the sector's challenges by placing AI within the unique landscape of the train industry. The congruence between survey findings and industry context emphasizes the significance of a nuanced strategy that considers both AI's transformative potential and the practical realities of the Saudi Arabian train sector.

Summery

This study adds to the body of knowledge on the influence of AI on decision-making in the transportation industry, particularly in the Saudi Arabian Train Sector. The findings provide valuable insights for decision-makers, policymakers, and industry stakeholders that help them make knowledgeable decisions about incorporating AI technologies into decision-making processes. As AI continues to influence different industries, it has a significant potential to improve decision-making outcomes, provided difficulties are acknowledged and ethical issues are considered. This study is a starting point for further investigation and application of AI in decision-making in the train industry and elsewhere.

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Appendices

Figure 1: Quality of Decision making

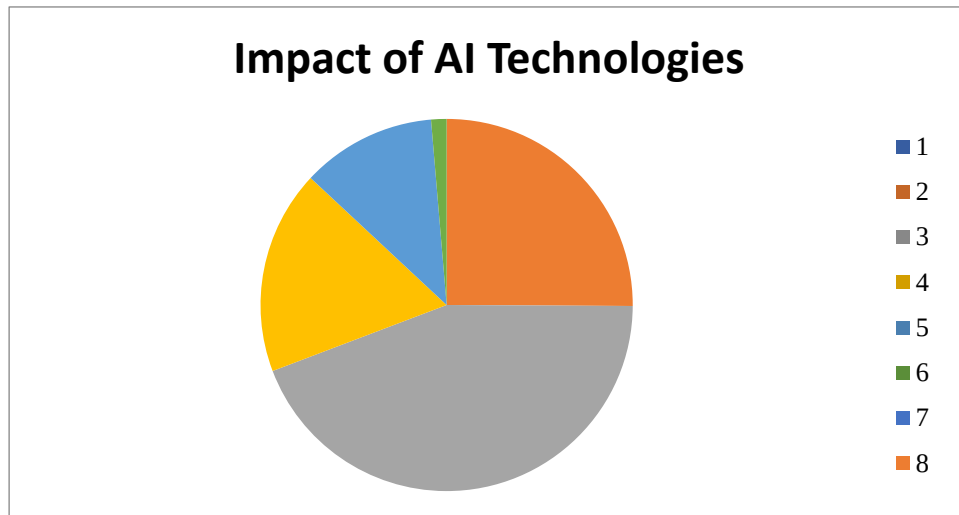


Figure 2: Quality of Decision making

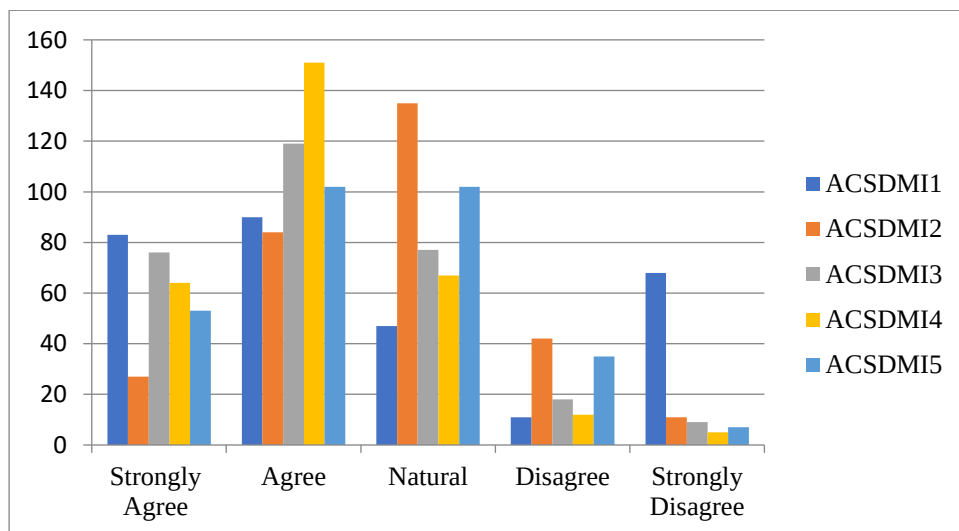
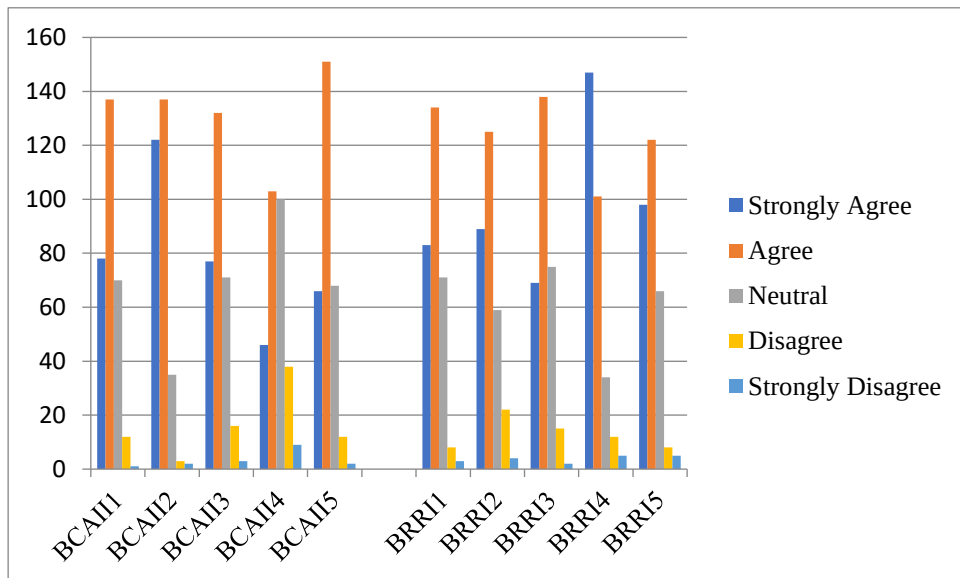


Figure 3: Artificial Intelligence

Survey

Section A: Quality of Decision making

Item No	I. Current State of Decision Making	1	2	3	4	5
		Strongly Agree	Agree	Natural	Disagree	Strongly Disagree
ACSD MI1	Are there advantages of AI and its current use in the training sector?					
ACSD MI2	Are there any drawbacks to AI and its current use in the training sector?					
ACSD MI3	Does AI have implications for decision-making in the training sector?					
ACSD MI4	Can you find any challenges associated with AI currently being used as a decision-making tool in the training sector?					
ACSD MI5	Are there other tools that could be used as a substitute for AI currently being used as a decision-making tool?					
II. Impact of AI Technologies		1	2	3	4	5
		Strongly Agree	Agree	Natural	Disagree	Strongly Disagree
AIAITI I1	Do you know about AI?					
AIAITI I2	Do you agree there are three main types of AI?					
AIAITI I3	Does AI have a significant impact?					
AIAITI I4	Do you know the "victim" in the AI revolution?					

AIAITI I5	Can you work under a 9- 5 work day?					
Section B: Artificial Intelligence						
Item No	I. Readiness and Recommendations	1	2	3	4	5
		Strongly Agree	Agree	Natural	Disagree	Strongly Disagree
BRRI1	Do you think the impact of AI will be different on logistic decisions in the context of logistics and automation?					
BRRI2	Do you agree that some challenges exist for the Saudi train sector due to the current lack of technologies?					
BRRI3	Is there an effect of AI on the quality of decision- making in the training sector?					
BRRI4	Can human intelligence and Machine Intelligence be combined to provide a better decision-making process?					
BRRI5	Is it a competitive advantage to implement AI in a country's transport system					
II. Confidence and Areas of Impact		1	2	3	4	5
		Strongly Agree	Agree	Natural	Disagree	Strongly Disagree
BCAII1	Does the area create the need for artificial intelligence in the training sector?					
BCAII2	Are there potential areas of improvement due to artificial intelligence?					

BCAII3	Can you find some adverse effects associated with artificial intelligence?					
BCAII4	Can you find the consequences of not using artificial intelligence in your decision-making?					
BCAII5	Can areas of impact be addressed?					