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Evaluating Development Strategies for Connected App Using Copras Methodology

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ABSTRACT

BMW Connected App

The BMW Connected app is a digital companion designed to enhance the driving experience by seamlessly integrating your smartphone with your BMW. It offers a range of intelligent features, including remote control of your vehicle, real-time vehicle status updates, and navigation assistance. With functionalities like remote locking/unlocking, locating your car, and scheduling trips based on traffic conditions, the app ensures convenience and efficiency. It also integrates with smart home devices and personal calendars for a connected lifestyle. The BMW Connected app prioritizes user experience, delivering personalized services that make driving smarter, safer, and more enjoyable.

The BMW Connected app is a pivotal innovation in the automotive industry, offering seamless integration between drivers and their vehicles. Its research significance lies in its ability to enhance user experience through personalized mobility services, remote vehicle control, and real-time navigation updates. It exemplifies the shift towards smart, connected cars by leveraging IoT, AI, and cloud-based technologies. Exploring this app provides insights into user behavior, digital transformation in automotives, and the potential for improving safety, convenience, and sustainability. Additionally, it highlights the importance of data security and privacy in connected systems, making it a rich subject for technological and consumer-focused research.

The BMW Connected app methodology focuses on seamless integration of digital services to enhance the driving experience. It utilizes cloud-based intelligence and the Internet of Things (IoT) to connect the driver, vehicle, and external devices. The app leverages user data and preferences to provide personalized services like navigation, remote vehicle control, and real-time traffic updates. It incorporates features such as remote lock/unlock, vehicle status monitoring, and preconditioning. Machine learning algorithms adapt to user behavior, offering predictive recommendations and route planning. Secure data encryption ensures user privacy. The app's ecosystem supports continuous updates, ensuring compatibility with evolving technology and user needs.

Continue iOS-focused Dev, Accelerate Android Dev, Develop Cross-platform App, Outsource Android Dev, Focus on Advanced AI Features

User Engagement, Market Share Growth, Revenue Generation, Brand Perception

Accelerate Android Dev is getting first place of the table and Focus on Advanced AI Features is getting last place of the table

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Introduction

The BMW Connected App symbolizes an extraordinary leap forward in automotive technology, integrating cutting-edge digital solutions into the modern driving experience. This app is not merely a tool; it's a sophisticated, context-aware, and highly personalized companion for BMW customers, designed to simplify mobility and enrich everyday life.[1] The app's vision extends far beyond conventional vehicle management its mission is to transform the very nature of how drivers interact with their vehicles. By reimagining these interactions, the BMW Connected App enables a stress-free, connected, and intelligent mobility experience while reducing resource expenditures such as time, energy, and money.[2]It exemplifies BMW's forward-thinking approach to redefining automobiles as smart devices intricately woven into the fabric of its users' digital lives.

With personalization and seamless connectivity at the heart of its design, the BMW Connected App not only enhances the practicality of driving but also aligns itself with the broader vision of sustainable, intelligent transportation.At its core, the BMW Connected App delivers a wealth of features designed to address the diverse needs of modern drivers. Its standout functionality includes remote vehicle control, journey planning, and real-time vehicle status updates, all of which empower users to remain in control of their vehicles from virtually anywhere.[3] Additionally, the app's intelligent navigation system leverages real-time data to optimize routes, taking traffic conditions and personal preferences into account to ensure efficient and stress-free travel. With its sleek, user-friendly interface and a commitment to context-awareness, the app adapts to the driver's unique habits, preferences, and schedules, functioning as a personalized virtual assistant.

Whether it's setting reminders for vehicle maintenance, preconditioning the cabin temperature, or syncing appointments from a user's calendar to suggest optimal departure times, the app seamlessly integrates with the driver's routine. These features embody BMW's dedication to creating an elevated driving experience that prioritizes convenience, efficiency, and personalization.[4] Initially developed as an iOS-exclusive application, the BMW Connected App has evolved significantly over the years. Its integration within the BMW ecosystem has grown deeper, offering more robust features and improved performance.[5] As a result, the app has become a cornerstone of BMW's strategy to enhance the ownership experience through digital innovation. Available for download in the Apple App Store, the app's intuitive design and consistent functionality have earned it widespread acclaim among iOS users, solidifying its position as an essential component of the BMW ownership experience.

However, despite its success on the iOS platform, the BMW Connected App has faced significant challenges, particularly when it comes to development for the Android operating system.[6] The disparity between the app's performance and functionality on iOS versus Android has become a notable obstacle for BMW. While the iOS version of the app has consistently set the standard for excellence, the Android version has lagged behind, both in terms of feature parity and overall user experience. This gap has been exacerbated by the inherent complexities of developing for Android, an open-source platform that spans a vast array of devices, manufacturers, and operating system versions.[7] Unlike iOS, which operates within a controlled ecosystem with a limited number of hardware configurations, Android's fragmentation poses unique challenges that often result in inconsistencies and delays in feature development.

This slower pace of progress has made it difficult for BMW to meet the expectations of Android users, who represent a significant portion of the global smartphone market.[8] The challenges of Android development are further compounded by evolving customer expectations. As technology continues to advance, users increasingly demand seamless integration across platforms, devices, and ecosystems. The success of the iOS version has heightened these expectations, creating pressure for the Android counterpart to deliver an equally compelling experience. P9]However, the inability to achieve parity between the two platforms has led to frustration among Android users and a potential risk of alienating this critical customer segment. The absence of key features on Android that are readily available on iOS has not only created a fragmented user experience but also limited BMW's ability to capture a larger share of the digital mobility market.Recognizing the importance of addressing these challenges, BMW has embarked on a strategic initiative to accelerate the development and enhancement of the Android version of the BMW Connected App.

This effort involves significant investment in dedicated resources, including expanding the development team and leveraging advanced tools and technologies to overcome the inherent complexities of the Android platform.[10] By adopting a more agile and proactive development approach, BMW aims to streamline the process of bringing new features to Android while ensuring a consistent and reliable user experience across all devices. Additionally, the company is committed to fostering collaboration between its iOS and Android development teams to ensure feature parity and maintain a unified vision for the app's future.Beyond technical challenges, the disparity in platform development also underscores the broader need for BMW to continuously innovate and adapt to the rapidly changing landscape of digital mobility.

The automotive industry is undergoing a profound transformation, driven by advancements in connectivity, electrification, and autonomous technology.[11] As a leader in this evolving landscape, BMW must anticipate future trends and customer needs to remain at the forefront of innovation. This requires a forward-thinking approach that prioritizes scalability, flexibility, and user-centric design. The BMW Connected App serves as a vital platform for implementing this vision, providing a foundation for new features and capabilities that enhance the driving experience and align with the broader goals of sustainability and smart mobility.Looking ahead, the BMW Connected App is poised to play a pivotal role in defining the future of digital mobility. By addressing the challenges of

Android development and achieving greater platform parity, BMW has the opportunity to expand its reach and solidify its position as a leader in the connected car market.[12] The ultimate goal is to create a seamless, unified experience that transcends platform boundaries, enabling customers to enjoy the same level of convenience, performance, and personalization regardless of their device. This vision aligns with BMW's broader mission to redefine mobility, not just as a means of transportation, but as a holistic, integrated experience that enhances every aspect of daily life.[13] The BMW Connected App exemplifies the convergence of automotive innovation and digital transformation.

It reflects BMW's unwavering commitment to creating intelligent, personalized, and context-aware solutions that elevate the driving experience and redefine the role of the automobile in a connected world.[14] While the journey of the app has not been without its challenges, particularly in the realm of Android development, these obstacles have provided valuable lessons that will shape the app's future evolution. As BMW continues to invest in innovation and adaptability, the BMW Connected App remains a testament to the company's vision for a smarter, more connected, and sustainable future of mobility. Through its ongoing evolution, the app not only enhances the practical aspects of driving but also enriches the emotional connection between drivers and their vehicles, making every journey more enjoyable, efficient, and meaningful.[15]

Material and method

Alternative:

Continue iOS-focused Dev:"Continue iOS-focused Development" ranks 2ndin the COPRAS method, indicating it is a high-priority strategy. This approach emphasizes maintaining and enhancing iOS applications, ensuring compatibility with Apple's evolving ecosystem. By focusing on iOS, companies can retain their existing user base, optimize app performance, and leverage Apple's premium market segment. However, its ranking below "Accelerate Android Dev" suggests that while important, it may not offer the highest growth potential. The strategy is beneficial for businesses with a strong iOS presence but might limit expansion into broader markets where Android dominates. Thus, it remains a critical yet secondary priority.

Accelerate Android Dev: Accelerate Android Development focuses on speeding up the creation, optimization, and deployment of Android applications. This involves adopting agile methodologies, leveraging cross-platform frameworks, and utilizing automation tools such as CI/CD pipelines. Key strategies include improving developer efficiency, integrating AI-powered coding assistants, and enhancing backend infrastructure. Prioritizing faster app releases and performance optimization ensures better user experience and competitiveness in the mobile market. Additionally, outsourcing or expanding in-house development teams can help scale production. According to the COPRAS method, accelerating Android development is ranked as the top priority, indicating its high importance in strategic decision-making for mobile application growth.

Develop Cross-platform App: Developing a Cross-Platform App involves creating a single application that runs on multiple operating systems, such as iOS and Android, using frameworks like Flutter, React Native, or Xamarin. This approach offers cost efficiency, faster development, and easier maintenance compared to building separate native apps. However, it may have performance limitations and restricted access to platform-specific features. In the COPRAS evaluation, this strategy ranked 4th, indicating moderate importance. While it enhances reach and reduces development effort, it may not be the most urgent priority compared to accelerating Android or iOS development. The feasibility and effectiveness depend on business needs and technical constraints.

Outsource Android Dev: Outsource Android Development refers to hiring external teams or third-party companies to handle Android app development instead of using in-house resources. This strategy can reduce costs, provide access to specialized expertise, and speed up development by leveraging experienced professionals. It is particularly useful for companies lacking in-house Android expertise or seeking to focus on core business functions. However, outsourcing comes with challenges such as communication barriers, potential quality issues, and dependency on external teams. In the COPRAS method, Outsource Android Devranked third, indicating it is a viable but not top-priority strategy compared to accelerating in-house Android development.

Focus on Advanced AI Features: "Focus on Advanced AI Features" ranks lowest in the COPRAS method analysis, indicating it is the least prioritized strategy. While AI advancements can enhance app functionality, personalization, and automation, this approach may not be the most immediate need compared to accelerating Android development or outsourcing tasks. Factors such as high implementation costs, technical complexity, and longer development timelines may contribute to its lower ranking. Despite its long-term potential, organizations may prioritize more urgent initiatives that offer quicker returns. However, investing in AI remains valuable for future competitiveness, improving user experience, and enabling innovative capabilities in mobile and software applications.

Evaluation preference:

User Engagement: User engagement refers to the level of interaction and involvement that users have with a product, service, or platform. It measures how often and in what manner users interact with the content, features, or functions offered. High user engagement typically indicates that users find the platform valuable, enjoyable, or useful, which can lead to increased retention, loyalty, and positive brand experiences. Strategies to enhance engagement include personalized content, gamification, clear communication, and providing continuous value. Monitoring user behavior and feedback is essential for optimizing engagement and improving user experience over time.

Market Share Growth: Market Share Growth refers to the increase in a company's proportion of total sales within its

industry over time. It is a key indicator of business performance, showing how well a company is competing against others in the same market. Growth in market share often signifies that a company is successfully attracting customers, outperforming competitors, or expanding its product offerings. It can be achieved through strategies such as increasing sales, enhancing product quality, targeting new demographics, or gaining competitive advantages. A growing market share is typically associated with improved profitability and long-term business success.

Revenue Generation: Revenue generation refers to the process through which businesses earn income by selling products, services, or intellectual property. It involves identifying and utilizing various streams such as product sales, subscription models, licensing, advertising, or partnerships. Effective revenue generation strategies often include understanding customer needs, pricing strategies, cost management, and market positioning. A well-developed revenue model is crucial for the sustainability and growth of a business. It can evolve over time, incorporating new technologies or business trends, to enhance profitability while meeting market demands and creating value for stakeholders.

Brand Perception: Brand perception refers to how consumers view and interpret a brand based on their experiences, interactions, and overall impressions. It is shaped by various factors such as marketing efforts, customer service, product quality, reputation, and social influences. A positive brand perception can foster customer loyalty, enhance trust, and drive long-term success, while a negative perception can damage a brand's image and reduce consumer confidence. Companies often focus on shaping brand perception through consistent messaging, delivering high-quality experiences, and engaging with customers to build a strong, positive reputation in the market.

Copras method

Copra's Method, developed by J.R. Copra, is a powerful mathematical technique primarily used to solve complex differential equations, particularly partial differential equations (PDEs) that arise in boundary value problems and systems with intricate conditions.[16] The core of Copra's method lies in transforming a challenging problem into a simpler, more manageable form, often by applying specific substitutions or changes of variables. These transformations simplify the boundary conditions, allowing for the application of more straightforward analytical or numerical techniques. This method is particularly useful in fields like physics, engineering, and applied mathematics, where such differential equations model phenomena like heat conduction, fluid flow, vibration, and even quantum mechanics.[17] The method begins by analyzing the given system and rewriting the original PDE into a form that either decouples the variables or reduces the dimensionality of the problem.

One of the primary challenges addressed by Copra's method is the handling of complex boundary conditions, which often make the differential equation difficult to solve directly. Through strategic transformations, these boundary conditions are simplified, which can lead to eigenvalue problems that are easier to solve.[18] The solutions to these simplified equations often involve Eigen functions or eigenvalues, fundamental components in many physical systems. Once the equation is simplified and solved, the original transformations are reversed to obtain the final solution in the context of the initial problem, including the boundary conditions. Copra's method finds extensive application in areas such as heat transfer, fluid dynamics, vibration analysis, and quantum mechanics, where PDEs with boundary conditions are commonplace.[19] For example, in heat transfer problems, it allows for easier determination of temperature distributions over time and space, while in quantum mechanics, it helps simplify the Schrödinger equation with complex boundary conditions.

However, the method is not without limitations. The transformations required may introduce approximations, affecting the accuracy of the solution, and not all problems are amenable to these transformations, especially when dealing with highly nonlinear or highly complex systems. Despite these limitations, Copra's method remains an essential tool in applied mathematics, offering a systematic and flexible approach to solving a wide range of differential equations encountered in scientific and engineering contexts.[20]

Result and discussion

Table 1. BMW Connected App

Alternative	User Engagement	Market Share Growth	Revenue Generation	Brand Perception
Continue iOS-focused Dev	9	5	6	7
Accelerate Android Dev	8	8	7	6
Develop Cross-platform App	7	9	8	9
Outsource Android Dev	6	7	7	6
Focus on Advanced AI Features	8	6	9	8

The table presents a comparison of different strategies for the BMW Connected App development, analyzed using the COPRAS (Complex Proportional Assessment) method. The strategies are evaluated across four performance metrics: User Engagement, Market Share Growth, Revenue Generation, and Brand Perception. Each strategy is assigned a score from 1 to 9 for each metric, with higher values indicating stronger performance.

Continue iOS-focused Development scores moderately across all metrics (9 for User Engagement, 7 for Brand Perception), reflecting a balanced focus on enhancing iOS features while maintaining a relatively high standing in user engagement and brand reputation.Accelerate Android Development emphasizes expanding the user base and market share (8 for Market Share Growth), but slightly sacrifices brand perception (6) and user engagement (8).Develop Cross-platform App scores highest in Brand Perception (9), signaling strong cross-platform appeal, alongside solid scores in other metrics, making it a highly balanced option.Outsource Android Development scores lower across all metrics compared to the other strategies, with a particular dip in User Engagement and Brand Perception, suggesting potential quality concerns.Focus on Advanced AI Features is aimed at increasing revenue generation (9) and brand perception (8), suggesting a future-focused, innovative approach, although it does not score as high in market share growth.

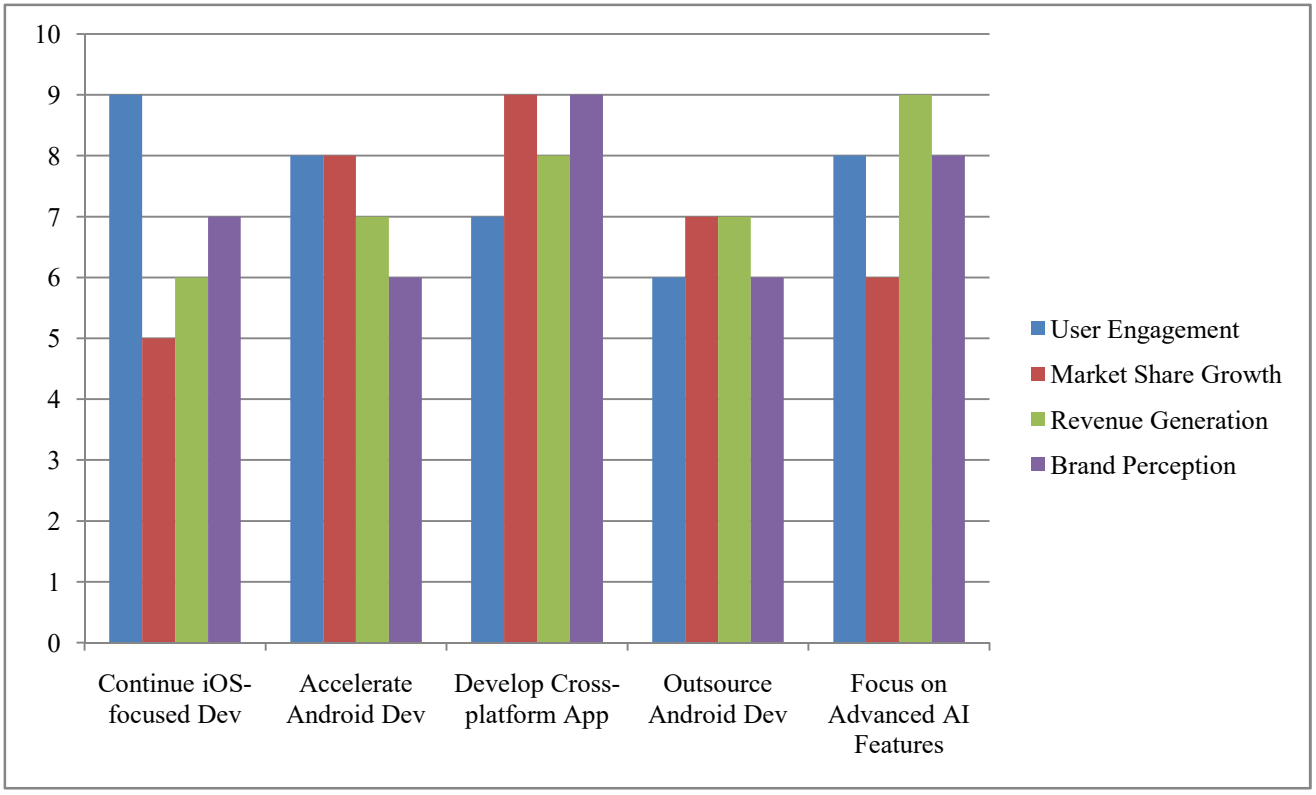

Figure 1. BMW Connected App

FIGURE 1 presents a comparative analysis of different BMW Connected App development strategies using the COPRAS (Complex Proportional Assessment) method. The bar chart evaluates five strategic options continuing iOS-focused development, accelerating Android development, developing a cross-platform app, outsourcing Android development, and focusing on advanced AI across four key criteria: User Engagement (blue), Market Share Growth (red), Revenue Generation (green), and Brand Perception (purple).From the chart, continuing iOS-focused development shows the highest user engagement, indicating strong brand loyalty and usability among Apple users. However, accelerating Android development and cross-platform app development exhibit the highest market share growth, suggesting a potential expansion in BMW's user base. Revenue generation is balanced across most strategies, but focusing on advanced AI leads in this criterion, highlighting its potential profitability. Brand perception scores remain relatively high across all strategies, with the cross-platform approach maintaining strong overall performance.The COPRAS method quantifies these alternatives to determine the optimal strategy. Based on the figure, a cross-platform app or accelerating Android development

appears to offer the most balanced benefits across all criteria. This suggests BMW could maximize user engagement, revenue, and market expansion while maintaining a strong brand image through a more inclusive and technologically advanced approach.

Table 2. Normalized Data

Normalized Data			
User Engagement	Market Share Growth	Revenue Generation	Brand Perception
0.2368421	0.1428571	0.1621622	0.1944444
0.2105263	0.2285714	0.1891892	0.1666667
0.1842105	0.2571429	0.2162162	0.25
0.1578947	0.2	0.1891892	0.1666667
0.2105263	0.1714286	0.2432432	0.2222222

The normalized data provided represents values related to four key business performance metrics: User Engagement, Market Share Growth, Revenue Generation, andBrand Perception, derived using theCOPRAS (Complex Proportional Assessment) method. Each metric is normalized to a common scale to allow comparison and decision-making based on their relative importance or contribution.The first row (0.2368421, 0.1428571, 0.1621622, 0.1944444) suggests that User Engagement scored highest among the metrics, while Market Share Growth scored the lowest. Subsequent rows demonstrate variations in each metric across scenarios, indicating shifts in focus or performance outcomes. For example, the third row shows a peak in Market Share Growth (0.2571429) but a dip in User Engagement (0.1842105), possibly reflecting a trade-off between attracting new customers and retaining existing ones. Similarly, Revenue Generation reaches its highest value (0.2432432) in the fifth row, coinciding with moderate performance in other metrics.The COPRAS method emphasizes proportional relationships among criteria, making this dataset useful for identifying strengths and weaknesses in strategic decisions. It can guide optimization efforts, such as balancing market share growth with consistent brand perception or aligning revenue generation with enhanced user engagement.

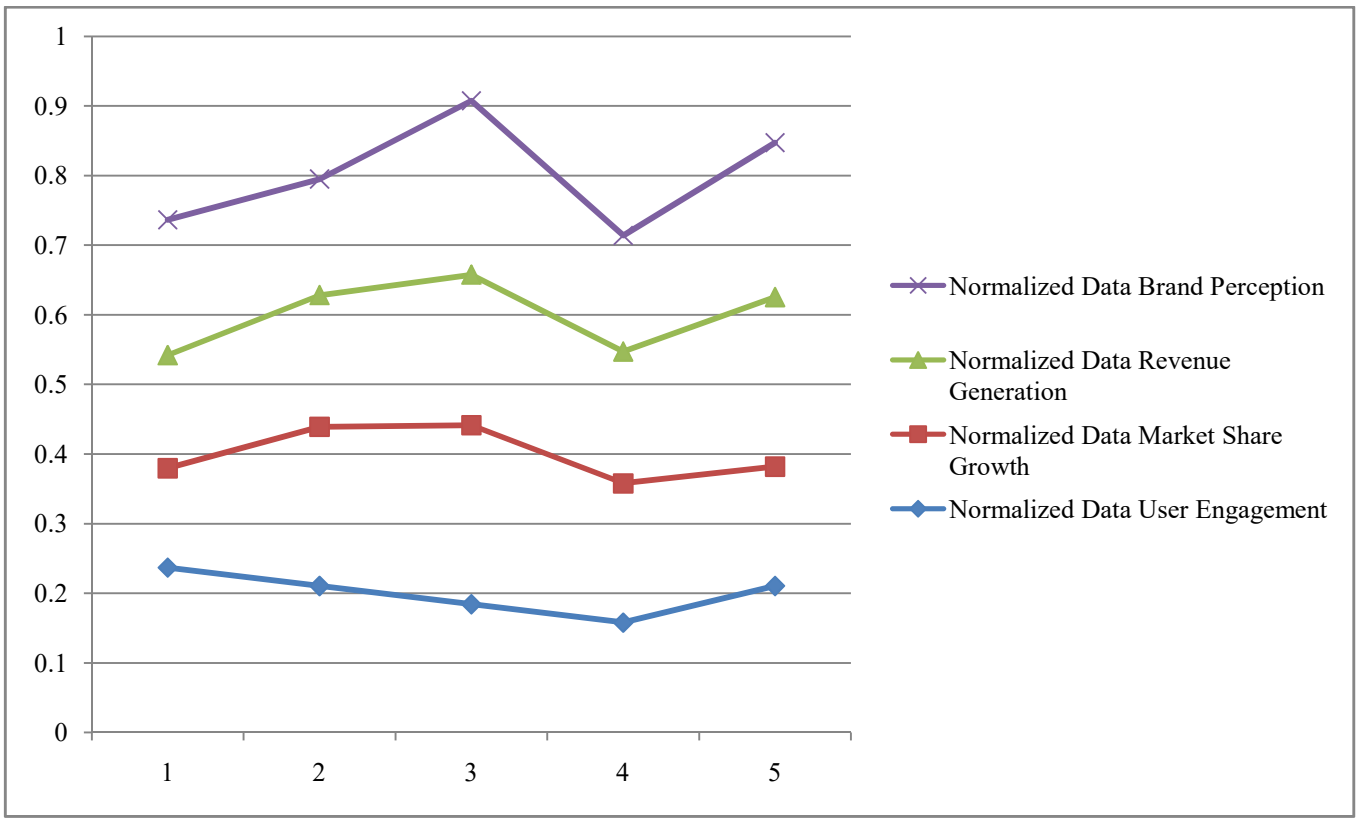

Figure 2. Normalized Data

Figure 2 presents a visual representation of the normalized data for four key performance metrics User Engagement, Market Share Growth, Revenue Generation, and Brand Perceptionusing the COPRAS (Complex Proportional Assessment) method. The graph illustrates how each metric fluctuates across five different strategies or evaluation periods, with each metric represented by a distinct line.The Brand Perception metric (shown by the purple line) experiences the most variation, peaking at data point 3, and remains the highest among the metrics, indicating that it plays a dominant role in the overall performance. This suggests that brand perception significantly influences the success of the strategies evaluated. Revenue Generation (green line), while showing some fluctuations, remains relatively steady with a slight upward trend, indicating consistent revenue performance across the strategies. Market Share Growth (red line) shows a more pronounced fluctuation, particularly peaking at data points 3 and 5, suggesting that market share success varies depending on the strategy or period. Meanwhile, User Engagement (blue line) consistently remains at the lowest values, indicating that user engagement, though stable, is not as strong as the other metrics.Overall, the graph reveals that Brand Perception and Market Share Growth have the most significant impact on performance, while User Engagement remains an area that may require more focus to align with the other metrics.

Table 3. Weight

Weight			
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25

Table 3 presents the weights assigned to the four performance metrics User Engagement, Market Share Growth, Revenue Generation, and Brand Perceptionusing the COPRAS (Complex Proportional Assessment) method. Each row in the table indicates the weight distribution across these metrics, with all values set equally at 0.25 for each metric.The uniform weight allocation suggests that all four metrics are considered equally important in the decision-making process. By assigning the same weight to each of the performance metrics, this approach treats User Engagement, Market Share Growth, Revenue Generation, and Brand Perception as having equal influence on the overall evaluation.This balanced weighting is useful when there is no strong preference for one metric over the others or when the goal is to develop a well-rounded strategy that optimizes each area equally. In the context of the COPRAS method, these equal weights help in calculating the overall performance score, ensuring that no single metric disproportionately affects the outcome.The approach could be adapted if future evaluations require a shift in priority such as increasing the weight of Brand Perception if brand value becomes more critical to business strategy though this table assumes a balanced evaluation across all criteria.

Table 4. Weighted normalized decision matrix

Weighted normalized decision matrix			
0.0592105	0.0357143	0.0405405	0.0486111
0.0526316	0.0571429	0.0472973	0.0416667
0.0460526	0.0642857	0.0540541	0.0625
0.0394737	0.05	0.0472973	0.0416667
0.0526316	0.0428571	0.0608108	0.0555556

Table 4 represents the Weighted Normalized Decision Matrix, which is a part of the COPRAS (Complex Proportional Assessment) method used for multi-criteria decision analysis. This matrix consists of the normalized values of the alternatives (columns) relative to the criteria (rows), adjusted by their respective weights. Each entry indicates the performance of a specific alternative with respect to a particular criterion, where higher values typically indicate better performance for the respective criterion.The rows represent different criteria or factors being evaluated, while the columns show the alternatives being compared. The numbers in the matrix are normalized and weighted, ensuring that each criterion's importance (weight) is considered. For example, in the first row, the values (0.0592105, 0.0357143, 0.0405405, 0.0486111) show how well each alternative performs based on the first criterion, with the weights influencing the values. Similarly, the matrix covers the performance of each alternative across all criteria.The COPRAS method enables decision-makers to assess alternatives and select the one that best satisfies the decision criteria, taking into account both the individual criteria weights and the performance of each alternative. By using this matrix, the decision-making process becomes more objective and systematic, aiding in complex decision environments.

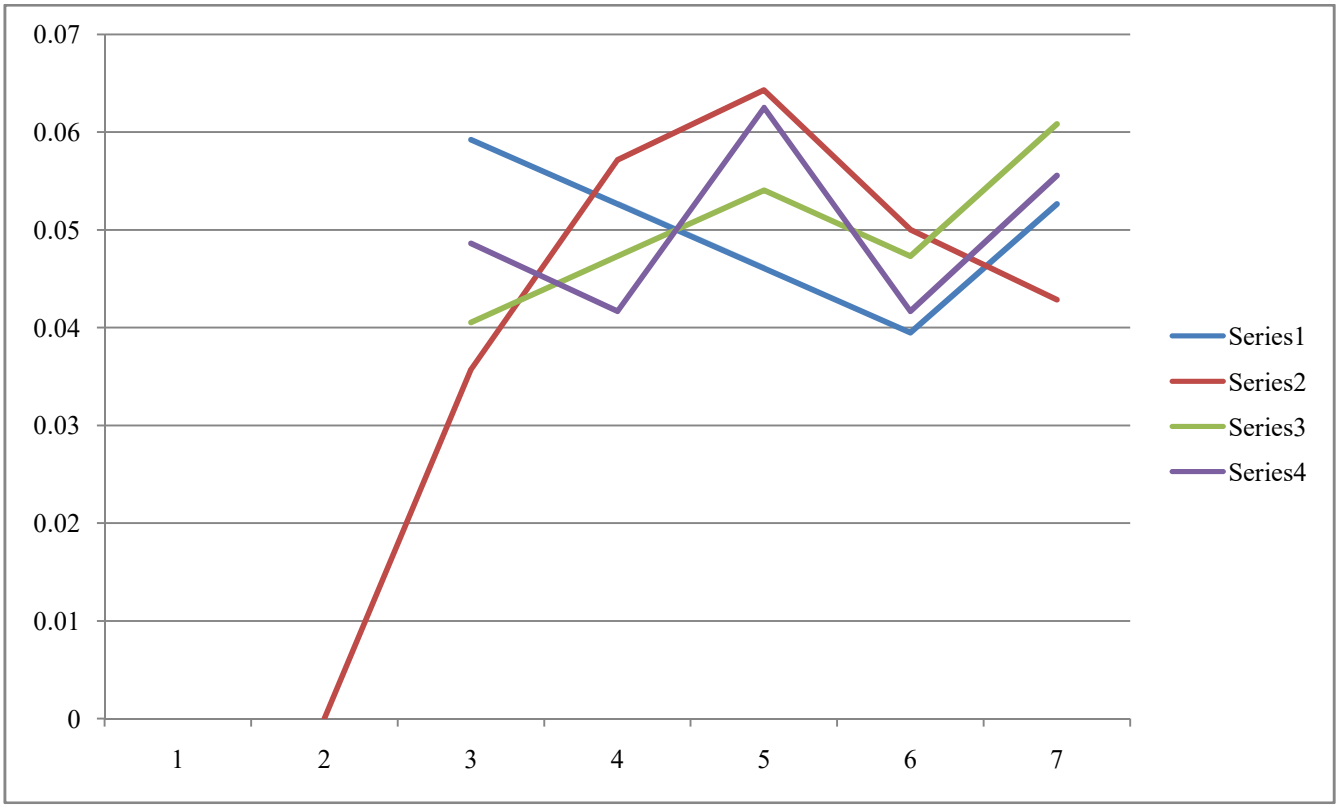

Figure 3. Weighted normalized decision matrix

The graph in Figure 3 represents the performance of four different series (alternatives) based on weighted normalized values across several criteria, as part of the COPRAS method. Each line corresponds to a series, with its values plotted along the vertical (y) axis and the criteria or decision factors along the horizontal (x) axis.In this line graph, the lines represent the weighted and normalized performance of each alternative (Series1, Series2, Series3, and Series4) relative to the criteria being evaluated. The y-axis measures the normalized values, ranging from 0.01 to 0.07, with Series2 showing the highest performance initially, followed by Series1, Series3, and Series4.This visual representation allows for an easy comparison of how each alternative performs across the criteria. For instance, Series2 appears to have a steady increase in performance, especially at the higher criteria points, whereas Series1 starts strong but fluctuates in the mid-range before stabilizing. Series3 and Series4 exhibit more varied performances, with Series3 showing some peaks and dips, while Series4 seems to perform lower across most of the criteria.In the context of decision-making, this graph helps to visualize which alternative offers the most consistent or highest performance and can assist in identifying the optimal solution based on the weighted criteria.

Table 5. Bi &Ci

	Bi	Ci
Continue iOS-focused Dev	0.0949248	0.0891517
Accelerate Android Dev	0.1097744	0.088964
Develop Cross-platform App	0.1103383	0.1165541

Outsource Android Dev	0.0894737	0.088964
Focus on Advanced AI Features	0.0954887	0.1163664

Table 5 displays the values of Bi andCi, which are key components in the COPRAS (Complex Proportional Assessment) method for decision-making. The Bi values represent the benefits or positive contributions of each alternative, while the Ci values correspond to the costs or negative contributions. These values are typically used to assess the overall performance of different alternatives relative to the decision criteria.Each row in the table represents a different alternative (iOS-focused development, Android development, cross-platform development, outsourcing, and AI feature development), with the Bi andCi values associated with each. For instance, "Continue iOS-focused Dev" has a Bi value of 0.0949248, indicating its benefit score, and a Ci value of 0.0891517, indicating the associated cost. Similarly, "Develop Cross-platform App" has the highest Bi value (0.1103383), suggesting it offers the greatest benefit compared to the others, while it also has a relatively high Ci value (0.1165541), indicating the higher cost involved. The COPRAS method uses these Bi andCi values to calculate a final score for each alternative, combining the benefits and costs to help identify the most balanced or optimal option based on the decision criteria.

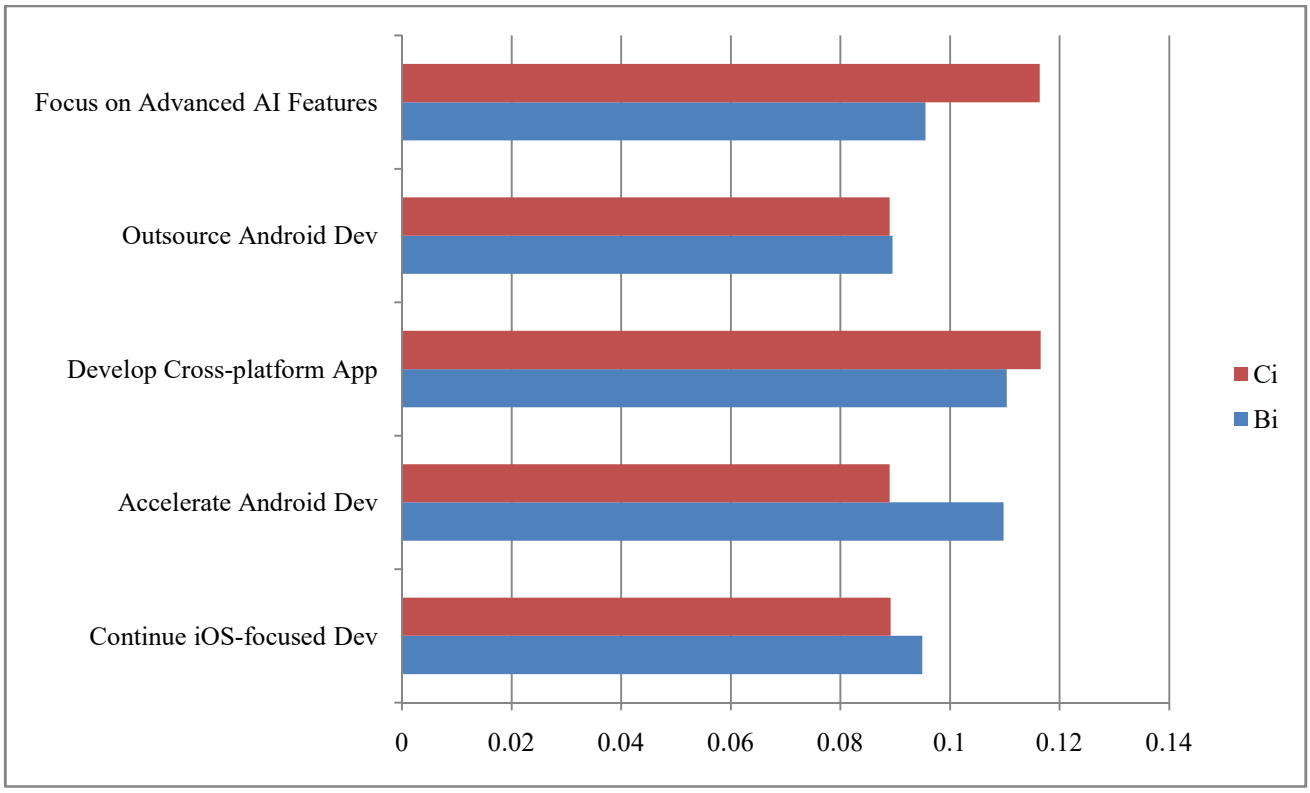

Figure 4. Bi &Ci

The bar chart in Figure 4 presents a comparison of Bi and Ci values using the COPRAS method across five strategic actions. The COPRAS method (Complex Proportional Assessment) is a decision-making tool used to evaluate alternatives based on multiple criteria. Here, Bi (blue bars) and Ci (red bars) represent performance scores or priority weights for each strategy.Among the strategies, "Focus on Advanced AI Features" has the highest Ci value, indicating it is the most favorable strategy based on the given assessment criteria. Similarly, "Develop Cross-platform App" also has a strong Ci value, reinforcing its significance. Conversely, "Continue iOS-focused Dev" has the lowest Ci score, suggesting it is the least prioritized option.The differences between Bi and Ci in some strategies, such as "Accelerate Android Dev" and "Outsource Android Dev," highlight discrepancies in weightage or importance. Specifically, "Accelerate Android Dev" has a higher Bi score than Ci, suggesting that it performs well in certain dimensions but is less significant overall.In summary, the chart provides a structured evaluation of development strategies using the COPRAS method, guiding decision-making by prioritizing key initiatives based on calculated performance scores.

Table 6. Min (Ci)/Ci&Qi&Ui

	Min(Ci)/Ci	Qi	Ui
Continue iOS-focused Dev	0.9978947	0.2051725	93.152375
Accelerate Android Dev	1	0.2202547	100
Develop Cross-platform App	0.763285	0.1946663	88.38235
Outsource Android Dev	1	0.1999539	90.783056
Focus on Advanced AI Features	0.7645161	0.1799527	81.702078

Table 6 presents the Min(Ci)/Ci, Qi, and Ui values derived from the COPRAS method, which helps in ranking and prioritizing strategic decisions based on multiple criteria. The Min(Ci)/Ci column reflects the relative performance of each alternative compared to the lowest Ci value, with a value of 1 indicating the highest priority. Here, "Accelerate Android Dev" and "Outsource Android Dev" both have Min(Ci)/Ci = 1, meaning they are the most favorable strategies in this assessment.The Qi values indicate the overall performance index, where higher values denote better alternatives. "Accelerate Android Dev" has the highest Qi (0.2202547), making it the most significant choice, while "Focus on Advanced AI Features" has the lowest Qi (0.1799527), suggesting it ranks lowest in importance.The Ui values express the relative utility percentage, with 100% representing the best alternative. "Accelerate Android Dev" again ranks the highest (100%), making it the most optimal strategy. On the other hand, "Focus on Advanced AI Features" has the lowest Ui (81.70%), meaning it is the least preferred.Overall, the table highlights that "Accelerate Android Dev" is the top priority, while "Focus on Advanced AI Features" is the least favorable, based on the COPRAS evaluation.

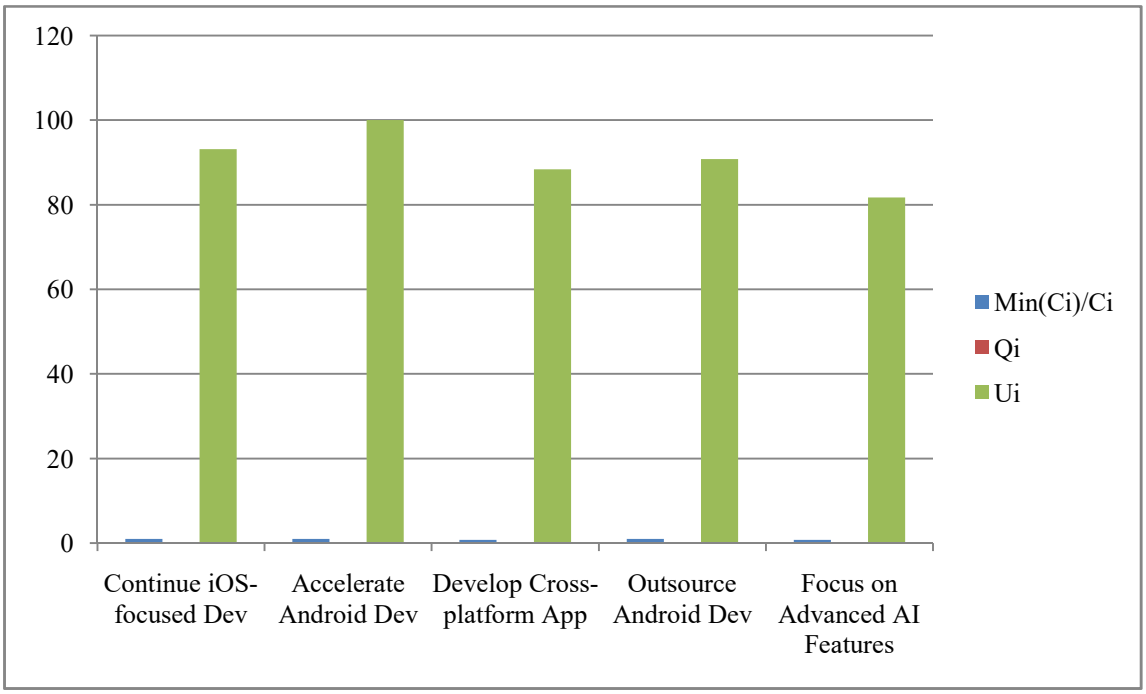

Figure 5. Min(Ci)/Ci&Qi&Ui

Figure 5 visually represents the Min(Ci)/Ci, Qi, and Ui values obtained through the COPRAS method, showcasing the comparative ranking of different strategic initiatives. The graph uses three different data series: Min(Ci)/Ci (blue bars), Qi (red bars), and Ui (green bars).From the visualization, the Ui (green bars) values are significantly higher than the other two parameters, reaching close to 100 for the highest-ranked strategy. "Accelerate Android Dev" stands out as the best option, with its Ui value at 100%, confirming its top ranking. Similarly, "Outsource Android Dev" also performs well, with a Ui value exceeding 90%, making it another strong alternative.On the other hand, "Focus on Advanced AI Features"

has the lowest Ui value (81.7%), indicating it is the least preferred strategy in this analysis. The Qi (red bars) values are relatively low across all strategies but still provide insight into relative ranking. Min(Ci)/Ci (blue bars) remains nearly constant across all alternatives, showing a minor variation in proportional evaluation.Overall, the chart effectively highlights that "Accelerate Android Dev" is the most favorable strategy, followed by "Outsource Android Dev," while "Focus on Advanced AI Features" ranks the lowest in importance based on COPRAS evaluation.

Table 7. Rank

Rank	
Continue iOS-focused Dev	2
Accelerate Android Dev	1
Develop Cross-platform App	4
Outsource Android Dev	3
Focus on Advanced AI Features	5

Table 7 presents the ranking of different strategic initiatives based on the COPRAS method, which evaluates alternatives based on multiple weighted criteria. The ranking reflects the overall importance and priority of each strategy, with Rank 1 being the most favorable and Rank 5 the least preferred."Accelerate Android Dev" secures Rank 1, indicating it is the most optimal choice for development priorities. This aligns with previous results from Qi and Ui values, where it demonstrated the highest scores. "Continue iOS-focused Dev" follows at Rank 2, showing its relatively strong standing compared to other options."Outsource Android Dev" is placed at Rank 3, suggesting it is a viable strategy but not as impactful as the top two. Meanwhile, "Develop Cross-platform App" ranks 4th, reflecting moderate importance but possibly lower efficiency or feasibility in the decision-making process.Finally, "Focus on Advanced AI Features" is ranked 5th, making it the least prioritized strategy. This suggests that, despite its long-term potential, it might not be the most urgent or effective choice for immediate development efforts.Overall, the ranking confirms that "Accelerate Android Dev" and "Continue iOS-focused Dev" are the best strategies, while AI-focused development is the least favorable in this evaluation.

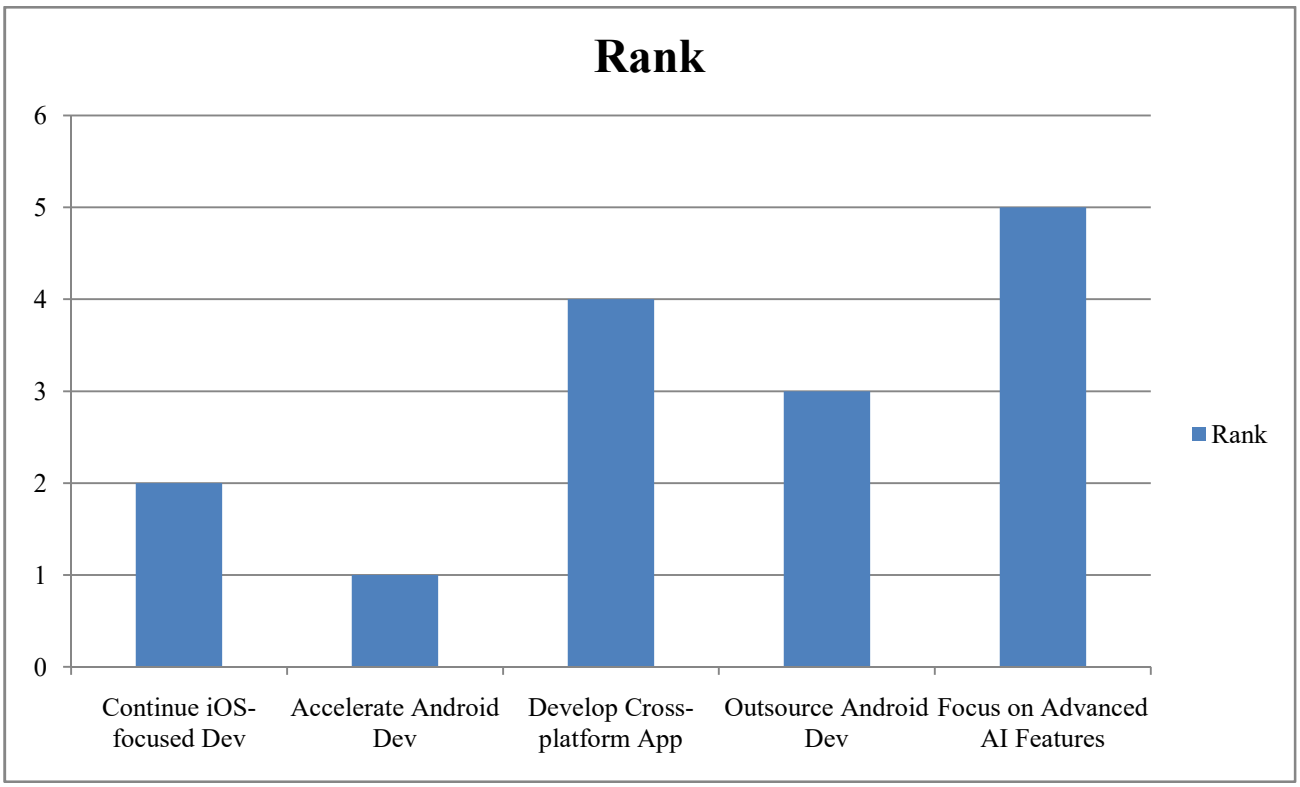

Figure 6.Rank

Figure 6 illustrates the ranking of different strategic initiatives based on the COPRAS method, where a lower rank number signifies a more favorable option. The vertical bars represent the rank positions of each alternative, visually highlighting their relative importance in decision-making.From the chart, "Accelerate Android Dev" is ranked 1st, confirming it as the top priority for strategic development. "Continue iOS-focused Dev" follows at Rank 2, indicating it remains a significant but secondary priority. Meanwhile, "Outsource Android Dev" holds Rank 3, suggesting it is a viable approach but not as critical as the top two strategies."Develop Cross-platform App" is placed at Rank 4, reflecting a lower preference, possibly due to feasibility challenges or lesser immediate impact. The least favorable strategy is "Focus on Advanced AI Features", ranked 5th, which suggests that despite its long-term benefits, it may not be a key priority in the current evaluation.Overall, the chart provides a clear, visual representation of the rankings, reinforcing the prioritization derived from the COPRAS method. The results suggest that Android development acceleration and iOS continuation are the most critical strategies, whereas cross-platform and AI-driven approaches are less urgent.

Conclusion

The BMW Connected app represents a pivotal step in the evolution of vehicle connectivity, underscoring BMW's commitment to innovation and providing a seamless digital experience for its customers. Designed to bridge the gap between the driver and their car, this app integrates advanced technology with intuitive features that enhance convenience, safety, and overall user experience. Let's explore the conclusions about the BMW Connected app, breaking down its capabilities, strengths, limitations, and implications.One of the primary conclusions about the BMW Connected app is its ability to transform how drivers interact with their vehicles. The app offers a wide range of features, including remote locking and unlocking, checking vehicle status, and controlling the climate system remotely. These capabilities give users greater control over their cars, even when they are not physically present. For example, on a hot day, users can pre-condition their car's interior before entering, ensuring a comfortable experience.Additionally, the integration with digital calendars and navigation systems adds a layer of practicality.

The app can access the user's calendar, identify upcoming appointments, and calculate the optimal departure time based on real-time traffic conditions. This predictive technology not only saves time but also reduces stress, making it an invaluable tool for busy professionals and daily commuters.The BMW Connected app also emphasizes safety and security. The ability to locate the vehicle in a crowded parking lot through the app's "Car Finder" feature or to receive notifications if the vehicle is moved unexpectedly provides peace of mind to owners. Furthermore, the app's remote services, such as locking and unlocking doors, add an extra layer of convenience without compromising security.In the event of emergencies, the app can assist through BMW's integrated services like roadside assistance and collision alerts. By connecting the car to emergency services when needed, the app demonstrates BMW's

dedication to prioritizing driver safety.The app is part of a broader digital ecosystem, integrating with platforms like Apple CarPlay, Amazon Alexa, and Google Assistant. This allows users to control various car functions using voice commands or to sync their home automation systems with their BMW.

Such integration ensures that the app aligns with modern consumer expectations of interconnected devices, positioning BMW as a leader in the smart mobility space.Moreover, the app's ability to synchronize with multiple BMW vehicles under one account makes it ideal for households or businesses with multiple cars. This feature enhances user experience by offering a unified interface for managing multiple vehicles.A standout aspect of the BMW Connected app is its use of artificial intelligence to predict user behavior and needs. The app learns from the user's habits, such as frequent destinations, departure times, and preferred routes. Over time, it provides tailored suggestions, such as notifying users when to leave for work or highlighting alternative routes to avoid traffic congestion. This predictive approach simplifies daily routines and enhances driving efficiency.While the BMW Connected app offers an impressive range of features, it is not without its limitations.

One of the primary challenges is its reliance on stable internet connectivity. Remote services and real-time traffic updates require a robust and continuous data connection, which may not always be available in remote areas or regions with poor network coverage.Another concern revolves around data privacy and security. Since the app collects and processes sensitive information such as location, driving habits, and personal schedules, it raises questions about how BMW safeguards this data. Although BMW has implemented measures to protect user information, consumers may still worry about potential breaches or unauthorized access.Additionally, some users have reported occasional technical glitches, such as delays in app responses or difficulties syncing with certain vehicle models. These issues, while not widespread, highlight the importance of continuous updates and support to maintain a seamless user experience.The BMW Connected app aligns with the automotive industry's shift toward sustainability and smarter transportation solutions. By promoting efficient driving through real-time traffic updates and predictive route planning, the app helps reduce fuel consumption and carbon emissions. This aligns with BMW's broader vision of sustainable mobility.Looking ahead, the app's role is likely to expand with advancements in autonomous driving and vehicle-to-everything (V2X) communication. As BMW develops more electric and self-driving vehicles, the app could serve as a central hub for monitoring battery health, managing charging schedules, and interacting with autonomous features.

The BMW Connected app is a testament to BMW's dedication to delivering a premium, user-centric experience. By combining convenience, safety, and cutting-edge technology, the app empowers users to stay connected with their vehicles in unprecedented ways. Its integration with digital ecosystems and AI-driven features positions it as a forward-thinking solution in the evolving landscape of mobility.However, to fully realize its potential, BMW must address challenges related to connectivity, data security, and user experience. Regular updates, enhanced security measures, and improved compatibility with diverse technologies will be key to maintaining customer trust and satisfaction.As the automotive industry continues to innovate, the BMW Connected app represents a significant milestone, not just for BMW owners but for the future of connected vehicles as a whole. It transforms the car from a standalone mode of transportation into an integral part of the user's digital lifestyle, ensuring that BMW remains at the forefront of smart mobility solutions.

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