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INTEGRATING ARTIFICIAL INTELLIGENCE AND NEUROMARKETING FOR SUSTAINABLE LOGISTICS INNOVATION IN MALAYSIA: A MULTI-CASE STUDY APPROACH

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Abstract:

This study examines how the integration of artificial intelligence and neuromarketing contributes to sustainable innovation in Malaysia's logistics and transportation industries. Using a qualitative multiple case study design, the research explores three leading Malaysian firms: Pos Malaysia Berhad, Grab Malaysia, and GDEX Express. The aim is to understand how emotional analytics enhance customer engagement,

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managerial decision-making, and sustainability performance. Data were obtained through interviews and document reviews and analysed thematically using NVivo software. The findings show that AI-driven neuromarketing enables firms to interpret emotional patterns, personalise communication, and design sustainability initiatives that align with customer values. Emotional analytics improved customer satisfaction, strengthened brand trust, and supported environmentally responsible marketing practices. The study contributes to theory by extending the concept of Logistical Enabled Services through the inclusion of emotional intelligence as a key factor in digital transformation. From a managerial perspective, it offers practical guidance for logistics leaders who wish to combine technological capability with human empathy. The results indicate that emotionally aware AI applications can enhance the competitiveness and sustainability of Malaysia's logistics ecosystem.

Keyword:

Artificial Intelligence, Customer Engagement, Logistics Innovation, Neuromarketing, Sustainable Logistics.

Introduction

The logistics and transportation industries in Malaysia are in the middle of a structural shift driven by digitalisation, e-commerce growth and national level transport planning. The National Transport Policy 2019 to 2030 makes it clear that competitiveness in logistics will depend on technology adoption, data driven decision making and customer centric services (Ministry of Transport Malaysia, 2019). At the same time, the global discussion on artificial intelligence is moving beyond automation toward intelligence that understands people. This is where neuromarketing enters the picture. Neuromarketing studies the way consumers respond emotionally and cognitively to marketing stimuli and provides evidence on what actually influences their choices rather than what they say influences their choices (Alsharif, 2023).

In Malaysia, most logistics firms already use AI for planning, routing and tracking. Fewer firms use AI for understanding the feelings and perceptions of customers. This is a missed opportunity because logistics is a service industry where reassurance, trust, speed and reliability are emotional as well as operational. If a customer is anxious about delivery, the problem is not only about the truck or the rider. It is also about perception. AI that is linked with neuromarketing can read and classify emotions from text, from facial responses or from interaction patterns. This information can then be used to adjust messages, mobile app content and service recovery scripts in real time (Chen et al., 2024). This study is written to explain that idea in a structured research way and to show how it can work in Malaysian firms such as Pos Malaysia, Grab Malaysia and GDEX Express.

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Background Of the Study

AI in logistics has been studied widely for issues such as fleet optimisation, sustainable routing and demand forecasting. These studies confirm that AI improves efficiency, reduces emissions and supports green logistics (Chen et al., 2024). However, logistics competitiveness today is not based on efficiency alone. It is also based on experience. Customers in Malaysia now interact with logistics firms through mobile platforms, on demand delivery apps and automated service portals. These interfaces are part of marketing even when they are not labelled as marketing.

Neuromarketing research in Malaysia shows that firms are interested in understanding real consumer emotions, but adoption is still slow because the techniques are perceived as costly and specialised (Alsharif, 2023). AI can reduce this barrier because AI can analyse large volumes of customer interaction data and produce emotional insight without the need for a full laboratory setting. When these two fields are combined, logistics firms can move from descriptive marketing to predictive and even prescriptive marketing. In other words, they can know what customers are likely to feel and can plan communication before dissatisfaction grows.

Malaysian Logistics Context

Malaysia's position as a trading nation, the growth of online marketplaces and the push for smart cities have created an ecosystem in which fast and reliable logistics is central. The government has been encouraging the use of digital and data technologies in transport and logistics for at least one decade (Ministry of Transport Malaysia, 2019). Private firms have responded by adopting AI for routing and for delivery time prediction. Research on Malaysian manufacturing supply chains also reports that AI improves transparency and productivity when properly integrated with operations (Ilangovan Perumal et al., 2023).

What is less documented is how marketing and customer communication functions inside logistics firms are making use of AI. In practice, service complaints on social media, feedback through apps and call centre transcripts contains rich emotional signals. These signals tell managers whether customers are calm, impatient, reassured or angry. AI can classify these signals. Neuromarketing theory can explain why such emotions appear. Together they can be used to restructure marketing messages for different customer segments. This is directly relevant for firms like Grab Malaysia that serve both passengers and delivery customers and for GDEX Express that competes in the courier segment where service experience is a differentiator.

Problem Statement

The main problem that motivates this study is the following. Logistics and transportation firms in Malaysia have already invested in AI for operations but have not used AI to capture and act on the emotional side of customer experience. This results in marketing communication that is accurate in terms of information but weak in terms of emotional resonance. Earlier studies on neuromarketing in Malaysia report that managers are aware of the value of emotional insight but do not have a clear model for implementation (Alsharif, 2023). On the other hand, studies on AI in logistics focus on physical flow and not on perception and behaviour (Chen et al., 2024). There is therefore a disconnection between what AI currently does in logistics firms and

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what marketing actually needs in order to retain customers in a competitive digital environment.

The second part of the problem is empirical. There is very little case based work that shows how a Malaysian logistics firm actually integrates AI generated emotional analytics into daily marketing and service design. Without such evidence, managers hesitate to invest. This study intends to provide precisely that kind of case-based explanation.

Research Gap

Based on the literature, four gaps can be identified. First, AI in logistics in Malaysia is often treated as an operations subject and rarely as an integrated marketing subject (Ilangovan Perumal et al., 2023). Second, neuromarketing in Malaysia has been discussed more in relation to consumer goods and retail, but not in relation to service supply chains where the delivered product is a performance, for example a delivery or a ride (Alsharif, 2023). Third, there is a lack of studies that place emotional analytics in the context of national transport policy and digital logistics strategy. Fourth, there is little explanation of how emotional insight can be translated into measurable benefits such as higher satisfaction or lower churn. This study is designed to respond to these four gaps.

Research Objectives

The study has three objectives which follow directly from the problem and the gaps.

1. To examine how AI technologies are currently or potentially integrated with neuromarketing practices in Malaysian logistics and transportation firms.
2. To identify and explain the benefits of AI enabled neuromarketing for customer experience, engagement and service design in these firms.
3. To present case study evidence from Malaysian firms that shows how emotional analytics can inform managerial decision making.

These objectives are aligned with previous work which argues that digital era logistics requires new competencies that combine technology, analytics and customer understanding (Koh et al., 2022).

Research Questions

The research is guided by the following questions.

1. In what ways do Malaysian logistics and transportation firms use AI to analyse or predict customer emotions.
2. What specific benefits do these firms obtain from applying AI assisted neuromarketing.
3. How does emotional insight influence marketing content, service recovery and customer retention strategies.

These questions will be answered using the three firm cases mentioned in the revised article, namely Pos Malaysia Berhad, Grab Malaysia and GDEX Express.

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Significance Of the Study

This study is significant for three reasons. First, it brings together two bodies of knowledge that are usually separate in Malaysia, namely AI in logistics and neuromarketing in services. Second, it offers a Malaysian centred explanation using Malaysian firms and a Malaysian policy setting. This is important because most neuromarketing studies use Western consumer data which may not reflect local service expectations. Third, the study speaks directly to managers. It shows that emotional analytics is not an abstract neuroscience exercise. It is a practical way to reduce service complaints, to increase positive word of mouth and to plan targeted promotions for high value segments. This is consistent with the call for more customer centred skills in logistics made by Koh et al. (2022).

Scope And Limitations

This study focuses on logistics and transportation firms operating in Malaysia. It considers both national level firms and large platform-based service providers. The analysis is qualitative, and case based and therefore does not claim statistical generalisation. The data on AI and emotional responses are from Malaysian conditions because public access to actual AI dashboards in these firms is limited. This limitation is common in digital logistics research where system level data are commercially sensitive (Chen et al., 2024).

Literature Review

Introduction

The study of artificial intelligence and neuromarketing within the logistics and transportation industries combines two complementary domains of knowledge. Artificial intelligence provides technological capacity for prediction, automation, and analytics, while neuromarketing contributes psychological and emotional understanding of consumer behavior. In Malaysia, this convergence is particularly relevant as logistics firms transition toward digital ecosystems that must also engage customers on an emotional level (Ibrahim et al., 2025; Amer et al., 2025).

This chapter review's major themes in the literature, beginning with the evolution of AI in logistics and transportation, followed by a discussion of neuromarketing and emotional analytics, the emergence of sustainable and green logistics, the role of aesthetics and consumer experience, and finally the integration of these themes within the Malaysian context.

Artificial Intelligence in Logistics and Transportation

Artificial intelligence has become essential in the digital transformation of logistics operations. Scholars report that AI is applied in demand forecasting, dynamic routing, fleet management, and warehouse automation to improve precision and sustainability (Chen et al., 2024). In Malaysia, research demonstrates that AI not only enhances efficiency but also supports national development policies aimed at smart mobility and sustainable transport (Ilangovan Perumal et al., 2023).

Ibrahim et al. (2025) describe how Logistical-Enabled Services, or LENS, represent the next step in integrating AI into urban logistics. Their study positions AI as a system that can synchronise data from transport, warehousing, and urban infrastructure, creating what they call a sustainable service ecosystem. They argue that AI can generate social as well as economic value when applied to public logistics planning.

Rahim et al. (2025) contribute another perspective by exploring the role of AI and blockchain technology in halal supply chains. Their study on Malaysian broiler producers demonstrates that AI improves traceability by verifying data integrity and ensuring ethical compliance. In this case, AI functions not only as a tool for optimisation but as an instrument for building consumer trust. Together, these studies show that AI in logistics has moved from operational efficiency toward value-based innovation.

Neuromarketing and Emotional Analytics

Neuromarketing focuses on understanding how the human brain and emotions influence purchasing and loyalty decisions. In Malaysia, Amer et al. (2025) find that neuromarketing techniques help startups and service firms identify emotional triggers that shape customer retention. They conclude that emotional engagement contributes more to loyalty than traditional satisfaction indicators.

The relevance of neuromarketing to logistics marketing becomes clear when considering how consumers perceive service reliability and empathy. Ibrahim et al. (2019) report that communication strategies with emotional sensitivity significantly increase engagement in online logistics platforms. Their analysis of a public service platform shows that customers respond more positively when messages reflect understanding and reassurance.

Amer et al. (2025) also examine aesthetic coherence in retail communication and show that visual and emotional consistency across multiple channels improves cognitive fluency. Although their work is in retail, the concept applies directly to logistics where customers interact through digital applications and websites. Emotional analytics powered by AI can identify the moments when a customer feels uncertainty or satisfaction and can guide marketing and service design accordingly.

Sustainability and Green Logistics

Sustainability is a recurring theme in logistics literature and forms part of Malaysia's national agenda. Muhammad et al. (2023) introduce the idea of "logispreneurs," referring to entrepreneurs who develop business models for reverse logistics and waste reduction. Their study demonstrates that digital tools and AI-based systems can promote circular practices and reduce environmental impact.

Apandi et al. (2025) investigate sustainable freight transport in Sabah and highlight three types of barriers: legal, operational, and institutional. Their findings reveal that regulatory inconsistencies and limited digital infrastructure slow down the adoption of green logistics. They recommend stronger integration of AI-based route optimisation and emission tracking tools to overcome these barriers.

Jamil et al. (2023) expand on this idea by analysing environmental management practices among Malaysian small and medium enterprises. They report that companies that use data-driven environmental monitoring systems are better able to comply with environmental regulations. These findings confirm that technology, particularly AI, can act as a facilitator of sustainability compliance and innovation in the logistics sector.

Customer Experience, Aesthetic Coherence, and Emotional Design

Emotional and visual coherence has become a determining factor in consumer engagement. Amer et al. (2025) show that visual harmony and consistency across brand channels increase emotional trust and attention. Their findings suggest that aesthetic coherence operates as a psychological signal of professionalism and reliability.

For logistics firms, where customer interactions occur mainly through digital platforms, the same principle applies. Well-designed user interfaces and consistent visual language in communication materials can enhance trust and reduce perceived risk. Johan et al. (2019) demonstrate that the human element also affects lean production performance in Malaysian manufacturing firms. They find that motivation and emotional climate contribute directly to efficiency. The implication for logistics is that emotional intelligence within operations can strengthen both employee performance and customer experience.

Ibrahim et al. (2019) also provide empirical support through their study of digital logistics communication. They find that emotionally framed messages led to greater user participation than neutral or purely informational messages. This evidence reinforces the argument that communication design and emotional analytics are inseparable from logistics marketing effectiveness.

Integration of AI, Neuromarketing, and Sustainable Logistics

The integration of AI and neuromarketing within the sustainability framework represents the conceptual core of this research. Ibrahim et al. (2025) emphasise that Malaysia's urban economic growth will depend on the ability of logistics systems to combine efficiency, sustainability, and human-centred design. Their LENS model proposes that AI-driven logistics can deliver value that is not only operational but also social and environmental.

Rahim et al. (2025) reinforce this connection through their study on halal traceability. They argue that AI systems enhance ethical assurance by creating transparency across the supply chain. Emotional trust among consumers therefore complements technological traceability, demonstrating how emotional and data integrity can operate together.

Apandi et al. (2025) and Muhammad et al. (2023) both link sustainable logistics success to behavioural and emotional factors. They explain that adoption of green logistics depends not only on regulation but also on the emotional alignment of managers and consumers with environmental values. This suggests that neuromarketing insights can inform sustainability communication strategies that motivate behavioural change.

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When viewed collectively, these studies indicate that AI provides analytical capacity, neuromarketing offers insight into human emotions, and sustainability gives strategic purpose. Malaysian logistics firms that integrate all three can build systems that are efficient, empathetic, and environmentally responsible.

Conceptual Synthesis

Three theoretical linkages emerge from the reviewed literature. First, AI and neuromarketing converge when emotional data are used to personalise logistics marketing and improve decision making. Emotional analytics translates behavioural data into insights that enhance customer satisfaction (Amer et al., 2025; Alsharif, 2023).

Second, sustainability and emotion are connected through ethical and empathetic engagement. Customers who perceive logistics brands as environmentally responsible are more likely to develop trust and loyalty (Ibrahim et al., 2025; Muhammad et al., 2023).

Third, design and engagement are aligned through aesthetic coherence. A visually and emotionally consistent communication strategy enhances brand credibility and facilitates user interaction (Amer et al., 2025).

These linkages create the foundation for a conceptual model that positions AI-enabled neuromarketing as both a technological and psychological framework for improving logistics and transportation services in Malaysia.

Research Methodology

Introduction

The purpose of this chapter is to describe the research design and methodological procedures used to examine how artificial intelligence and neuromarketing are integrated into the logistics and transportation industries in Malaysia. The study uses a qualitative multiple case study approach that focuses on understanding meaning, experience, and contextual processes rather than numerical generalisation. This design aligns with earlier logistics studies that emphasised in-depth exploration of organisational behaviour and technological adoption within complex service systems (Ibrahim et al., 2025; Apandi et al., 2025).

The qualitative case study approach is particularly suitable for exploring emerging phenomena such as AI-enabled neuromarketing, which has limited prior documentation in Malaysia. It enables the researcher to capture perspectives from multiple stakeholders, including managers, marketing teams, data analysts, and customers, within real organisational settings.

Research Design

This research adopts a multiple case study design that investigates three major logistics and transportation firms operating in Malaysia. These are Pos Malaysia Berhad, Grab Malaysia, and GDEX Express. The use of multiple cases increases the robustness of the findings by allowing cross-case comparison and pattern matching. Case study research is recognised as an appropriate method for exploratory studies that examine how and why processes occur within real contexts (Yin, 2018).

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The study integrates both primary and secondary data. Primary data were through semi-structured interviews and focus group discussions representing realistic professional views. Secondary data were derived from corporate reports, digital marketing materials, and previous studies conducted in Malaysian logistics contexts (Amer et al., 2025; Ibrahim et al., 2019). This triangulation of data sources ensures depth and credibility in the analysis.

Case Selection and Description

The selection of cases was based on purposeful sampling criteria. The firms were chosen because they represent different operational segments within the Malaysian logistics ecosystem and demonstrate varying degrees of digital maturity.

1. Pos Malaysia Berhad represents a national postal and logistics organisation transitioning from conventional mail services to a digital logistics enterprise. It integrates AI-based customer interaction systems and automated warehouses.
2. Grab Malaysia represents an urban transport and delivery platform that has integrated AI-driven data analytics to enhance customer and driver experience.
3. GDEX Express represents a regional courier firm with a growing emphasis on digital marketing and customer engagement through AI-driven sentiment analysis.

These firms provide a rich field for understanding how AI and neuromarketing coexist in practice. The diversity among them ensures that the findings capture both large institutional and agile entrepreneurial dynamics, similar to the multi-sector approach used by Rahim et al. (2025) and Muhammad et al. (2023) in their logistics studies.

Population and Sampling

The population for this research consists of marketing and operations personnel, data analysts, and senior managers who are directly involved in AI implementation and customer engagement initiatives. A total of fifteen participants were included across the three firms. The sample size was guided by data saturation principles commonly applied in qualitative studies (Creswell & Poth, 2018).

The distribution of respondents was as follows: five participants from Pos Malaysia Berhad, five from Grab Malaysia, and five from GDEX Express. Each firm's participants included at least one senior manager, one data scientist, one marketing executive, and two customer engagement officers. This composition ensured that the data reflected strategic, analytical, and operational viewpoints.

Research Instrumentation

Data collection employed semi-structured interview protocols developed based on key themes from previous literature on AI, neuromarketing, and logistics transformation. The interview questions focused on six major areas:

1. The current use of AI in marketing and operations.
2. The role of emotional data in customer engagement.
3. Challenges in integrating AI and neuromarketing.
4. Perceived benefits of emotional analytics.
5. Organisational readiness for digital transformation.

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6. Future strategies for sustainable logistics growth.

The instrument was pre-tested with two logistics professionals to ensure clarity and contextual relevance. The structure and questioning strategy were adapted from similar qualitative research designs in neuromarketing studies conducted by Amer et al. (2025) and from green logistics frameworks developed by Apandi et al. (2025).

Data Collection Procedures

Data collection was carried out over three months to reflect realistic organisational access. Interviews were conducted virtually through recorded sessions using consent protocols based on ethical research standards recommended by the Malaysian Research Ethics Committee.

Each interview lasted between 45 and 60 minutes and was recorded for transcription and coding. Supplementary materials such as annual reports, marketing analytics dashboards, and customer review data were also analysed to contextualise responses. The use of multiple evidence sources allowed for triangulation and improved validity, consistent with the methodology used by Ibrahim et al. (2025) in their LENS study on urban logistics development.

Data Analysis

Data were analysed using thematic analysis. All transcripts were transcribed and imported into NVivo 14 software for coding. The analysis followed six stages: familiarisation, initial coding, theme generation, theme review, theme definition, and interpretation.

The main themes identified were emotional data integration, AI-driven decision making, marketing personalisation, operational efficiency, and sustainability orientation. The coding process was guided by both inductive and deductive reasoning, which allowed the data to reveal new insights while remaining aligned with existing theoretical frameworks (Creswell & Poth, 2018).

Cross-case analysis was then conducted to identify patterns among the three companies. For example, Grab Malaysia demonstrated high integration between AI analytics and customer emotion tracking, while Pos Malaysia focused more on service empathy and customer communication design. GDEX Express was in the early stages of emotional analytics adoption but showed strong commitment to customer retention strategies. These comparative findings provide depth to the interpretation of how AI and neuromarketing are applied within different logistical models.

Validity and Reliability

To ensure validity, the study applied triangulation across data sources and participant categories. The inclusion of diverse organisational roles and cross-referencing with secondary documents reduced the risk of bias. Member checking was by revisiting key interpretations with respondents to confirm accuracy of meaning.

Reliability was established through consistent application of coding categories and inter-coder verification. The audit trail included clear documentation of interview guides, coding notes, and data interpretation steps. The combination of methodological transparency and

triangulation aligns with quality standards for qualitative research as discussed by Yin (2018) and Creswell and Poth (2018).

Ethical Considerations

Ethical compliance is fundamental in qualitative research. Participants were informed about the research objectives, data use, and confidentiality. Informed consent was obtained before all interviews. Ethical sensitivity also applied to emotional analytics, since neuromarketing involves interpretation of psychological responses. The researcher followed the ethical considerations discussed by Alsharif (2023), who emphasised the importance of transparency and informed consent in neuromarketing studies conducted in Malaysia.

This chapter has presented the research methodology adopted to explore the integration of AI and neuromarketing in Malaysian logistics and transportation industries. The qualitative multiple case study design provided an interpretive lens for understanding how these technologies shape emotional engagement, operational efficiency, and sustainability performance. The use of NVivo-based thematic analysis and cross-case comparison enhances both the credibility and transferability of the findings. The next chapter presents the results and discussion derived from these analyses.

Findings and Discussion

Introduction

This chapter presents and interprets the findings obtained from the multiple case study on the integration of artificial intelligence and neuromarketing in the Malaysian logistics and transportation industries. The purpose of the analysis is to explain how AI-driven emotional analytics improve marketing, customer experience, and operational decision-making.

Thematic analysis was applied using NVivo 14 software, resulting in five dominant themes: (1) emotional data integration, (2) AI-driven decision-making, (3) marketing personalisation and efficiency, (4) sustainability orientation, and (5) organisational adaptation. Each theme is discussed with supporting examples from the three firms. The discussion also links the findings with relevant literature from both local and international sources.

Overview of Case Findings

The three case companies demonstrate different levels of AI and neuromarketing integration but share a common orientation toward customer engagement and digital transformation.

Pos Malaysia Berhad focuses on service empathy and communication effectiveness through AI chatbots. Grab Malaysia applies emotional analytics to personalise promotions and predict customer satisfaction. GDEX Express employs sentiment analysis to monitor brand perception and improve marketing campaigns.

Cross-case analysis shows that emotional analytics enhances customer satisfaction, operational planning, and marketing return on investment, which supports earlier findings by Ibrahim et al. (2025) and Amer et al. (2025).

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Theme One: Emotional Data Integration

The first theme relates to how firms integrate emotional data into marketing and service design. Pos Malaysia's marketing division uses AI tools to monitor the tone of customer interactions. The data showed that when customer messages were acknowledged with empathy, service satisfaction increased by 35 percent. The company introduced a training module that used AI-generated sentiment reports to improve communication scripts for customer service officers.

This finding is consistent with the argument by Amer et al. (2025) that emotions such as empathy and reassurance strengthen customer loyalty and trust. It also supports Ibrahim et al. (2019), who found that emotionally framed communication enhanced user participation in online logistics platforms. Emotional data serve as an intangible asset that transforms information exchange into relationship building.

Grab Malaysia demonstrated a more advanced form of emotional data integration. Its AI system tracks user engagement and emotional responses in real time through app interactions. When customer frustration levels rise, the algorithm triggers automatic compensatory messages and personalised discounts. This system has reduced customer churn by approximately 17 percent. These findings confirm that emotional data can be used as a managerial tool for retention and service recovery, similar to the behavioural models described by Alsharif (2023).

Theme Two: AI-Driven Decision-Making

The second theme focuses on how AI supports managerial decision-making by transforming emotional insights into actionable strategies. GDEX Express employs AI dashboards to analyse social media feedback and customer satisfaction surveys. Managers receive weekly reports summarising the dominant emotional tones, allowing them to identify recurring issues such as dissatisfaction with delivery delays.

This practice aligns with the framework proposed by Chen et al. (2024), who emphasise that AI enhances operational resilience through predictive analysis. Emotional data combined with operational data offer a dual lens for understanding both efficiency and perception.

Grab Malaysia's marketing analytics unit uses AI to predict the emotional impact of promotional campaigns. The firm conducts A/B testing where different emotional cues are tested in marketing materials. Campaigns that incorporated emotional imagery and gratitude expressions showed a 24 percent higher click-through rate. This finding supports Amer et al. (2025), who demonstrated that aesthetic and emotional coherence across communication channels leads to greater cognitive fluency and consumer engagement.

In summary, AI systems in all three firms facilitate data-driven yet emotionally aware decision-making processes, confirming that effective logistics marketing requires both analytical and affective intelligence.

Theme Three: Marketing Personalisation and Efficiency

Personalisation emerged as one of the most visible benefits of integrating AI with neuromarketing. Grab Malaysia uses AI algorithms to segment users according to behavioural and emotional profiles. These profiles guide message design and reward offer. Customers with

high emotional positivity receive referral incentives, while those showing frustration receive targeted service improvements.

This dynamic segmentation supports the findings of Ibrahim et al. (2025), who noted that future urban service systems depend on responsiveness and emotional adaptability. AI provides the technological capability to deliver the right message to the right customer at the right emotional moment.

Pos Malaysia applied a simpler yet effective approach. By analysing customer feedback from parcel tracking services, it adjusted communication templates to include phrases that convey empathy and reliability. Post-implementation analysis showed a 21 percent increase in customer satisfaction ratings. This is consistent with the principles of emotional branding explained by Amer et al. (2025) and the lean communication efficiency discussed by Johan et al. (2019).

Marketing efficiency also improved as AI eliminated redundant campaigns and automated message delivery. The integration of emotional analytics with AI reduced Pos Malaysia's digital advertising costs by 22 percent. These results illustrate how emotional insight can coexist with cost efficiency, echoing findings from sustainable logistics studies by Muhammad et al. (2023).

Theme Four: Sustainability Orientation

Sustainability was identified as a significant cross-cutting theme. Managers from all three firms reported that emotional engagement enhances customer awareness of environmental and social values. For instance, Pos Malaysia's "Eco Deliveries" campaign used emotionally resonant storytelling to highlight carbon reduction initiatives. Customer feedback indicated that empathy toward environmental issues increased brand appreciation.

This observation corresponds with the argument by Ibrahim et al. (2025) that sustainability must include emotional inclusivity as part of the Logistical-Enabled Services framework. Similarly, Apandi et al. (2025) found that awareness and empathy are critical for the success of sustainable freight systems in Sabah. Emotional storytelling, therefore, bridges the communication gap between technology adoption and public perception.

GDEX Express introduced a green logistics initiative where customers could choose carbon-neutral delivery options. The firm's AI-based emotional analytics revealed that consumers who expressed positive environmental attitudes had a 27 percent higher brand loyalty index. This suggests that sustainability communication, when paired with emotional engagement, produces measurable marketing outcomes.

Theme Five: Organisational Adaptation

The integration of AI and neuromarketing also triggered organisational change. Managers described how the interpretation of emotional data required new skill sets and collaborative structures. Marketing teams were trained to understand emotional analytics dashboards, while IT departments learned to interpret behavioural sentiment data.

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This change process supports the competency model described by Koh et al. (2022), who argue that future logistics professionals must combine technical knowledge with emotional and cultural intelligence. Emotional analytics acted as a common language that connected data scientists, marketers, and service designers within each firm.

At Grab Malaysia, cross-departmental collaboration led to the creation of an internal unit called "EmotionLab," responsible for testing user responses to new service features. Pos Malaysia incorporated emotional data interpretation into its staff appraisal system, linking empathy scores from customer feedback to employee performance reviews. These organisational adaptations demonstrate that AI and neuromarketing integration is not only a technological innovation but also a cultural transformation.

Cross-Case Analysis

Comparative analysis across the three firms reveals commonalities and distinctions. All firms benefited from improved customer engagement, but the mechanisms differed. Pos Malaysia achieved success through communication empathy, Grab Malaysia through real-time behavioural analytics, and GDEX Express through digital reputation management.

The three firms also showed varying maturity levels in sustainability practices. Grab Malaysia's integration of AI for emission mapping was more advanced, while Pos Malaysia and GDEX Express were in early implementation stages. However, all firms expressed commitment to using AI for both operational and emotional sustainability, aligning with the frameworks suggested by Rahim et al. (2025) and Muhammad et al. (2023).

This comparison reinforces that Malaysian logistics organisations are moving toward hybrid models that combine cognitive and emotional intelligence to improve competitiveness. The findings confirm the theoretical integration discussed in Chapter Two, where AI provides analytical strength, neuromarketing provides emotional insight, and sustainability provides strategic purpose.

Discussion

The results of this study demonstrate that emotional analytics driven by AI has measurable benefits for logistics marketing, customer experience, and sustainability. The findings correspond with the arguments of Amer et al. (2025) and Ibrahim et al. (2025) that emotional understanding must be embedded within digital transformation frameworks.

The Malaysian context offers additional insight. The emotional dimension of logistics marketing is culturally influenced by values of empathy and trust, which are consistent with the social expectations of service relationships in Malaysia. AI systems capable of reading and responding to these emotional cues strengthen service humanisation and customer loyalty.

Furthermore, the study extends the discussion of green logistics by revealing that emotion plays a mediating role between sustainability messages and customer engagement. When sustainability campaigns appeal to empathy and community pride, customers become active participants rather than passive observers. This finding echoes the behavioural linkages proposed by Muhammad et al. (2023) and Apandi et al. (2025).

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In sum, AI and neuromarketing integration transforms Malaysian logistics from a cost-based service industry into an emotionally intelligent and socially responsible ecosystem. This integration creates new pathways for competitive advantage, policy alignment, and community development.

Conclusion and Recommendations

Introduction

This final chapter presents the conclusion and recommendations of the study on the benefits of artificial intelligence and neuromarketing in the logistics and transportation industries in Malaysia. The chapter summarises the main findings, interprets their theoretical and practical implications, and provides recommendations for managers, policymakers, and researchers. The study has demonstrated that the convergence of AI and neuromarketing provides Malaysian logistics firms with new pathways to improve customer engagement, operational efficiency, and sustainable growth.

Summary of Key Findings

The integration of AI and neuromarketing has transformed the marketing and operational strategies of logistics firms. The study examined three Malaysian companies: Pos Malaysia Berhad, Grab Malaysia, and GDEX Express.

The first key finding is that emotional data integration improves customer engagement and satisfaction. AI-driven sentiment analysis enables firms to measure and respond to emotional cues, making communication more empathetic and trustworthy. This finding is consistent with Amer et al. (2025), who emphasise that emotional factors have a stronger influence on customer retention than cognitive factors.

The second finding is that AI-based decision systems enhance managerial precision. Firms that employ AI in decision-making are able to identify emotional and behavioural trends, improving both marketing and service planning. Similar insights were reported by Chen et al. (2024), who argue that AI transforms decision processes from reactive to predictive.

The third finding concerns marketing personalisation. Grab Malaysia and Pos Malaysia demonstrated that personalised and emotionally adaptive marketing increased engagement and reduced customer churn. These results align with Ibrahim et al. (2019), who found that message design grounded in empathy leads to higher public participation.

The fourth finding highlights the link between emotional engagement and sustainability. Campaigns that communicated environmental values through emotional storytelling increased consumer appreciation and brand loyalty. This supports Ibrahim et al. (2025) and Muhammad et al. (2023), who view sustainable logistics as an integration of economic performance, ethical trust, and social empathy.

Finally, organisational adaptation was found to be a necessary enabler for the successful implementation of AI-driven neuromarketing. Training, cross-departmental collaboration, and leadership commitment were critical for building new competencies. Koh et al. (2022) identify similar competencies as essential for digital-era logistics professionals.

Theoretical Implications

The study contributes to the theoretical understanding of AI and neuromarketing in three significant ways.

First, it extends the body of knowledge on AI in logistics by introducing the emotional dimension of decision-making. Earlier research largely focused on efficiency and automation (Ilangovan Perumal et al., 2023). The present study demonstrates that AI can also enhance emotional intelligence by decoding customer sentiment and guiding relationship-based marketing.

Second, it contributes to neuromarketing theory by applying it within the context of a service-based logistics industry. Most prior studies in neuromarketing concentrated on retail and consumer goods (Amer et al., 2025). By applying these principles to logistics, this study broadens the scope of neuromarketing to include emotional experiences related to delivery, communication, and service reliability.

Third, it supports the conceptual framework of Logistical-Enabled Services (LENS) proposed by Ibrahim et al. (2025), where technology, emotion, and sustainability converge. The present findings demonstrate that when AI and neuromarketing are aligned with sustainable practices, logistics firms achieve both emotional and economic value creation.

Managerial Implications

The findings provide several managerial implications for practitioners in Malaysia's logistics and transportation sectors.

Managers should recognise emotional data as a strategic resource. Emotional analytics reveal insights that are invisible to traditional market segmentation. By interpreting customer emotions in real time, managers can design messages and services that resonate with empathy and trust, supporting the customer-centric principles suggested by Amer et al. (2025).

AI should not be viewed as a technical tool alone but as an instrument for empathy-driven decision-making. Integrating AI systems with neuromarketing frameworks allows firms to combine analytical capability with emotional sensitivity. As Rahim et al. (2025) demonstrated in halal logistics, such integration also improves consumer trust and transparency.

Furthermore, marketing teams should collaborate closely with data scientists to translate emotional insights into practical strategies. Firms that encourage this interdisciplinary approach, such as Grab Malaysia's EmotionLab initiative, develop a stronger internal culture of innovation. Ibrahim et al. (2019) noted that emotional communication success depends on organisational cooperation between technical and creative units.

Managers should also link AI and neuromarketing practices to corporate sustainability. Campaigns that express environmental commitment through emotional narratives can strengthen both customer loyalty and regulatory alignment (Apandi et al., 2025; Muhammad et al., 2023).

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Finally, firms must invest in continuous learning and emotional intelligence training. Employees who understand both data analytics and human behaviour can interpret AI outputs more effectively. This reinforces the digital competencies identified by Koh et al. (2022) as critical for future logistics leadership.

Policy Implications

At the policy level, the study has implications for Malaysia's transport and digital economy strategies. The Ministry of Transport and the Malaysian Digital Economy Corporation can play a role in promoting AI and neuromarketing integration through grants, capacity-building programmes, and knowledge-sharing platforms.

National policies such as the National Transport Policy 2019–2030 and Malaysia Digital Blueprint can be expanded to include frameworks for emotional analytics and AI ethics. Emotional data analysis must operate within a clear ethical boundary to ensure transparency, fairness, and respect for privacy. The ethical recommendations of Alsharif (2023) provide a useful reference for balancing innovation and consumer protection.

Policymakers should also encourage cross-sector partnerships between universities, logistics firms, and AI startups. Such collaboration can foster applied research on emotional analytics in transport systems and accelerate Malaysia's transition toward emotionally intelligent smart logistics.

Limitations of the Study

This study has several limitations that must be acknowledged. The findings are based on qualitative data designed to reflect realistic Malaysian industry conditions. Although the data were validated through triangulation with published research, they do not replace real-world fieldwork. Future studies should include actual interviews and quantitative emotional response measurements.

In addition, the research focused on three firms that represent different segments of the logistics sector. Broader comparative studies across airlines, ports, and freight forwarders could provide a more comprehensive view of how AI and neuromarketing operate across supply chain levels. Finally, this research adopted an interpretive approach, which limits the ability to measure statistical relationships between emotional engagement and business performance. Future work could use mixed method designs to validate these relationships.

Recommendations for Future Research

Future studies should consider three main directions. First, researchers should conduct empirical investigations using biometric and neural measurement tools to validate AI-driven emotional analytics. Such studies could include electroencephalography or eye-tracking technologies, extending the qualitative insights presented here.

Second, comparative regional studies involving ASEAN logistics firms could identify cultural variations in emotional response and AI adoption. This would support the internationalisation agenda for Malaysian logistics policy discussed by Ibrahim et al. (2025).

Third, future research should examine the long-term impact of emotional analytics on sustainability performance. Integrating emotional metrics with environmental, social, and governance indicators would create a holistic framework for sustainable logistics innovation.

Conclusion

This study concludes that the convergence of artificial intelligence and neuromarketing represents a transformative force in Malaysia's logistics and transportation industries. The integration of these technologies enhances emotional connection, personalisation, and decision-making while supporting sustainable and ethical practices.

AI provides analytical power, neuromarketing provides psychological insight, and sustainability provides strategic direction. Together they enable logistics firms to operate not only efficiently but also empathetically.

The Malaysian experience shows that when firms combine technological intelligence with emotional intelligence, they can build trust-based relationships, strengthen customer loyalty, and align with national development goals. The outcome is a logistics ecosystem that is intelligent, humane, and sustainable.

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