

Selection Strategy Of Ipad Through Analytic Hierarchy Process

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ABSTRACT

IPADS are used in Teaching and Learning by students seeing them as essential for 21st century education. The finger-driven IPAD interface always motivates and engages students, keeping them busy and interested in subject content for longer duration. The main importance of IPAD is that it enhances and stimulates opportunities for face-to-face social interaction in several types that desktop, laptop and individual peripherals in fixed location and overall design do not. Analytical Hierarchy Process (AHP) is a method for ranking data, selecting the best given criteria and to analyze consumer preferences while buying IPADS. This paper aims to highlights information and relevant data, which focus on customer's demand and prioritizes the features while purchasing IPADS. The main parameters like Price, Battery, Camera and Memory selected to prioritize factors. Multiple Criteria decision-making (MCDM) method is utilized for ranking the features against the well known branded Products.

Keywords: Analytic Hierarchy Process(AHP), Features, Customer expectation, Multi Criteria Decision Making (MCDM)

1. INTRODUCTION

The key potential benefit of iPad-like devices involves their working in combination with other technologies. Students are benefited with efficient network connectivity and cloud storage they offer ever-increasing capacity for the collection and collation of data about learning activity,

(Berson, I. R., et al 2011). The analysis and representation of this data about learning is vital to formative evaluation, assessment, self-assessment and reflection, (FrogTrade,2012). The consistency of the iPad operating system and interface and the availability of apps, as well as issues of security, backup, restore and lifecycle support was identified as an important benefit of iPads over other devices, (Chosun Ilbo, 2012). The product selection is important Phenomena which are involved many criteria as technical requirements, specifications and unit cost, etc. Hence, there is an urgent need to develop a systematic selection process for simplification, in order to identify relevant criteria, and evaluate effective method for purchasing process. The approach will reduce cost and time in selection process to form firm decision making.(A.A. Ecomomides, A. Grousopoulou, 2012) highlighted the use of the AHP approach for product selection. Moreover, the AHP model is easy to apply in purchasing problems, improve decision making process. The hierarchical structure was utilized in formulating a model to visualize the problem systematically in relevant criteria and sub-criteria.

2. LITERATURE REVIEW

The AHP is a measurement method which prioritizes the hierarchy and consistency of judgmental decision done by a group of decision makers. These AHP models highlight the results of all experts' choice into a final decision, without used their subjective criteria, which was used by pair-wise comparisons of the alternatives, (Saaty, T. L. 1980), . In a smart way, AHP approach is a scoring method which was designed to change a complex decision problem into a simple hierarchy process, and then formed a priority weight within each level of the hierarchy by carrying out simple pair-wise comparisons, the relative importance of decision criteria, attributes and alternatives, (Saaty, T. L. 1980), For a conceptual foundation, the AHP modeling process involves four phases; structuring the decision problem, measurement technique, data collection, determination of normalized weights and synthesis finding solution to the problem (Saaty, T. L. 1980), While we used this four-phase to formulate an AHP model for an assessment process that could be applied to the product selection. Thus, the AHP has been successfully applied to a various problems with the calculation procedure as follows: (Hawkins I. ET AL, 2007).

Establishment of pair-wise comparison matrix A ; Let $C_1, C_2, \dots, C_n$ denote the set of elements, while a_{ij} represents a quantified judgment on a pair of elements C_i , and C_j . The relative importance of two elements was rated using a scale with the values 1, 3, 5, 7, and 9, where 1 refers

to “equally important”, 3 denotes “slightly more important”, 5 defines “strongly more important”, 7 represents “demonstrably more important”, and 9 denotes “absolutely more important”. These scales yield a $n \times n$ matrix A as follows: (Saaty, T.L., 1977),

$C_1, C_2, \dots, C_n$ where $a_{ij} = 1$ and $a_{ij} = 1/a_{ji}, i, j = 1, 2, \dots, n$. In matrix A , the problem becomes one of assigning to the n elements $C_1, C_2, \dots, C_n$ a set of numerical weights $W_1, W_2, \dots, W_n$ that was reflected the recorded judgments.

$$A = [a_{ij}] = \begin{matrix} C_1 & \begin{bmatrix} 1 & a_{12} & \cdots & a_{1n} \\ 1/a_{12} & 1 & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ 1/a_{1n} & 1/a_{2n} & \cdots & 1 \end{bmatrix} \\ C_2 & \\ \vdots & \\ C_n & \end{matrix}$$

Saaty suggested that the largest Eigen-value $\lambda_{\max}$ would be, Saaty, T. L. (1980),

$$\lambda_{\max} = \sum_{j=1}^n a_{ij} \frac{W_j}{W_i}$$

And then Saaty proposed utilizing consistency index (CI) and consistency ratio (CR) to verify the consistency of the comparison matrix. CI and CR are defined as follow:

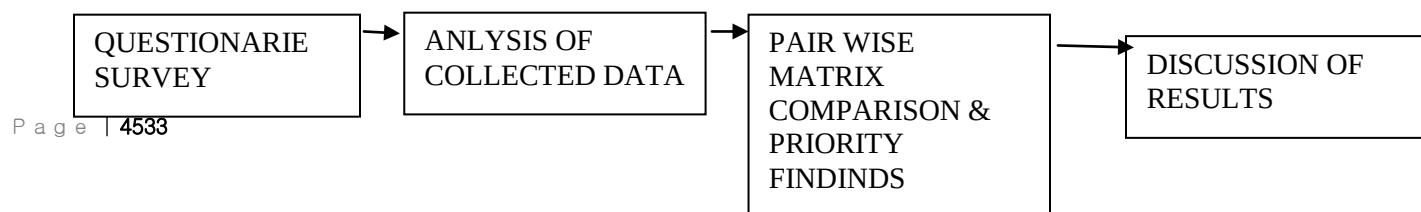
$$CI = (\lambda_{\max} - n) / (n - 1),$$

$$CR = CI / RI,$$

Here, the RI represents the average consistency index over numerous random elements of same order reciprocal matrices. If $CR \leq 0.1$ indicated that the matrix reached consistency. (Saaty, T.L., 1977),

3. METHODOLOGY

AHP is a complete mathematical and smart psychological tool for the systematic analysis of expert opinions. This research work included students from all age groups who utilize IPADS in Schools and Colleges as well as from Company experts. For the survey, Importance scale from 9 being Extremely Important to 1 being Equally Important was used to obtain the judgments. Building the matrix becomes possible to compute the priority vector. The flow chart of methodology is shown in fig 1



.Figure 1 Flow chart of Methodology**3.1 QUESTIONNAIRE DESIGN AND SURVEY**

Quantitative research method was done. It depends on measuring parameters which relates to numerical system and analyzing these collected data. (Iqbal, J. M.K., 2004). A questionnaire survey was done, Data collected by scrutinizing the questionnaire. The questionnaires were distributed among 500 Students nationwide from which 410 positive responses. The main criteria like Battery, Memory, Camera, Price are the judging parameters against branded IPADS.

3.2 ANALYSIS OF DATA COLLECTED

The data was collected on this research by a questionnaire which was distributed to respondents, individuals to provide information when interviewed, administered questionnaires, interviews, or focus groups, data collection also from online surveys and email, telephonic conversations, interview with company officials. Thus the research objective is Customer preference of buying IPADS with respect to advanced features.

3.3 PAIR WISE MATRIX COMPARISON & PRIORITY FINDINGS

The analyzed data was formulated systematically

Step 1: Goal Formulation to select best IPAD

Step 2: Use of various judgmental criteria to achieve the goal.

Step 3: Consideration of different alternatives.

Step 4: Formation of pair-wise comparison matrices.

Step 5: Calculation of Priority Vectors (PV), largest Eigen values and consistency checking from the pair-wise comparison matrices formed in step 4. (Vargas, L. G., 1990),

Step 6: Calculation of composite Priority Weight (PW) and ranking of alternatives.

3.4 DISCUSSION OF RESULTS THROUGH DIFFERENT ALTERNATIVES

A Customer has to select an IPAD from many alternatives. MCDM, ranking of alternative choices generated by AHP helps user in mobile phone selection process. (Malviya, M.S. et al 2013)

AHP operates on the hierarchical mapping of Goal, Criteria and Alternatives.

- Goal of a problem forms the top level of the hierarchy is Selection of IPAD.
- Criteria are placed in the next level as Price, Battery, Camera and Memory
- Alternatives are the brands Samsung Lenovo, Huawei, Asus.

The mapping between different levels of the hierarchy is very critical. (M. Hsiao, L. Chen,2015) Proper mapping is essential for achieving the formulated goal. Fig.2 shows. Establishment of AHP structure.

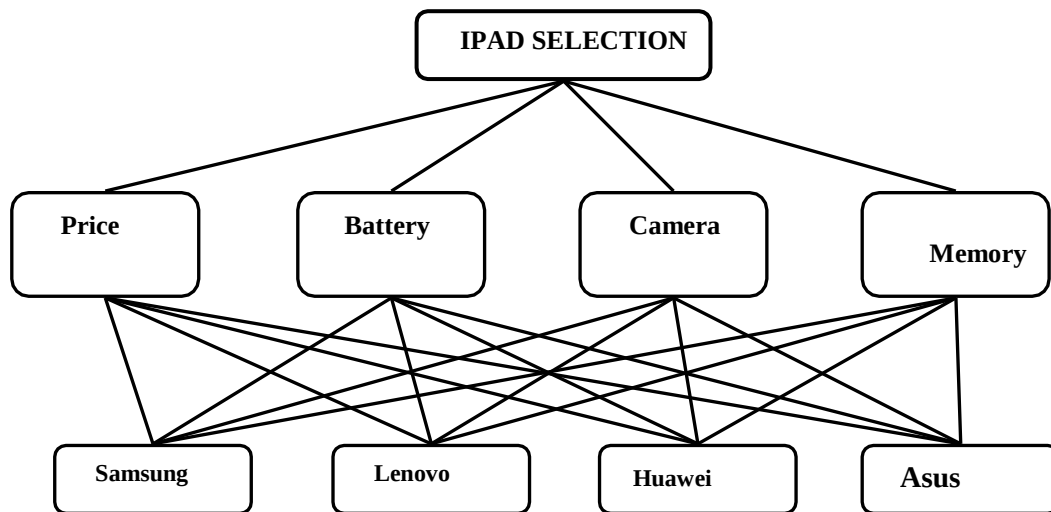


Figure 2. Establishment of AHP structure

3.5 EVALUATING BUYER DECISION PROCESS THROUGH AHP MODEL

The Analytical Hierarchy Process is a Multi Criteria Decision Making (MCDM) technique, where both quantitative and qualitative performance factors are considered to select alternatives highlighted by (Dr El syed , Dr Shaik Dawood A.K. 2017). The qualitative criteria are usually judged by expert opinions, whereas quantitative criteria are analyzed against the collected data and calculated quantitative criteria. (Dr El syed , Dr Shaik Dawood A.K. 2017).

For pair-wise comparison, i.e. relative importance of one option over other is done using a scale of relative importance. For example, if the consumer believes that memory is moderately more important than price, then this judgment is represented by a 3. Decision Judgments are required for all the criterion comparisons, and for all the alternative comparisons for each criterion. .

(Quamruzzaman, S. K., 2002), Preference weight values for different level of importance are shown in Table 3. The consumer has to develop a set of pair wise comparisons to define the relative importance of the criteria to complete the matrix shown in Table 4.

Table 3: Level of Preference Weight For AHP

Level of importance/ preference weights	Definition	Explanation
1	Equally Preferred	Two activities contribute equally to the objective
3	Moderately	Experience and judgment slightly favor one activity over another
5	Strong importance	Experience and judgment strongly or essentially favor one activity over another
7	Noticeable dominance	An activity is strongly favored over another and its dominance demonstrated in practice
9	Extreme importance	The evidence favoring one activity over another is of the highest degree possible of affirmation
2,4,6,8	Intermediate values	Used to represent compromise between the preferences listed above
Reciprocals	Reciprocals for inverse comparison	

Table 4. Pairwise comparison table of the main criteria

Attributes	Price	Battery	Camera	Memory
Memory	1	3	4	2
Battery	1/3	1	4	3
Camera	1/5	1/7	1	1/5
Price	1	1/2	3	1
Sum	2.533	4.64	12	6.2

4. RESULTS AND DISCUSSION

4.1 PAIR WISE COMPARISON FOR THE MAIN CRITERIA ANALYSIS

In Analytical Hierarchy Process (AHP), the main criteria developed as the measurement of best IPAD has been compared. AHP determines the relative importance or weight of the criteria, to rank the criteria from most important to least important. A criterion with the highest average weight indicates the priority criterion among others. Firstly, Price becomes the most important criteria when they want to choose IPAD; they choose the most affordable price. Because of mostly the customers of IPAD are students who still get money from their parents. So, they should not give the unaffordable and very costly price for the customers. Price has highest score criteria compare to the other Three criteria, being the most preferred criteria by respondents.

4.2 PAIR WISE COMPARISON CRITERIA WITHIN THREE IPAD ALTERNATIVES ANALYSIS

Almost in every criterion, Samsung not being the most preferred IPAD though it has good features in battery, memory and camera. It is because almost all the Samsung products have a higher Price compared to the other branded IPADS that have a good price with long-lasting durability and also powerful specifications.

4.3 RESULT OF ANALYTICAL HIERARCHY PROCESS OF CONSUMER PREFERRED IPAD

Based on the overall data, customer will choose Lenovo as the most preferred IPAD compared to the other alternatives. The result shows that when people want to buy IPAD they prefer to choose Lenovo as the most preferred one among the other alternatives. Lenovo has the highest score, in the second position is Huawei, and followed by Samsung in the third position and Asus in final position. The final Evaluation of AHP result are shown in Table 5

Table 5: Final Evaluation for Analytic Hierarchy Process (AHP)

Alternatives	Attributes and their Weights				Composite Weight	Over-all Ranking
	Price	Battery	Camera	Memory		
Lenovo	.19	.34	.64	.65	.33	1
Samsung	.56	.59	.18	.23	.21	3
Huawei	.21	.33	.28	.25	.28	2
Asus	.29	.17	.30	.38	.18	4
TOTAL					1	

5. CONCLUSIONS

This research paper attempted to explore the problem of selecting the best IPAD device by the ranking from the available branded models. The method was based on AHP with MCDM. The demonstration and effectiveness of the proposed method was carried out through real time study. The proposed work has successfully ranked IPADS as per judgmental priorities and thus proves to be beneficial for the buyers in terms of providing an easy and time saving selection process. According to the data comparison that developed in pair wise comparison, Price became the most preferred criteria for customer when buying an IPAD. Based on the overall result that developed using (AHP), with regard to Price, Battery, Camera it was concluded that Lenovo was the most preferred IPAD by the customers with score (0.33), in the second position is Huawei with score (0.28), Samsung in the third position with score (0.21) and finally Asus in fourth position with score(0.18).

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