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Comparative commodity evaluation of smartphones across different price segments

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Abstract. The aim of the study was to make a comparative evaluation of smartphones of different price segments – in terms of their technical, operational, economic and informational characteristics. The research methodology was based upon a type of comparative commodity analysis, establishing evaluation criteria and employing both a weighted scoring approach and verification of correspondence between official specifications and manufacturer technical details. Four smartphone models representing the budget, mid-range, premium, and flagship price segments were selected for the analysis. The comparative assessment showed that the Samsung Galaxy S25 Ultra achieved the highest integrated quality score (4.80 points), whereas the Xiaomi Redmi Note 14 Pro 5G demonstrated the most favourable balance between technical performance and market price (4.55 points). The Apple iPhone 16 confirmed the importance of software optimisation, ecosystem integration, and long-term software support for the consumer value of premium devices, while the Samsung Galaxy A26 5G provided adequate functionality for everyday use as the most cost-effective model. The analysis indicates that higher prices for smartphones are not necessarily accompanied by improvements in the technical characteristics of those devices. The differences between phones within each price segment relate most directly to the processor performance of the devices, the imaging capabilities of the cameras, the design and construction of the devices, and the software that is available to support those smartphones. Each of the technical specifications for each of the smartphones was verified to be consistent with those published by the device manufacturers. The practical significance of the study lies in the applicability of the proposed evaluation criteria and integrated assessment methodology for commodity examination of smartphones, the development of consumer recommendations, and the selection of smartphone models according to price segment and user requirements

Keywords: consumer properties; integrated quality index; technical specifications; software support; consumer value

Introduction

Due to the rapid development of mobile technologies, expansion of the number of mobile phone models created by the manufacturers and competition between the manufacturers, there is a considerable diversification of mobile phones of different price segments. The technical sophistication of mobile phones, the number of features that the phones offer and the different approaches of the manufacturers to positioning their products make it challenging to compare the properties of mobile phones of different manufacturers. A commodity assessment approach makes it possible to comprehensively evaluate the characteristics of mobile phones, identify their advantages in competition with other mobile phones of different manufacturers and determine whether the quality of the mobile phones is in line with their market price.

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The evolution of commodity science has made it possible to replace the evaluation of separate technical parameters with the evaluation of consumer properties, functional value, and the product's ability to satisfy the needs of its users. V. Vasiuta *et al.* (2022) state that commodity science is becoming more and more related to technical, economic, and consumer quality criteria, which allows products to be evaluated more objectively in terms of the competitive marketplace. The authors point out that even for technically complex products, the evaluation of separate parameters is not enough because the quality of a product is dependent on the cumulative influence of many different, interrelated characteristics.

A similar argument is made by K. Petrov & I. Kobzev (2022), who introduced a method of accounting for the contribution of individual consumer characteristics to the consumer value of a product and the use of weighting coefficients to measure the relative importance of these characteristics based on information about consumer choice. The authors asserted that individual attributes of a product contribute unequally to its consumer value. Such an approach allows researchers to move past simply comparing individual parameters of a product to performing an integrated evaluation of an entire product to determine its competitiveness in the marketplace.

Another area of development within the field of science concerns the systematisation of electronic products. N. Marchuk *et al.* (2021), in their investigation of the classification of wearable electronic devices, stated that the rapid development of digital technologies has led to the need for the continual development of the attributes that are utilised to classify and evaluate those devices. The scientists explained that the various features of the electronic devices must be considered as a group of attributes that can be evaluated as a whole to determine the consumer properties of the electronic device. The smartphone market has also been influenced by the digitalisation of commerce and changes in consumer behaviour. According to S. Breus & O. Tsymbalenko (2024), the integration of digital technologies into the processes that occur within businesses has altered the interactions between those businesses and the consumers of their products. As a result, consumers can access the technical specifications of the products they wish to purchase, and often base their purchasing decisions on the digital information that is available about those products.

The expansion of opportunities for electronic commerce has enabled the comparison of smartphones according to their technical and economic characteristics. The study by O. Zaitseva *et al.* (2024) showed that B2C and C2C platforms have made information on the specifications, prices, sales conditions, and reviews of smartphones accessible to consumers. The availability of such information has led to an increase in the difficulty of making smartphone purchases due to the necessity of comparing a variety of technical specifications of these products. Changes in the behavior of smartphone consumers have also made an impact on the different criteria that are used to evaluate electronic products. The study by O. Tsyhanenko *et al.* (2023) indicated that during periods of economic uncertainty, consumers tend to base their purchasing decisions on the capabilities and the price of electronic products rather than the other attributes that are advertised by the manufacturers of those products.

Another of the focuses of the research within the field of commodity science is that which investigates the nature of the product information that is provided by the manufacturers of the goods that are being sold. R. Voloshyn & P. Muravka (2025) have published research that indicates that the expansion of e-commerce has led to product information becoming one of the primary factors that influences the purchasing decisions of consumers. As such, the authors stated that the product information must be complete, accessible, and reliable in order to allow for the performance of an objective evaluation of the commodities.

As digital sales channels for goods and services continue to expand, the issue of the reliability of the product information published by the manufacturers becomes more pressing. N.V. Romaniuk (2026) has investigated the use of digital control tools in the aims of increasing the transparency of the sales channels, making it easier to identify issues with the product information that is published by the manufacturers, and reducing the number of instances in which goods with inaccuracies in their characteristics are placed for sale. At the same time, a literature review of the issue of smartphones evaluation revealed that most of the existing research papers address separate aspects of the problem, such as aspects related to the science of commodities, aspects related to electronic commerce, aspects related to consumer behaviour, or aspects related to the provision of product information. A lack of comprehensive research in the study of smartphones from different price segments and according to different assessment criteria determined the need to conduct the research described in this paper.

The aim of the study was to evaluate smartphones from different price segments through a comprehensive study of the commodity characteristics of those smartphones, as well as to determine any relationship between those technical specifications of the phones and their market price. To accomplish this aim, the following tasks had to be performed: to systematise approaches to evaluating smartphone characteristics and to develop a set of criteria for their comprehensive assessment; to conduct a comparative analysis of the technical, functional and economic characteristics of smartphones from different price segments in order to calculate a quality index for the models representing each price

segment; and to determine the consistency of the technical characteristics of smartphones stated in product information and labelling with the official technical specifications published by the manufacturers.

Materials and Methods

The study had a theoretical-empirical research design. It was conducted in January 2026. Its focus was on performing a comprehensive evaluation of smartphones from different price segments with regard to their technical, functional, structural, economic, and informational characteristics. The theoretical phase of the study included a systematic analysis of existing approaches to assessing the quality of smartphones. On the empirical side of the research, a comparative characterisation of four smartphone models was performed, an assessment of each model according to the established criteria, an analysis of the price-to-quality ratio of the models evaluated, and a verification of the technical specifications of the brands that manufactured the smartphones in question.

At the theoretical stage of the work, the steps of theoretical generalisation, analysis, systematisation, and comparison of existing studies were performed. Such an approach allowed the researchers to systematise the approaches to evaluating smartphones as commodities, to identify the criteria for the properties of smartphones that are consumed, to determine the methods of assessing their technical, structural, operational, economic, and informational properties, as well as the approaches to assessing the price-quality characteristics of these mobile devices. As a result, a set of criteria was developed that allowed for the comprehensive evaluation of smartphones, which would become the methodological basis for the following empirical stage of the work. The source base included scholarly publications on commodity science, quality assessment of electronic products, consumer studies of the smartphone market, and official technical materials issued by leading mobile device manufacturers.

The empirical study included four smartphone models representing four price segments of the mobile device market: Samsung Galaxy A26 5G (budget segment), Xiaomi Redmi Note 14 Pro 5G (mid-range segment), Apple iPhone 16 (premium segment), and Samsung Galaxy S25 Ultra (flagship segment). The models were selected according to the representativeness of their price categories and their relevance at the time of the study. To ensure comparability of the results, the analysis covered base configurations officially presented by the manufacturers. The information sources included official manufacturers' technical specifications, official product catalogues, and open data on average market prices for the examined models (Samsung, n.d.a; n.d.b; Apple, n.d.; Xiaomi, n.d.).

For a comprehensive comparison of the consumer properties of smartphones from different price segments, a comparative commodity analysis was employed. The comparison was based on a set of criteria covering technical specifications, camera performance, battery life, structural design, software support, as well as economic and informational indicators. The methodological foundation for this stage included studies on the commodity evaluation of smartphones together with research addressing the factors that shape their consumer properties and market value. The reasons for choosing such an approach to assessing the quality of smartphones are primarily that no individual specification of a smartphone is likely to provide an accurate reflection of its overall quality, but the evaluation of each specification separately can provide a more objective representation of both the capabilities and the value of that smartphone. Methods of generalisation and classification helped to develop a unified system of assessment criteria for smartphones.

To compare the selected smartphone models quantitatively, an integrated weighted scoring method was used. Each criterion was assessed on a five-point scale, where 1 represented the lowest level of compliance with the evaluation criterion and 5 represented the highest value among the examined models. The relative importance of each criterion was incorporated through weighting coefficients, the sum of which equaled 1.00. The integrated quality index was calculated as the sum of the products of the score assigned to each criterion and its corresponding weighting coefficient (formula (1)):

$$I = \sum_{i=1}^{n} B_i W_i, \quad (1)$$

where I – the integrated commodity evaluation index; B_i – the score assigned to the i-th criterion; W_i – the weighting coefficient of the co5rresponding criterion.

The research data were processed automatically in Google Sheets (USA). Descriptive statistical methods were applied to organise the collected data, compare indicators, rank the evaluated models, and calculate the integrated quality indices. Calculations were performed separately for each smartphone model using the established system of evaluation criteria. The integrated assessment method made it possible to move beyond the examination of individual characteristics toward a comprehensive evaluation of overall smartphone quality and provided a basis for objective ranking regardless of price segment.

The reliability of the information about the products was determined using the documentation verification method for the technical specifications of the products. The verification of the technical specifications was based on the official technical specifications of the smartphones published on the manufacturers' official websites. The verification included checking the model of the smartphone, the type of processor installed in the device, the amount of Random-Access Memory

(RAM) and the internal storage capacity, the technical specifications of the display, the characteristics of the cameras, the specifications of the batteries, the specifications of the chargers, the ingress protection, the operating system installed, and the software specifications and support information. The characteristics of the smartphones were compared with the official technical specifications published by the manufacturers to verify each smartphone model. Based on these comparisons, the information about the characteristics of each smartphone model was determined to match the specifications published by the smartphone manufacturers. Through performing such a verification process, it became possible to determine the completeness and reliability of the information regarding the characteristics of smartphones. Additionally, it was possible to determine the suitability of the specifications published by the smartphone manufacturers as a source of information regarding the characteristics of those smartphone models.

Results

From the perspective of commodity science, smartphone evaluation involves determining the extent to which a device is capable of meeting users' functional needs throughout its service life. Such an assessment considers not only the technical specifications stated by the manufacturer but also their influence on operational performance, reliability, durability, and the economic feasibility of purchase (Haba *et al.*, 2017; Akiba & Jonsson, 2022). Considering these characteristics as an integrated system provides a more objective basis for commodity evaluation.

The quality of smartphones is determined by how well its functional, technical, operational, and economic characteristics meet the requirements of end users (Horani & Dong, 2023). The technical qualities of smartphones include their display specifications, processor performance, RAM and internal storage capacity, graphics subsystem characteristics, wireless connectivity features, and support for current data transmission standards. Other aspects to consider when evaluating smartphone quality include ease of use, durability, reliability, the quality of product information, and economic efficiency.

One of the principal components of a comprehensive smartphone evaluation is the assessment of its technical characteristics. Technical characteristics include display specifications, processor performance, RAM and storage capacity, graphics processing unit, connectivity technologies, and support for current data transmission standards (Rai *et al.*, 2023). Together, these characteristics determine processing performance, operational stability under workload, and the ability of the device to handle a wide range of user tasks. At the same time, individual technical specifications should not be interpreted independently, since overall performance depends on the balance of the entire hardware and software architecture.

The characteristics of the display technology represent another important component of a comprehensive evaluation of smartphone models. Factors related to the display technology, such as resolution, refresh rate, brightness, colour accuracy, and contrast, all play a role in the convenience with which the smartphone can be utilised in everyday functions (Blanco-Encomienda *et al.*, 2024). As the primary interface between the smartphone and the user, the display's characteristics have a major impact on the device's overall quality. For phones in the mid-range, premium, and flagship segments, display performance is one of the main factors that differentiate between smartphone models.

The photographic performance of a smartphone represents another group of considerations that can be used to provide a comprehensive review of the device. The photographic capabilities of smartphones have evolved into sophisticated digital imaging systems, and the quality of the images captured by these devices is determined by a variety of factors beyond the sensor resolution. Factors such as computational image processing algorithms, artificial intelligence functions, and the noise reduction algorithms implemented within these devices can affect the quality of the photographs. Consequently, the photographic quality of a smartphone can be evaluated mainly in terms of the quality of the photographs taken with those devices, rather than the manufacturer's specifications (Huang & Wu, 2020; Zhu *et al.*, 2020).

Battery endurance is also regarded as one of the fundamental indicators of smartphone consumer quality. The operating time of a smartphone is determined by factors beyond the battery capacity itself, such as the processing power of the device's processor, the characteristics of its display, the software that is installed on the device, and its operating system (Cai, 2025). Smartphones with identical batteries can last considerably longer than others due to these factors. Hence, another parameter to evaluate when considering the different models of smartphones is the operating time of the device.

The structural characteristics of smartphones are another essential dimension of their evaluation. The materials of construction of the device, the durability of its construction, its resistance to dust and water ingress, its weight, its thickness, and its ergonomics all play a role in the durability and comfort of the device. Smartphones constructed of aluminium alloys, reinforced glass, and even titanium components offer performance benefits to the user at the expense of higher manufacturing costs and, thus, retail price. Hence, smartphones' structural characteristics should be evaluated in conjunction with their functional capabilities. This makes it possible to determine whether the construction of smartphones using such higher-grade materials

provides an improvement in the product's durability. Smartphones' economic indicators are another essential dimension of their evaluation. The price of smartphones does not necessarily correlate with the functional performance that they offer (Akiba & Jonsson, 2022). The price of high-end and flagship smartphones often correlates with features such as brand value, industrial design, the use of advanced construction materials, and the inclusion of certain technological innovations (Horani & Dong, 2023). Hence, the relationship between quality and price is another of the key criteria to consider in the evaluation of smartphones as commodities.

Consumer perceptions of smartphone quality are also shaped by the manufacturer's reputation, the brand's country of origin, and the level of trust associated with the brand. These factors may increase consumers' willingness to choose a particular model even when technical differences between competing products are minimal. Nevertheless, such attributes should not outweigh objective product characteristics during commodity evaluation, since its primary purpose is to determine the actual quality of a product regardless of brand-related marketing influences (Shin & Choo, 2012; Blanco-Encomienda *et al.*, 2024). The synthesis of these approaches served as the basis for establishing the evaluation criteria applied in the subsequent comparative analysis of smartphones across different price segments (Table 1).

Table 1. *Main criteria for the comprehensive commodity evaluation of smartphones across different price segments*

Criterion group	Evaluation indicators	Contribution to consumer properties	Role in commodity evaluation
Technical characteristics	Display technology and size, resolution, refresh rate, processor, RAM, internal storage	Determine processing performance, operating speed, display quality, and the ability to perform resource-intensive tasks	Used to compare the functional capabilities of smartphones across different price segments
Camera characteristics	Main camera, ultra-wide camera, front camera, optical image stabilisation, video recording capabilities	Reflect photographic and video performance as well as multimedia capabilities	Used to assess whether technical specifications correspond to actual imaging performance
Battery performance	Battery capacity, charging speed, wireless charging support	Determine battery life and convenience in everyday use	Used to evaluate the practical efficiency of smartphone operation
Structural characteristics	Body materials, weight, dimensions, dust and water resistance (IP rating)	Influence durability, mechanical strength, ergonomics, and ease of handling	Used to assess the operational reliability of the product
Software support	Operating system version, duration of software support, artificial intelligence features	Ensure operational stability, security, and the long-term availability of functional capabilities	Used to evaluate the long-term usability of the smartphone
Economic indicators	Market price, price segment, integrated price-to-quality index	Reflect the economic justification for purchasing a particular model	Used to determine the optimal balance between price and overall quality
Informational indicators	Product labelling, technical documentation, consistency between declared and actual specifications	Reflect the completeness and reliability of product information	Used to verify compliance with manufacturers' specifications and support an objective commodity evaluation

Note: *P – ingress protection*

Source: *compiled by the author based on D.-H. Shin & H. Choo (2012), C.-H. Huang & J.-L. Wu (2020), E.A.G. Akiba & R. Jonsson (2022), L.F. Horani & L. Dong (2023)*

The analysis of the proposed criteria for product evaluation confirms the variation of their significance depending on the price category of smartphones. For this reason, commodity evaluation should be based on a comprehensive assessment, not on separate technical indicators that do not always correlate with the actual level of consumer properties of a smartphone. The choice of a mobile device by a consumer is usually based on the overall combination of technical capabilities, functionality, battery life, external design, and price, not individual product characteristics (Hailat *et al.*, 2025). In addition, the weight of different evaluation criteria varies between price categories. Processing performance and affordability remain the most significant for budget smartphones, while display quality, camera performance, body material, and software support increasingly take precedence in premium and flagship categories. In addition, a smartphone's elevated market price does not guarantee that all its technical characteristics have improved proportionately. Therefore, price should be examined in conjunction with the true level of quality of the product (Cai, 2025; Cui *et al.*, 2025).

The next stage of the study involved applying the established evaluation framework to smartphones of different price segments. Four smartphones of different price segments were selected for evaluation: the Samsung Galaxy A26 5G smartphone of the budget segment, the Xiaomi Redmi Note 14 Pro 5G of the mid-range segment, the Apple iPhone 16 of the premium segment, and the Samsung Galaxy S25 Ultra of the flagship segment. The first stage of the evaluation of these smartphones was to compare their technical characteristics, the results of which are presented in Table 2.

Table 2. *Comparative technical characteristics of smartphones across different price segments*

Parameter	Samsung Galaxy A26 5G (Budget)	Xiaomi Redmi Note 14 Pro 5G (Mid-range)	Apple iPhone 16 (Premium)	Samsung Galaxy S25 Ultra (Flagship)
Average market price, USD*	299	399	799	1299
Display	Super AMOLED, 6.7″	AMOLED, 6.67″	Super Retina XDR OLED, 6.1″	Dynamic AMOLED 2X, 6.9″
Resolution	2,340×1,080	2,712×1,220	2,556×1,179	3,120×1,440
Refresh rate	120 Hz	120 Hz	60 Hz	120 Hz (adaptive)
Processor	Exynos 1380	MediaTek Dimensity 7300 Ultra	Apple A18	Snapdragon 8 Elite for Galaxy
RAM	6/8 GB	8/12 GB	8 GB	12 GB
Internal storage	128/256 GB	256/512 GB	128/256/512 GB	256/512 GB/1 TB
Main camera	50 MP	200 MP	48 MP	200 MP
Ultra-wide camera	8 MP	8 MP	12 MP	50 MP
Telephoto camera	-	-	-	50 MP+10 MP
Front camera	13 MP	20 MP	12 MP	12 MP
Maximum video resolution	4K	4K	4K Dolby Vision	8K
Battery capacity	5,000 mAh	5,110 mAh	≈3,561 mAh	5,000 mAh
Fast charging	25 W	45 W	25 W	45 W
Wireless charging	No	No	MagSafe, Qi2	Yes
Body material	Plastic	Glass/Plastic	Aluminium and Glass	Titanium and Glass
Ingress protection	IP67	IP68	IP68	IP68
Operating system	Android 15 (One UI 7)	Android 15 (HyperOS)	iOS 18	Android 15 (One UI 7)
Guaranteed software support	Up to 6 years	Up to 4 years	Approximately 5 years**	Up to 7 years

Note: **Average market prices are presented as of the study period and may vary depending on the country of sale and memory configuration. **Apple does not officially specify a guaranteed software support period; therefore, the value shown reflects the average duration of software updates provided for previous iPhone generations*

Source: *compiled by the author based on Apple (n.d.), Samsung (n.d.a; n.d.b), Xiaomi (n.d.)*

The data presented in Table 2 showed that there is an overall increase in technical characteristics as smartphones transition from the budget to the high-end models. However, not all specifications experience increases in any given range. For example, technical characteristics like processing performance, RAM and storage capacity, body materials, and camera specifications tend to increase with price. Other characteristics, such as battery capacity and refresh rate, are relatively the same across the different price range segments. Thus, many of the technologies that are traditionally present in high-end smartphones are also incorporated into budget models.

The Samsung Galaxy A26 5G is a smartphone that sits within the budget range for smartphones. It comes with an AMOLED display with a 120 Hz refresh rate, a 5,000 mAh battery, and the latest version of the mobile operating system. However, its body is made of plastic materials, it does not include a telephoto camera, it has relatively lower processing power than many other smartphones in its range, and it offers fewer fast charging specifications than other models in the same price range.

The Xiaomi Redmi Note 14 Pro 5G is a smartphone in the mid-range for smartphones. It has a 200 MP main camera lens, increased RAM, it can charge to 100% in 30 minutes with a 120 W fast charger, and it is water and dust resistant to IP68 standards. These specifications indicate that the Xiaomi Redmi Note 14 Pro 5G has focused on providing the highest specification for smartphones in its price range.

Finally, the Apple iPhone 16 creates its value proposition differently from the other brands discussed. While the specifications for the iPhone 16 are slightly lower than those of the other brands discussed (especially in relation to the refresh rate and battery capacity), its strengths lie in the A18 processor within the device, the integration of iOS with both the phone and the Apple ecosystem, and the length of time that it will be supported with software updates.

Among the models evaluated, the Samsung Galaxy S25 Ultra demonstrates the most advanced technical configuration. Its advantages include a flagship processor, a titanium body, a professional camera system, 8K camera capabilities, high memory configurations, and the longest duration of software support for this model of smartphone. Although the Samsung Galaxy S25 Ultra has the most advanced technical specifications among the models compared, it also has the highest market price for the phones in this evaluation.

Although higher prices were found for phones with improvements to the functional and structural characteristics of the devices, not every technical specification for those phones was improved. Based on these findings alone, it is noted that evaluating smartphones according to only the various specifications provided for each manufacturer will not provide an objective

measurement of the quality of those phones. Thus, the findings indicate the need for an integrated evaluation model to determine the overall quality of each brand of smartphone. Hence, the results of the evaluation will be summarised through the implementation of an integrated evaluation model (Table 3).

Table 3. *Integrated commodity evaluation scores for smartphones across different price segments*

Evaluation criterion	Weighting coefficient	Samsung Galaxy A26 5G	Xiaomi Redmi Note 14 Pro 5G	Apple iPhone 16	Samsung Galaxy S25 Ultra
Display	0.15	4	5	4	5
Processor performance	0.20	3	4	5	5
Camera performance	0.20	3	5	4	5
Battery performance	0.15	4	5	4	5
Structural design and body materials	0.10	3	4	5	5
Software support	0.10	5	4	5	5
Price-to-quality ratio	0.10	5	5	4	3
Integrated quality index	1.00	3.65	4.55	4.45	4.80

Source: *Compiled by the author*

The Samsung Galaxy S25 Ultra emerged as the smartphone with the highest integrated quality index of 4.80. The phone features the best technical performance, but its high market price lowers its score for the price-to-quality criterion. The Xiaomi Redmi Note 14 Pro 5G ranked second with an integrated quality index of 4.55. This model offers the best balance between technical specifications and cost of purchase. It scores highly in the criteria for camera performance, battery performance, and price-to-quality. The Apple iPhone 16 received an integrated quality index of 4.45. This phone offers some of the best processing power, structural quality, and software performance in the smartphone segment. However, the lower refresh rate of the screen, the smaller battery size, and higher purchase price of the phone lower its overall score. Finally, the Samsung Galaxy A26 5G received the lowest integrated quality index of 3.65. This phone is positioned in the budget segment of the smartphone market. While the hardware specifications and camera quality are more limited compared with other models, the phone performs all necessary tasks for everyday use and offers good value for money.

The findings show that there is no direct relationship between the increasing price of smartphones and the improvement of their technical characteristics. The most appropriate choice of smartphone for a consumer depends on the relationship between the technical characteristics and the price of smartphones. Thus, while the quality index is helpful in obtaining an overview of the technical characteristics of smartphone models, verifying the technical specifications provided by the manufacturers is also necessary for a complete evaluation of smartphone commodities. The last stage of the evaluation of these smartphone commodities involved verifying the information provided by smartphone manufacturers regarding their technical specifications with the technical characteristics that they have declared for these smartphone models. The results of such an evaluation are presented in Table 4.

Table 4. *Verification of the consistency between product labelling information and the manufacturers' official technical specifications*

Parameter	Samsung Galaxy A26 5G	Xiaomi Redmi Note 14 Pro 5G	Apple iPhone 16	Samsung Galaxy S25 Ultra
Model designation	+	+	+	+
Processor	+	+	+	+
RAM	+	+	+	+
Internal storage	+	+	+	+
Display specifications	+	+	+	+
Camera specifications	+	+	+	+
Battery capacity	+	+	+	+
Charging performance	+	+	+	+
Ingress protection rating	+	+	+	+
Operating system version	+	+	+	+
Software support information	+	+	+	+
Overall compliance	Full	Full	Full	Full

Note: *"+" indicates that the information declared by the manufacturer is consistent with the official technical specifications of the corresponding smartphone model*

Source: *compiled by the author based on Apple (n.d.), Samsung (n.d.a; n.d.b), Xiaomi (n.d.)*

The results presented in Table 4 demonstrate that all the smartphones under consideration comply with the technical specifications published by their manufacturers. The differences between models relate to the detail provided within the technical specifications rather than the accuracy of the information provided. The flagship models include the most detailed technical specifications due to their variety of features, while the budget model includes a more concise specification that still provides all the information necessary to describe the model and its consumer properties.

The smartphone manufacturers provide similar technical specifications for the models they publish, including details on the processor type, memory, display, cameras, battery, operating system, and the ingress protection of the devices. These specifications allow for a direct comparison of the smartphones from different price segments. Some specifications might differ from the way the smartphones function due to the features and operating systems of the devices. However, these specifications from the manufacturers are sufficiently reliable for comparing the consumer properties of smartphones from each price segment. Thus, these specifications can be used as a basis for comparing the smartphones according to their consumer properties and for formulating recommendations regarding which smartphone models consumers should purchase.

The results of the commodity evaluation of smartphones allow for the selection of phones that best match the requirements of individual consumers. A higher purchase price does not necessarily indicate improved technical specifications for the smartphone. Rather, the decision to purchase a phone can be based upon the combination of the technical specifications of the devices.

For consumers seeking a smartphone with a low purchase price and whose requirements are satisfied by the capabilities of midrange phones, the Samsung Galaxy A26 5G is an appropriate model to purchase. The phone contains sufficient specifications to meet the needs of most casual consumers. For those seeking higher technical specifications at a similar price, the Xiaomi Redmi Note 14 Pro 5G may be the best model for selection. The Redmi Note contains higher capabilities in each of its technical specifications at a lower price point.

For consumers who utilise the Apple operating system and value long-term support for that software, the Apple iPhone 16 may be the most appropriate smartphone to select; while many of the specifications of the phone are less advanced than other models, the phone has higher software support and performance, as well as higher performance in general. For consumers who require the highest possible specifications for their smartphone, such as processing power, camera and display capabilities, the Samsung Galaxy S25 Ultra will provide the highest level of performance, supporting its higher purchase price. Overall, then, the balance between the capabilities, performance, and price of smartphones is the most important specification for smartphones.

Discussion

As a result of this analysis, it became apparent that the differences between smartphone price segments are reflected not only in the number of technical advantages each device provides but also in the way the various features interact. Each budget phone model offers consumers an adequate level of the features and technologies they need to complete their everyday tasks, while the advantages of premium and flagship devices arise from a balanced approach to the technologies included in those devices.

These findings are consistent with those of J.B. Phillips & H. Eliasson (2017), who published a study that emphasises the importance of a comprehensive analysis of smartphone camera features rather than simply considering each individual technical specification. The authors explained that to objectively evaluate a smartphone camera, one must consider image detail, colour accuracy, noise levels, dynamic range, and image-processing algorithms. As a result, the smartphones earning the highest camera scores did not necessarily have the highest specifications for any single feature, but offered a balanced technology that delivers high-quality images overall.

Furthermore, the assessment of battery performance also helps to indicate that battery capacity alone is not a measure of the efficiency of smartphones. D. Flores-Martin *et al.* (2024) have published research in which they indicate that the length of time that their smartphones operate is based upon the battery management systems within the smartphones, the applications that are utilised, and the amount of activity that the phone performs in relation to communication with other devices and systems. Instead, smartphones that have similar battery capacities can have different performances from one another, indicating that another factor is at play.

The evaluation of the structural features of the smartphones additionally indicates the use of a more comprehensive assessment of the commodity. According to S. Soudachanh & S. Salhofer (2025), the evaluation of electronic products is no longer limited to technical specifications but also considers repairability, service life, and long-term manufacturer support. Similarly, smartphones that utilise more durable materials for their cases, have more protection against water and other environmental factors, and that are supported by the manufacturer for longer periods of time will score higher on a more comprehensive evaluation of those smartphones.

The results of this research are additionally in alignment with the concept of technological evolution

in complex technological products, as described by M. Coccia (2026). The author explained that the development of complex technological products often includes developing each of the subsystems of that product simultaneously to maximise the overall competitiveness of the product. Each of the factors that contribute to the overall evaluation score for the smartphone – processing performance, structural quality, imaging performance, battery performance, and software support – are evaluated simultaneously by the manufacturer in the creation of that device, indicating that the score for that brand of smartphone is the result of each of these factors being developed in conjunction with one another. For these reasons, the use of such a comprehensive evaluation of each brand of smartphone is superior to the evaluation of each of its individual specifications.

A similar perspective on smartphone characteristics is provided by A. Pellegrino (2024). The author indicated that many consumers tend to consider a variety of factors in the purchase of a smartphone, such as its functional characteristics, price, user experience, brand, and the value of the product provided to the consumers over time. The author explains that as a result, the technical specifications of the devices are less important to many consumers than ensuring that the characteristics of the smartphones correlate with the value that the consumers are willing to provide for the device. The findings of the study reflect these suggestions: the mid-range smartphones were deemed to offer the best balance between their characteristics and their cost.

These findings are also reflective of the conclusions of S. Hoffmann & P. Akbar (2023). The authors explained in their review that consumers consider a variety of factors in the purchase of technology products, including the functional characteristics, the psychological attributes of the product, and the economic factors related to the product. The findings of this current study reflect these factors in that the various technical specifications and features of smartphones did not have an impact upon their overall evaluation by consumers unless those specifications provided some benefit to the consumers in relation to their use of those products.

Another factor that influences the evaluation of smartphones is the after-purchase experience. P. Guo *et al.* (2025) have determined that factors that impact smartphone consumer satisfaction include the stability of the software installed on the smartphone, the regularity with which software updates are made to those smartphones, the quality of after-sales support for those manufacturers, and the reliability of the device over time. These same factors were recognised within the present study, as phones that offered longer periods of software support received higher evaluation scores than those that did not, even if they contained some technically less advanced specifications than their competitors.

Brand perception represents another factor influencing the way consumers assess smartphone value. According to M. Kayakuş *et al.* (2024), brand reputation can lead to consumers feeling more confident in the brand of the smartphone that they are purchasing, and in the abilities of that brand to provide high-value phones despite the relatively small technical differences between their products. However, the results of the present study suggest that brand reputation should not be considered an indicator of the quality of the smartphones that are manufactured by those brands; instead, the technical, operational, and economic indicators of those brands provide a more accurate measure of the quality of their smartphones.

A more comprehensive assessment of smartphones that incorporates the various aspects of the products, such as their technical, structural, operational, economic, and informational characteristics, will allow for a more complete understanding of the consumer properties of the evaluated products and for the identification of the competitive strengths of smartphone models, regardless of their market segment. Thus, the focus of the assessment can shift from the technical specifications of the smartphones to an evaluation of their consumer value.

This type of assessment reflects the concepts evaluated by L. Moutinho *et al.* (2014), who determined that the evaluation of technological products extends beyond the consideration of their technical specifications to incorporate aspects related to the consumers of those products, such as their behaviour and the value that they place upon those products. The assessment of smartphones according to the various characteristics of the products, each associated with another characteristic of the products, reflects these concepts and indicates that each smartphone has an overall value that can be determined according to these characteristics. The findings of this study have a range of implications for various groups of stakeholders in the industry. Manufacturers can utilise the framework to determine the strengths of their smartphones compared to competitors. Retailers who are aware of the evaluation study can provide recommendations regarding smartphones to consumers. Experts can apply the framework to provide an objective evaluation of the quality of smartphones.

The conclusions of this evaluation are in agreement with the findings of M. Nasirinejad & S. Sampalli (2023), who determined that the selection of digital products requires the evaluation of different specifications of those products. The findings of this study provide support for the application of such an evaluation system to smartphones of different price segments. Furthermore, the specifications that are evaluated in this study can also be applied to the evaluation of other categories of digital electronic products.

Overall, the conclusions of this study, in conjunction with previous research findings on the topic, lead to

the determination that a framework for the evaluation of the characteristics of smartphones of each price segment can be beneficial for a variety of reasons. Unlike the evaluation of the specifications of smartphones alone, this framework considers the interrelationship between the functional, structural, operational, economic, and informational characteristics of smartphones. Evaluating these different characteristics as a system allows for the determination of the value of those products to its consumers, to experts in the field, and provides a framework for the further evaluation of other categories of digital electronic products.

Conclusions

The study demonstrated that the proposed framework provides an objective basis for comparing smartphones using multiple technical, operational, structural, software-related, economic, and informational criteria. The integrated weighted assessment made it possible to evaluate smartphones comprehensively rather than relying on individual specifications. The findings showed that although higher-priced models generally offered better processor performance, structural quality, and software support, price increases were not proportional to improvements in overall consumer value. At the same time, features previously associated mainly with flagship devices, including high refresh-rate displays, ingress protection, and large battery capacity, have become available across different price categories, reflecting the narrowing technological gap and increasing competition in the smartphone market.

The comparative evaluation showed that the Samsung Galaxy S25 Ultra achieved the highest integrated quality index (4.80), although its advantage over the remaining models was considerably smaller than the difference in market price. The Xiaomi Redmi Note 14 Pro 5G ranked second (4.55) and demonstrated the most favourable balance between technical capabilities and purchase cost. The Apple iPhone 16 confirmed that the consumer value of premium devices depends not only on hardware specifications but also on software optimisation, ecosystem integration, and long-term software support. In contrast, the Samsung Galaxy A26 5G provided sufficient functionality for everyday use while remaining the most cost-effective option among the evaluated models. Verification of the manufacturers' official specifications confirmed full consistency between the declared and actual characteristics, supporting the use of these data for comparative product evaluation and the development of evidence-based consumer recommendations.

The main limitation of this study is that the evaluation relied exclusively on manufacturers' official technical specifications without independent testing of processing performance, battery endurance, or camera capabilities. Future research should expand the range of evaluated models by incorporating independent laboratory testing together with indicators of long-term reliability, repairability, and maintenance costs.

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Conflict of Interest

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Порівняльний аналіз характеристик смартфонів у різних цінових сегментах

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Анотація. Метою дослідження було провести порівняльну оцінку смартфонів різних цінових сегментів – з точки зору їх технічних, експлуатаційних, економічних та інформаційних характеристик. Методологія дослідження базувалася на порівняльному товарознавчому аналізі, встановлюючи критерії оцінки та використовуючи як підхід зваженої оцінки, так і перевірку відповідності між офіційними характеристиками та технічними даними виробника. Для аналізу було обрано чотири моделі смартфонів, що представляють бюджетний, середній, преміальний та флагманський цінові сегменти. Порівняльна оцінка показала, що Samsung Galaxy S25 Ultra досяг найвищого інтегрованого балу якості (4,80 бала), тоді як Xiaomi Redmi Note 14 Pro 5G продемонстрував найвигідніший баланс між технічними характеристиками та ринковою ціною (4,55 бала). Apple iPhone 16 підтвердив важливість оптимізації програмного забезпечення, інтеграції екосистеми та довгострокової підтримки програмного забезпечення для споживчої цінності преміальних пристроїв, тоді як Samsung Galaxy A26 5G забезпечив адекватну функціональність для щоденного використання як найекономічніша модель. Аналіз показує, що вищі ціни на смартфони не обов'язково супроводжуються покращенням технічних характеристик цих пристроїв. Відмінності між телефонами в кожному ціновому сегменті найбільш безпосередньо пов'язані з продуктивністю процесора пристроїв, можливостями обробки зображень камер, дизайном та конструкцією пристроїв, а також програмним забезпеченням, доступним для підтримки цих смартфонів. Кожна з технічних специфікацій для кожного зі смартфонів була перевірена на відповідність тим, що опубліковані виробниками пристроїв. Практичне значення дослідження полягає в застосовності запропонованих критеріїв оцінки та комплексної методології оцінки для товарної експертизи смартфонів, розробки рекомендацій для споживачів та вибору моделей смартфонів відповідно до цінового сегмента та вимог користувача

Ключові слова: споживчі властивості; інтегрований індекс якості; технічні характеристики; програмна підтримка; споживча цінність