ISSN 2354-0082

Implementation of Analytical Hierarchy Process On Airplane Ticket Booking Application Selection With Software Quality Requirements and Evaluation ISO/IEC 25010:2011

Fanny Andalia
Program Pascasarjana Magister Ilmu Komputer, Universitas Putra Indonesia "YPTK" Padang. Jalan Raya Lubuk Begalung, Padang, Indonesia
fanny.andalia@gmail.com

Received on October 27th, 2017
Accepted on December 20th, 2017

***Abstract*—Decision-making is the process of selecting alternative actions to achieve a particular goal. Increased movement of the number of passengers using air transportation mode, making the growth of ticket booking application also increase. A system judgment is required to determine which airplane ticket booking application to use. This research discusses the process of choosing an airplane ticket booking application using Analytical Hierarchy Process (AHP) method by using Systems and Software Quality Requirements and Evaluation ISO / IEC 25010:2011 criteria measurement of quality in use. The processed data is obtained from the geometric average of three respondents ie representatives from information technology experts, the public and travel agent. Analysis and data processing using expert choice tools. This research assesses the software quality of the three airplane ticket booking applications. All application names are not displayed. This is because it is feared to have a negative effect on the existing business competition. This research has generated the sequence of applications that have the highest value so it is recommended to use.**

***Index Terms*— AHP, E-Ticket, Expert Choice, ISO/IEC 25010:2011, Software Quality.**

I. INTRODUCTION

Decision-making is the process of selecting alternative actions to achieve a particular goal or goal. Many approach methods can be used in Decision Support Systems. One method that can be used is by using Analytical Hierarchy Process (AHP) method. AHP is an excellent and accurate tool in making decisions [1].

Several other studies have also implemented the AHP method. Koç and Burhan's research, [2] uses AHP to help locate stores, whereas Magdalena [3] has selected digital library applications for college environments using AHP methods. In the field of management, AHP can help determine the residual results of operations in one of the civil service cooperatives [4], assisting the Culture and Tourism Office in revitalizing the cultural heritage [5], strengthening the performance of red pepper agribusiness [6] and lecturer performance assessment [7]. In addition, AHP is also implemented in human resource fields that can be used in the selection of employee recruitment [8], determination of promotion [9], and according to Tanti [10] AHP can also be used in the selection of outstanding employees.

This research needs to be done because the people in Indonesia who use airplane transportation has increased. The high number of people who use air transportation also has an impact on the use of air ticket service providers, either through travel agents or airline ticket online. Currently a lot of application service provider website to make airplane reservations. Based on information from Alexa Internet, the most frequent order from airplane ticket booking service website in April 2017 in Indonesia is Application A with sequence 91, Application B sequence 197 and Application C order to 288.

Providers of online airplane ticket booking in Indonesia are quite a lot and will increase in the future. It will also confuse the people to choose which applications are recommended to use. A system assessment is required to determine which ticket booking application to use. To make the selection of air ticket booking application that best suits the needs, certainly not necessarily can be easily determined.

The quality measure in the use of a system or application in Systems and software Quality Requirements and Evaluation (SQuaRE) can use standardization of ISO / IEC 25010: 2011 metrics measurement of quality in use. ISO / IEC 25010: 2011

can be used to determine the quality of ERP systems to be selected [11], while Rafique [12], describes the data quality framework in ISO.

II. LITERATURE REVIEW

According to Saragih [13], Decision Support System (DSS) is an interactive information system that provides information, modeling, and manipulating data. Turban decision support system in Arbelia research [9] is a computer-based information system that combines models and data to provide support to decision makers in solving semi-structured problems or dependency issues involving the user in depth.

According to Saaty in his research Rochmasari et al. [13] Analitycal Hierarchy Process (AHP) is a comprehensive decision-making model taking into account the qualitative and quantitative aspects.

In solving the problem with AHP there are several principles that must be understood, here are the basic principles of the AHP method based on some research conducted by Andri [14] as well as Sestri's research [7] of which are creating hierarchies, criteria and alternatives assessment, determining logical priorities and consistency.

The steps of the AHP method according to Ebedia [15], Dimas [5], Rosmawanti [16] are:

1. Define the problem and determine the desired solution
2. Create a hierarchical structure
3. Determining the priority of the elements
4. Calculate the consistency ratio test

AHP can also be used in a group so it is not required that the source of its input value be from one person only. For more than one respondent, the calculation results should be combined using geometric or geometric mean [17]. Riyanto [18] explained that brainstorming and sharing ideas and insights often resulted in better understanding and understanding of the problem, rather than on a single decision maker.

The final value obtained is then performed the average geometric assessment (geometric mean). To calculate the average value of the geometry, the value must be multiplied, and from this result is then drawn the same rank root as the number of the person who gave the judgment. Here is the equation of the geometric mean.

$$G = \sqrt[n]{X1.X2.X3 \dots Xn} \quad (1)$$

Where :
G = Geometric average searched
X1, X2, Xn = Assessment of respondents to 1, 2 to N
n = Number of a respondent component of the assessment.

The model used to assess software quality is the ISO / IEC 25010: 2011 model. ISO / IEC 25010: 2011 is one of the international standard methods used to assess the quality model of a software released by ISO / IEC. ISO / IEC 25010: 2011 is actually a revised document of ISO 9126-1: 2001. The ISO / IEC 25010: 2011 model can be used to evaluate software quality based on two common dimensions: quality in use and product quality.

To assess an application based on metrics quality in use, there are several characteristics that are viewed from the perspective of a user, among others effectiveness, efficiency, satisfaction, freedom for risk and context coverage. While in the product quality dimension, where the process refers to the characteristics of a software product, it has several elements that include functional suitability, reliability, operability, performance efficiency, security, compatibility, maintainability, and portability.

Quality in use or quality of use is the level at which a product or system can be used by a particular user to meet their needs in achieving a particular goal with effectiveness, efficiency, freedom from risk, and satisfaction in the context of the intended use. A quality model of system usage composed of five characteristics, where further subdivided into sub-characteristics that can be measured/tested when a product is used/implemented in real terms.

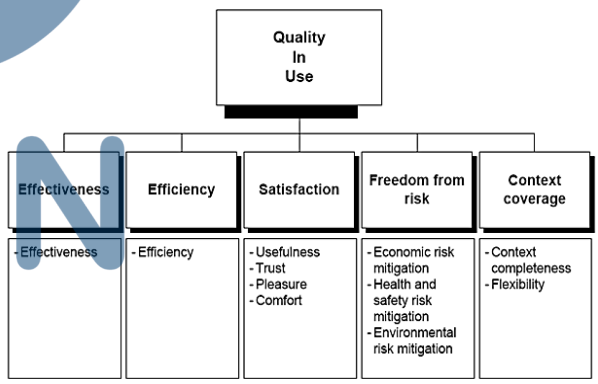

Fig 1. Quality Model of System Usage

Currently a lot of application service provider website that has been working with airlines to make airplane reservations. Based on information from Alexa Internet that is a provider of website traffic information, obtained the order of the top of the ticket booking service website in Indonesia for the period of April 2017 frequented by Internet visitors, namely Application A with sequence 91, Application B sequence 197 and Application C sequence 288. In addition to these three websites, of course, there are many other website providers, but the website is still in position on the order of the number thousand.

The ticket is a valid proof for passengers to be able to use the mode of transportation in accordance with

the mode of transportation and travel time. Electronic ticketing (electronic ticketing) or commonly also e-mailed into E-Ticket is an online ticketing system. Figure 2 is an example of an electronic ticket obtained from one of the ticket booking apps.

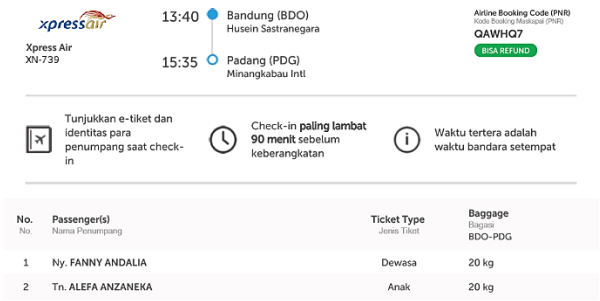

Fig 2. Example of E-Ticket

III. RESEARCH METHODS

This research uses Analytical Hierarchy Process to make decisions in the selection of airplane ticket booking applications based on several criteria of assessment. The research framework used in this research can be seen in Figure 3 below.

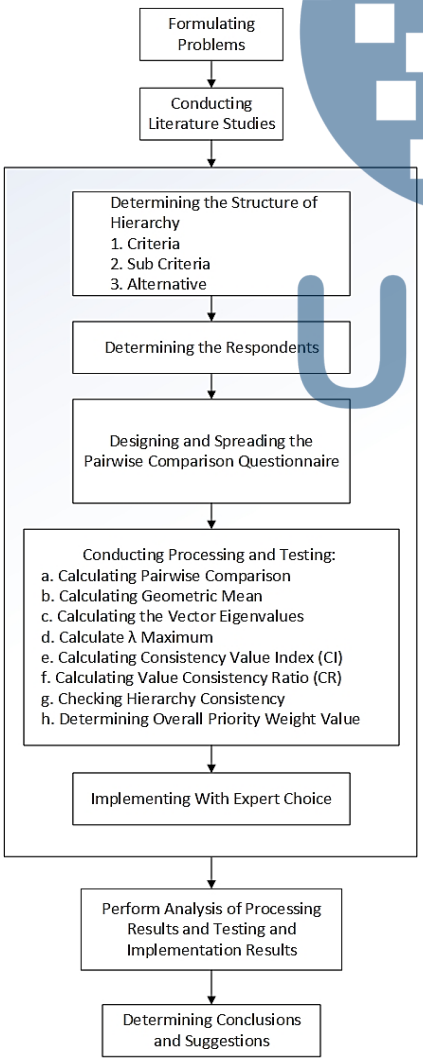

Fig 3. Research Framework

The hierarchical structure used in this research can be seen in Figure 4.

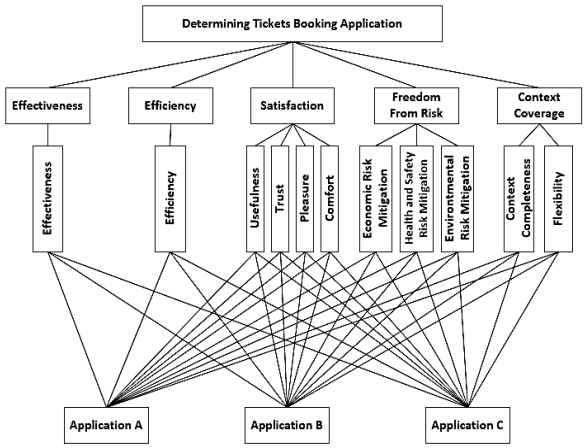

Fig 4. Structure of Research Hierarchy

IV. RESULT AND DISCUSSION

Sources of data obtained in this research came from three respondents who can represent several contexts and understandings. To be specific from the three respondents can be seen in table 1 below :

Table 1. Research Respondents

No. Respondents	Skills / Capacity
1st respondent	Representatives of information technology experts
2nd respondent	Representatives from the community of user representatives of airplane ticket booking applications online
3rd respondent	Representative of travel agent

The results of the assessment of the three respondents then processed and analyzed by using Expert Choice tools. The result of computation with a geometric mean of the three respondents, the merger value is then calculated eigenvalues for each criterion.

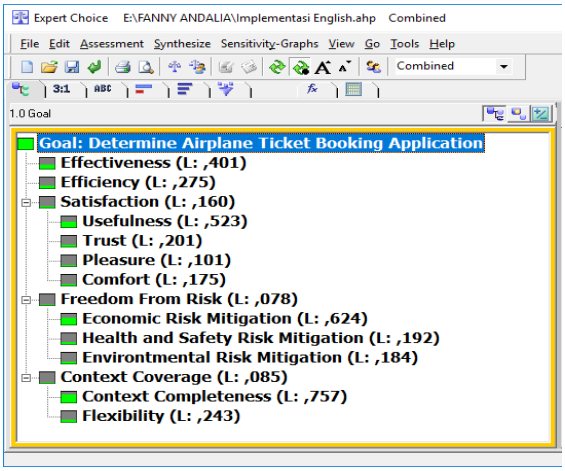

Fig 5. Eigen Value Calculation Result

The weight of each alternative based on the criteria and subcriteria of the geometric mean using Expert Choice can be seen in figure 6 to figure 10.

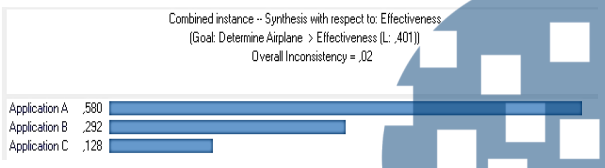

Fig 6. Weight Value of Any Alternative Based on Effectiveness Criteria

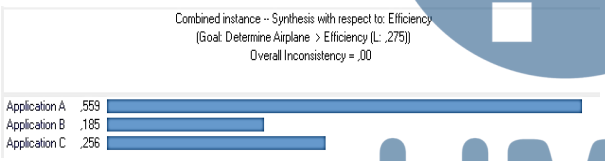

Fig 7. The Value of Each Alternative Weight Based on Efficiency Criteria

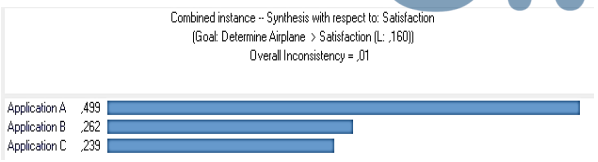

Fig 8. The Value of Each Alternative Weight Based on Satisfaction Criteria

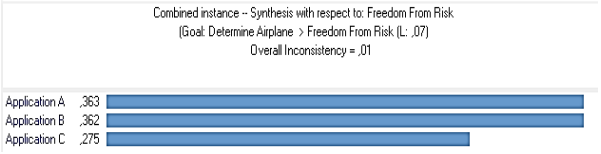

Fig 9. The Value of Any Alternative Weight Based on Freedom From Risk Criteria

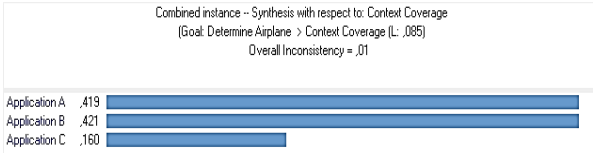

Fig 10. The Value of Each Alternative Weight Based on Context Coverage Criteria

The final assessment of the value of each alternative based on the weight of each criterion and subcriteria can be seen in Figure 11.

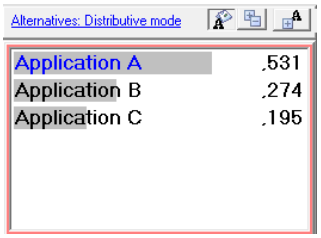

Fig 11. Final Evaluation Results of Each Alternative

Based on figure 11, the results obtained from Expert Choice analysis process that Application A has the highest position with a value of 0.531. The second alternative sequence is Application B with the value of 0.274 and the third alternative order is Application C with value 0,195.

The data source on the AHP method should have a Consistency Ratio (CR) value below 0,1 so that the hierarchy assessment results are performed consistently. Based on the results of the calculation using Expert Choice found that the value of the three respondents, as well as the results of the combined assessment using geometric mean, all have values below 0,1 so that the results considered consistent. The value of the Consistency Ratio (CR) can be seen in Figure 12 below.

PID	Name	Overall	Goal: Determine Airplane Ticket Booking Application
		=Factors	5
0	Facilitator	,0000	
1	Combined	,0087	,0080
2	Responden 1	,0219	,0214
3	Responden 2	,0173	,0138
4	Responden 3	,0187	,0153

Fig 12. Consistency Ratio Value

Based on Figure 13 it is known that all the criteria, sub-criteria and alternatives obtained have consistent Consistency Ratio (CR) value because the value of the item overall inconsistency = 0.01.

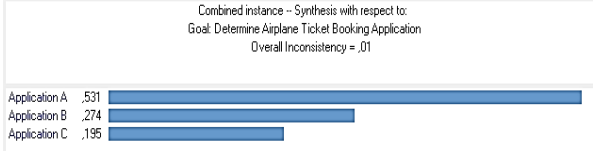

Fig 13. Final Values and Overall Consistency Ratio

V. CONCLUSION

Based on the results of research conducted, can be taken some conclusions :

1. Analytical Hierarchy Process (AHP) method in this research can provide a recommendation for us in making the decision to determine the application of airplane ticket booking.
2. Based on the software quality assessment using AHP and ISO / IEC 25010: 2011 metrics quality criteria used, it has generated the sequence of applications that have the highest value so it is recommended to use.
3. ISO / IEC 25010:2011 may be used to assess software quality in terms of quality in use rating criteria.

REFERENCES

[1] Tamrakar, S., Tiwari, A. and Tandon, P. (2014) 'Application of Analytical Hierarchy Process in Industries', *International Journal of Modern Engineering Research (IJMER)*, 4, pp. 28–32.

[2] Koç, E. and Burhan, H. A. (2015) 'An Application of Analytic Hierarchy Process (AHP) in a Real World Problem of Store Location Selection', *Advances in Management & Applied Economics*, 5(1), pp. 41–50.

[3] Magdalena, H. (2012) 'Model Pengambilan Keputusan Untuk Memilih Software Berbasis Open Source Untuk Aplikasi Digital Library Berbasis Web', in *Seminar Nasional Teknologi Informasi dan Komunikasi (SENTIKA)*, pp. 41–48.

[4] Arifin, Z. (2010) 'Penerapan Metode Analytical Hierarchy Process (AHP) Untuk Menentukan Sisa Hasil Usaha Pada Koperasi Pegawai Negeri', *Jurnal Informatika Mulawarman*, 5, pp. 1–12.

[5] Prabowo, S. D. and Setiawan, E. B. (2013) 'Jurnal Ilmiah Komputer dan Informatika (KOMPUTA)', *Jurnal Ilmiah Komputer dan Informatika (KOMPUTA)*, 2(2), pp. 27–33.

[6] Oelviani, R. (2013) 'Penerapan Metode Analytic Hierarchy Process Untuk Merumuskan Strategi Penguatan Kinerja Sistem Aribisnis Cabai Merah di Kabupaten Temanggung', *Informatika Pertanian*, 22(1), pp. 11–19.

[7] Sestri, E. (2013) 'Penilaian Kinerja Dosen Dengan Menggunakan Metode AHP Studi Kasus di STIE Ahmad Dahlan Jakarta', *Jurnal Liquidity*, 2(1), pp. 100–109.

[8] Kosasi, S. and Syarifudin, G. (2015) 'Sistem Penunjang Keputusan Seleksi Penerimaan Account Officer', CSRID Journal, 7(3), pp. 113–123.

[9] Arbelia, P. (2014) 'Penerapan Metode Ahp dan Topsis Sebagai Sistem Pendukung Keputusan Dalam Menentukan Kenaikan Jabatan Bagi Karyawan', Jurnal Ilmiah Go Infotech, 20(1), pp. 9–17.

[10] Tanti, L. (2015) 'Monitoring dan Evaluasi Kinerja Pegawai Dalam Pengambilan Keputusan Pemilihan Pegawai Berprestasi', *Citec Journal*, 2(3), pp. 244–255.

[11] Ratono, J., Seminar, K. B., Arkeman, Y. and Suroso, A. I. (2015) 'Analisis Kriteria Penting Berjenjang untuk Seleksi Enterprise Resource Planning (ERP) Pada Industri', Jurnal Aplikasi Manajemen (JAM), 13(2), pp. 207–219.

[12] Rafique, I., Lew, P., Abbasi, M. Q. and Li, Z. (2012) 'Information Quality Evaluation Framework : Extending ISO 25012 Data Quality Model', International Journal of Computer and Information Sciences, pp. 1–6.

[13] Rochmasari, L., Suprapedi and Subagyo, H. (2010) 'Penentuan Prioritas Usulan Sertifikasi Guru Dengan Metode AHP (Analitic Hirarky Process)', Jurnal Teknologi Informasi, 6(April), pp. 115–121.

[14] Suryadi, A. and Nurdiana, D. (2015) 'Sistem Pengambilan Keputusan Untuk Pemilihan Teknisi Lab Dengan Multi Kriteria Menggunakan Metode AHP (Anaylitic Hierarchy Process)', Jurnal Pendidikan Matematika, 5(April), pp. 11–21.

[15] Hilda, E., Kumalasari, E. and Rachmawati, Y. (2015) 'Penerapan Metode Analytical Hierarchy Process (AHP) Pada Sistem Pendukung Keputusan Pemilihan Mahasiswa Berprestasi Menggunakan Framework Laravel', Jurnal Script, 1(1), pp. 49–57.

[16] Rosmawanti, N. and Prastyo, D. E. (2013) 'Implementasi Metode AHP dalam Pemilihan Karyawan Obonk Steak n ' Rib ' s Berprestasi', Jurnal JUTISI, 2(1), pp. 297–334.

[17] Mustari, D. (2015) 'Model Pemilihan Server Side Scripting Untuk Sistem Informasi Sekolah : Studi Komparasi ASP, JSP, PHP, Phyton dan Ruby', Journal of Information Systems, 11(1), pp. 13–20. doi: 10.1017/CBO9781107415324.004.

[18] Riyanto, A. (2012) 'Prioritas Pemilihan Surat Kabar Menggunakan Analytic Hierarchy Process', Journal of Industrial & Quality Engineering, 1(1), pp. 47–53.