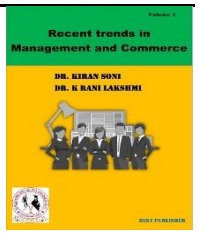
Recent trends in Management and Commerce
Vol: 1(2), 2020
REST Publisher
ISBN: 978-81-936097-6-7
Website: http://restpublisher.com/book-series/rmc/



Home Based e-health Electronic Medical Record Systems a Decision Support Selection Framework for Individual, Security and Privacy Concerns Using MCDM Analysis

Nikam Suvarna Prashant
SSt College of Arts and Commerce, Maharashtra, India.
Email: suvarnanikam@sstcollege.edu.in

Abstract

Home based e-health Electronic medical record**.** E-health is currently buzzing with discussion of the Electronic Medical Record (EMR). EMRs are essential to e-health applications because they store patient health data. Additionally, the EMR includes court documents produced in ambulatory and medical facility settings. These files provide as a source of data for electronic health records. Healthcare personnel have trouble trusting EMR systems, despite their use in hospitals. There aren't many research on EMR adoption in hospitals, especially given the privacy and security issues with EMR systems from a variety of fundamental angles. In order to better understand how individual, security, and privacy variables affect EMR uptake and use, the current study provides a decision-support choice framework. Early in the twenty-first century, the term "e-health" was developed to describe the application of contemporary information and communication technologies to the delivery of healthcare. E-health necessitates various developments in computer science, telecommunications, and the transfer of medical data over vast distances. E-health usage enhances global networking and thinking while also enhancing local, regional, and societal health. Numerous advantages are provided, such as improved patient care quality, functional hygiene effectiveness, and health promotion. Physicians and other healthcare professionals are regarded as the most significant influencers in e-health projects. Healthcare providers will not be able to gain from e-health if they do not adopt and use this technology. While both "Electronic Medical Records" (EMR) and "Electronic Health Records" (EHR) are essential components of e-health applications and both contain patient health-related information, they are distinct from one another and are used separately. When deciding between alternative multi-criteria decision-making (MCDM) techniques, MOORA is typically chosen for three main reasons. The first MOORA is a novel MCTM method that was developed with knowledge of the sensitivity parameters of earlier techniques. So, in our opinion, it should be completely worthwhile. The amount of processing time needed by MOORA to solve the given issue using the MCDM literature is known as the 2d internalisation. Finally, according to the MOORA literature, time is static and requires little to no structure [23]. A tool for choosing college students who will receive scholarships is called MOORA Gadget. From the result it is seen that Individual factors is showing the highest value for Privacy factors is showing the lowest value. Resulting in Individual factors ranked first, there a Privacy factor has low rank.

Keywords: EMR**,** MOORA**,** e-health.

Introduction

The Electronic Medical Record is currently a hot topic in e-health (EMR). Because they store patient health data, EMRs are crucial to e-health applications. Court records created in ambulatory and medical facility settings are also included in the EMR. These files provide as a source of data for electronic health records. Healthcare personnel have trouble trusting EMR systems, despite their use in hospitals. Given the privacy and security concerns with EMR systems from a variety of basic viewpoints, there isn't much research on EMR use in hospitals. The current study offers a decision-support choice framework to help people better understand how individual, security, and privacy aspects affect people's adoption and use of EMRs. The proposed framework is built on the different viewpoints gleaned from Malaysian health professionals. The structure is divided into four phases. In two preliminary stages, sub-factors of the individual, security, and privacy determinants were looked into. A similar multi-criteria strategy was used to identify sub-factors and produce a decision matrix. Based on specific uniforms, the resulting matrix clustered user perspectives and subfactors. Following that, a brand-new "multi-criteria decision-making (MCTM) technique" was put into practise. The MCDM approach was used using a combination strategy of similarity priority ranking (MOORA) and analytic hierarchy process (MOORA). Significant factors within each category were found using K-means clustering. 100 questionnaires were provided to the workers of five public hospitals in Malaysia, and responders were chosen from among Malaysian health professionals. The relationship between personal, privacy, and security determinants and EMR system adoption and use was clarified using a conceptual model that was taken from the integrated theory of technology acceptance and application decision context. Data relating to the adoption and use of EMR were analysed using structural equation modelling once the data sets had been gathered.

Healthcare will be greatly improved by the development and acceptance of computer-based medical record systems. However, after years of research, paper-based medical records continue to rule. came to the conclusion that there are now inadequate resources to enable a full computer-based patient record and issued several recommendations to stop the growth and use of such records. Both technological and non-technical obstacles exist. The lack of development in voice recognition technology, handheld terminals, and user-friendly human-computer interfaces are among the technical obstacles mentioned. Among the non-technical barriers highlighted include a lack of technology infrastructure, unresolved privacy protection issues, and a lack

of understanding of the potential and benefits of electronic medical records among prospective users and vendors. All of these constraints are important when considering the narrative parts of the medical record. It should come as no surprise that developers have had difficulty with clinical narratives ever since the advent of computer-based medical records [2]. In this review of the literature, we make an effort to outline the present state of the art for computerising clinical narratives and to explain the course of recent developments. We separate three parts for this purpose: data input, data storage, and data presentation. The literature on approaches to medical storytelling is something we are particularly interested in reading. We are aware that a significant number of recent advancements in electronic medical record systems, particularly those produced by for-profit vendors, have not (yet) resulted in papers in the scientific community. We restricted the papers and books reviewed in this study since it is challenging to find trustworthy information on unpublished breakthroughs. We use the terms "computer-based" or "electronic medical record" (EMR). Repository of patient data combined with direct computer input and other information sources in the healthcare system is Medical Records, Patient Records Agency (US).

The easiest way to convey the goal of present systems is with this phrase. We shall refer to all of the systems examined in this survey using this word for convenience's sake. All qualitative (and semi-quantitative) information gathered by the doctor is regarded as having a "clinical interpretation" by us. The phrase refers to the "essential components" of the patient's medical file that the doctor has gathered (medical history, physical examination, progress notes, and reports of extremely specialised operations). We pay particular attention to these "key areas." We discuss two first-generation electronic medical record (EMR) systems that were specifically created around a medical record architecture concept that served as a template for later systems. We talk about the first wave of practical, so-called "classical" EMR systems, which reached maturity before 1990 and are today employed in a variety of clinical settings alongside new projects, the majority of which are still in the experimental stage. Each of these initiatives is listed in roughly the same order as the number of articles the research team has published on the subject. We will review the current state of the art for three issues relating to the use of clinical narratives in the discussion, including making data entry simpler, comprehending data, and enhancing the provision of direct patient care.

Materials & Methods

E-health is a word coined at the beginning of the twenty-first century to refer to the use of modern information and communication technology to deliver healthcare services [2]. To transmit clinical data across vast geographic distances, e-health necessitates numerous developments in telecommunications, computer science, and technologies [4]. E-health usage enhances worldwide networking and thinking, as well as local, regional, and societal health [5]. Numerous advantages are provided, such as improved patient care quality, functional hygiene effectiveness, and health promotion. Physicians and other healthcare professionals are regarded as the most significant influencers in e-health projects. If healthcare providers don't adapt and use e-health, they won't benefit from it [7]. Electronic medical records (EMR) and electronic health records (EHR) are both necessary, but components of e-health applications and both contain patient health-related information, they are distinct from one another and are used separately. EMR can be used by all healthcare professionals, including doctors, nurses, and pharmacists [14]. The EMR legal record established in clinical settings and ambulatory settings is the study's primary data source. Patients' information can be viewed and updated as they get various treatments, and medical information can be conveniently shared across stakeholders. Partners of the government include healthcare providers, patients, employers, and insurers/payers [16]. Health information technology can lower costs and increase patient safety while enhancing the quality, effectiveness, and results of healthcare [25]. Despite the seeming advantages, there are few HIT systems available, and those that are are implemented incorrectly [27]. HIT adoption is very low, particularly in poor nations. User perception has a beneficial impact on how any system is perceived, hence it is important to look into it before building or implementing a system [33]. Security, privacy, and confidentiality are frequent problems with EMR systems [34]. To give an example, doctors worry that unauthorised users could access patient information repositories and exploit data in the EMR system. The confidentiality of patient records is affected legally as a result [3]. [4] Because paper records are more secure and confidential than electronic medical records (EMR) systems, doctors are more worried about security and confidentiality issues pertaining to actual patients. Such a preference demonstrates how privacy and security issues affect the use of EMR. Patients may be reluctant to share information with a healthcare professional for better health or to avoid inappropriateness if there are no privacy safeguards. The variables are divided into three categories: security, privacy, and personal variables. The sub-factors in the security group are AUT, NON, CON, DATA, and AVAIL; in the privacy group, COL, SCU, UNAU, and ERR; and in the private group, EFF, PRE, SOCI, FCC, HEDO, and HBT. An integrated assessment scale serves as the test's foundation. Different Developer Weighted Scores is a category for the scores used to weight the perspectives of the three developers (the head of the IT department).

MOORA Method

Concurrent improvement of many objectives within restrictions or more competing qualities (notes) in the system. Many areas of product and process design involve multi-objective optimization problems, which in the context of trade-offs must either involve the best options or necessitate choosing between opposing objectives. Increasing sales and lowering product costs will boost productivity and cut down on the amount of gasoline used in vehicles; at the same time weight loss increases complications [22]. When deciding between alternative multi-criteria decision-making (MCDM) techniques, MOORA is

typically chosen for three main reasons. The first MOORA is a novel MCTM method that was developed with knowledge of the sensitivity parameters of earlier techniques. So, in our opinion, it should be completely worthwhile. The amount of processing time needed by MOORA to solve the given issue using the MCDM literature is known as the 2d internalisation. Finally, according to the MOORA literature, time is static and requires little to no structure [23]. A tool for choosing college students who will receive scholarships is called MOORA Gadget. Machine test makers can utilise MOORA as a decision maker to quickly identify scholarship winners using a selection aid tool created by a university. The reference MOORA technique and the ratio gadget are both factorial components. We carefully selected the kind and significance of objectives and alternatives when simulating port construction projects. National, regional, and cooperating institutions are relevant stakeholders. The product's implied concern is consumer sovereignty. [1] In the production of designed components and equipment, grinding wheel wear is a crucial quantifiable aspect of grinding. Grinding is a procedure that includes removing material from a work piece's surface and changing it to a desired finish that might otherwise be impossible to achieve with standard machining techniques.[2] referred to as a "tactile bump" occasionally. Before bottoming out, tactile switches feature a (sometimes slight) bump that can be felt during key presses. The actuation point is often represented by this hump Point of contact / Force of contact atop the tactile "bump," similar to the Activation point/Activation force point. [3] Approximately 150 °C is the temperature at which burnout occurs, after which it abruptly rises to 400 °C or higher. [4] Surface finish, also referred to as roughness, encompasses surface roughness (surface texture). It is determined by how far a real surface departs from its ideal shape in the normal vector's direction. If these changes are significant, the surface is considered rough; if they are slight, the surface is considered smooth. [5] The term "environmental pollution" refers to the act of contaminating the physical and biological elements of the earth's and atmosphere's systems to the extent that it seriously impairs the functioning of regular environmental processes [6].

Result and discussions

TABLE 1. Electronic medical record system

DATA SET				
	Physician perspectives	**Nurse perspectives**	**Pharmacist perspectives**	**Laboratory staff perspectives**
Security factors	0.0142	0.0135	0.5126	0.5142
Privacy factors	0.0270	0.0291	0.1261	0.1053
Individual factors	0.0370	0.0357	0.7333	0.7024

Table 1 shows the Multi-Objective Optimization based on ratio Analysis and Electronic medical record systems Alternative: Security factors, Privacy factors, Individual factors. Evaluation preference: Physician perspectives, Nurse Perspectives, Pharmacist perspectives, Laboratory staff perspectives, use this table.

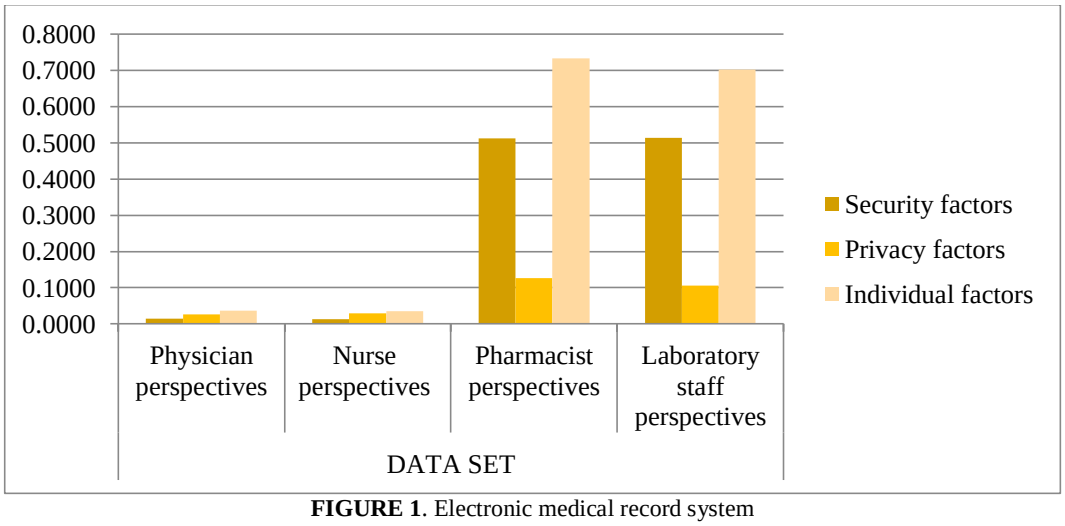


FIGURE 1. Electronic medical record system

Figure 1 Shows the Electronic medical record systems is the Physician perspectives it is seen that Security factors is showing the highest value for Individual factors is showing the lowest value. Nurse Perspectives it is seen that Individual factors is showing the highest value for Security factors is showing the lowest value. Pharmacist perspectives it is seen that Individual factors is showing the highest value for Privacy factors is showing the lowest value. Laboratory staff perspectives it is seen that Individual factors is showing the highest value for Privacy factors is showing the lowest value.

TABLE 2. Divide & Sum

0.0002	0.0002	0.2628	0.2644

0.0007	0.0008	0.0159	0.0111
0.0014	0.0013	0.5377	0.4934
0.0023	**0.0023**	**0.8164**	**0.7689**

Table 2 shows the Divide & Sum matrix formula used this table.

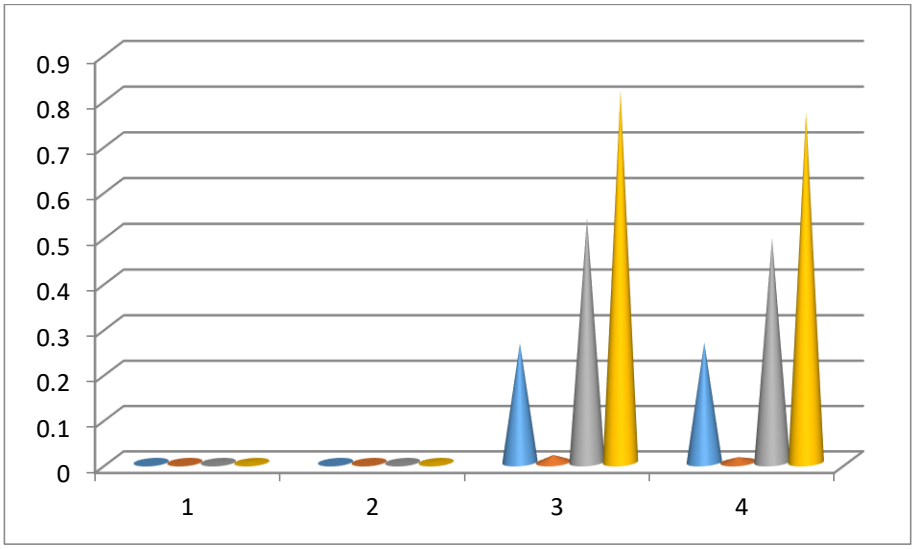


FIGURE 2. Divide & Sum

Figure 2 shows the Divide & Sum matrix formula used this table.

TABLE 3. Normalized Data

Normalized Data			
Physician perspectives	**Nurse perspectives**	**Pharmacist perspectives**	**Laboratory staff perspectives**
0.2961	0.2813	0.5673	0.5864
0.5630	0.6063	0.1396	0.1201
0.7716	0.7438	0.8116	0.8011

Table 3 shows the Multi-Objective Optimization based on ratio Analysis and Electronic medical record systems Normalized Data Alternative: Security factors, Privacy factors, Individual factors. Evaluation preference: Physician perspectives, Nurse Perspectives, Pharmacist perspectives, Laboratory staff perspectives, use this formula.

TABLE 4. 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

Table 4 shows the Weight all same value.

TABLE 5. Weighted normalized decision matrix

Weighted normalized decision matrix			
0.0740	0.0703	0.1418	0.1466
0.1408	0.1516	0.0349	0.0300
0.1929	0.1860	0.2029	0.2003

Table 3 shows the Multi-Objective Optimization based on ratio Analysis and Electronic medical record systems Weighted normalized decision matrix Alternative: Security factors, Privacy factors, Individual factors. Evaluation preference: Physician perspectives, Nurse Perspectives, Pharmacist perspectives, Laboratory staff perspectives, use this formula.

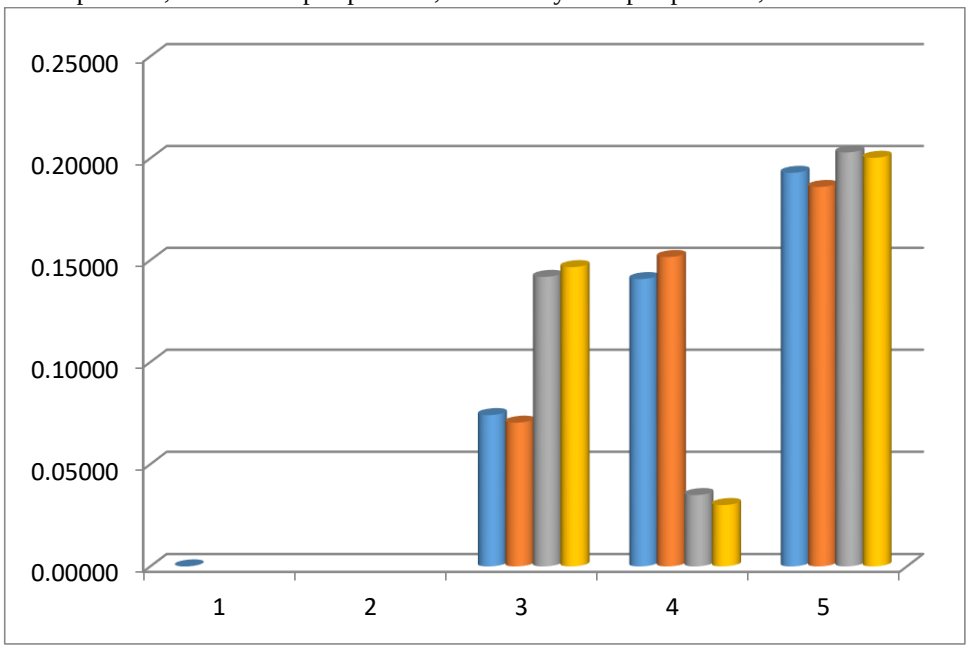


FIGURE 3. Weighted normalized decision matrix

Figure 3 shows the Multi-Objective Optimization based on ratio Analysis and Electronic medical record systems Weighted normalized decision matrix Alternative: Security factors, Privacy factors, Individual factors. Evaluation preference: Physician perspectives, Nurse Perspectives, Pharmacist perspectives, Laboratory staff perspectives, use this formula.

TABLE 6. Assessment value

Assessment value	
Security factors	0.4328
Privacy factors	0.3572
Individual factors	0.7820

Table 6 shows the Assessment value used Assessment value for Security factors = 0.4328, Privacy factors = 0.3572, Individual factors = 0.7820.

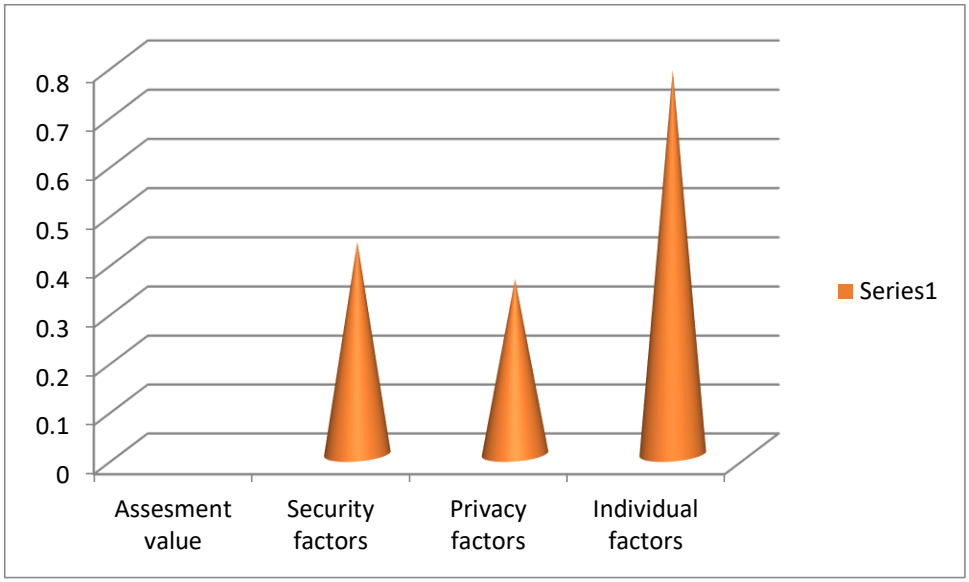


FIGURE 4. Assessment value

Figure 4 shows the Assessment value used Assessment value for Security factors = 0.4328, Privacy factors = 0.3572, Individual factors = 0.7820.

TABLE 7. Rank

	Rank
Security factors	**2**
Privacy factors	**3**
Individual factors	**1**

Table 8 shows the final rank of this paper the Security factors is in 2 nd rank, Privacy factors is in 3 rd rank, Individual factors is in 1 st rank. The final result is done by using the MOORA method.

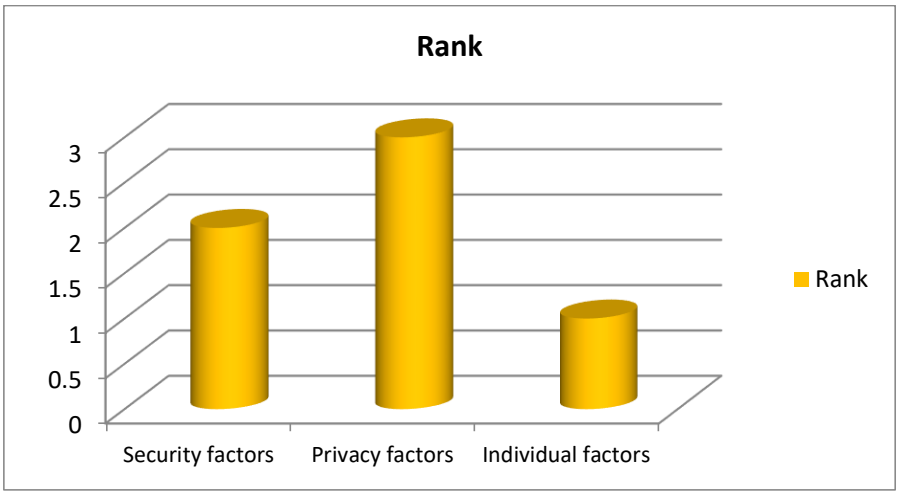


Figure 5 Rank

Figure 5 shows the final rank of this paper the Security factors is in 2 nd rank, Privacy factors is in 3 rd rank, Individual factors is in 1 st rank. The final result is done by using the MOORA method.

Conclusion

The Electronic Medical Record is currently a hot topic in e-health (EMR). Because they store patient health data, EMRs are crucial to e-health applications. Court records created in ambulatory and medical facility settings are also included in the EMR. These files provide as a source of data for electronic health records. Healthcare personnel have trouble trusting EMR systems, despite their use in hospitals. Given the privacy and security concerns with EMR systems from a variety of basic viewpoints, there isn't much research on EMR use in hospitals. The current study offers a decision-support choice framework to help people better understand how individual, security, and privacy aspects affect people's adoption and use of EMRs. The proposed framework is based on the numerous viewpoints gathered from Malaysian health professionals. The structure is divided into four phases. In two preliminary stages, sub-factors of the individual, security, and privacy determinants were looked into. A similar multi-criteria strategy was used to identify sub-factors and produce a decision matrix. Based on specific uniforms, the resulting matrix clustered user perspectives and subfactors. Following that, a new "multi-criteria decision-making (MCTM) technique" was put into practise. The MCDM approach was used using a combination strategy of similarity priority ranking (MOORA) and analytic hierarchy process (MOORA). Significant factors within each category were found using K-means clustering. 100 questionnaires were provided to the workers of five public hospitals in Malaysia, and responders were chosen from among Malaysian health professionals. The relationship between personal, adoption and use of EMR systems, as well as factors affecting privacy and security was clarified using a conceptual model that was taken from the integrated theory of technology acceptance and application decision context. Data relating to the adoption and use of EMR were analysed using structural equation modelling once the data sets had been gathered. Early in the twenty-first century, the term "e-health" was developed to describe the use of modern information and communication technology to offer healthcare services [2]. To share medical data across vast geographic distances, e-health necessitates numerous developments in telecommunications, computer science, and technologies [4].From the result it is seen that Individual factors is showing the highest value for Privacy factors is showing the lowest value.

References

1. Gund, Anna, Bengt Arne Sjöqvist, Helena Wigert, Elisabet Hentz, Kaj Lindecrantz, and Kristina Bry. "A randomized controlled study about the use of eHealth in the home health care of premature infants." BMC medical informatics and decision making 13, no. 1 (2013): 1-11.

2. Hogan, Timothy P., Bonnie Wakefield, Kim M. Nazi, Thomas K. Houston, and Frances M. Weaver. "Promoting access through complementary eHealth technologies: recommendations for VA's Home Telehealth and personal health record programs." Journal of general internal medicine 26, no. 2 (2011): 628-635.
3. Rialle, Vincent, Florence Duchene, Norbert Noury, Lionel Bajolle, and Jacques Demongeot. "Health" smart" home: information technology for patients at home." Telemedicine Journal and E-Health 8, no. 4 (2002): 395-409.
4. Wakefield, Bonnie J., Marcia M. Ward, John E. Holman, Annette Ray, Melody Scherubel, Trudy L. Burns, Michael G. Kienzle, and Gary E. Rosenthal. "Evaluation of home telehealth following hospitalization for heart failure: a randomized trial." Telemedicine and e-Health 14, no. 8 (2008): 753-761.
5. Dang, Stuti, Susan Dimmick, and Geetanjali Kelkar. "Evaluating the evidence base for the use of home telehealth remote monitoring in elderly with heart failure." Telemedicine and e-Health 15, no. 8 (2009): 783-796.
6. Wakefield, Bonnie J., Richelle J. Koopman, Lynn E. Keplinger, Marilee Bomar, Beth Bernt, Jennifer L. Johanning, Robin L. Kruse, J. Wade Davis, Douglas S. Wakefield, and David R. Mehr. "Effect of home telemonitoring on glycemic and blood pressure control in primary care clinic patients with diabetes." Telemedicine and e-Health 20, no. 3 (2014): 199-205.
7. Paganelli, Federica, and Dino Giuli. "An ontology-based system for context-aware and configurable services to support home-based continuous care." IEEE Transactions on Information Technology in Biomedicine 15, no. 2 (2010): 324-333.
8. Enaizan, Odai, Ahmad A. Zaidan, N. H. Alwi, Bulat B. Zaidan, Mohammed Assim Alsalem, O. S. Albahri, and A. S. Albahri. "Electronic medical record systems: Decision support examination framework for individual, security and privacy concerns using multi-perspective analysis." Health and Technology 10, no. 3 (2020): 795-822.
9. McDonald, Clement J. "The barriers to electronic medical record systems and how to overcome them." Journal of the American Medical Informatics Association 4, no. 3 (1997): 213-221.
10. Hillestad, Richard, James Bigelow, Anthony Bower, Federico Girosi, Robin Meili, Richard Scoville, and Roger Taylor. "Can electronic medical record systems transform health care? Potential health benefits, savings, and costs." Health affairs 24, no. 5 (2005): 1103-1117.
11. Rector, A. L., W. A. Nowlan, and Shazia Kay. "Foundations for an electronic medical record." Methods of information in medicine 30, no. 03 (1991): 179-186.
12. Tange, Huibert J., Arie Hasman, Pieter F. de Vries Robbé, and Harry C. Schouten. "Medical narratives in electronic medical records." International journal of medical informatics 46, no. 1 (1997): 7-29.
13. Wang, Samuel J., Blackford Middleton, Lisa A. Prosser, Christiana G. Bardon, Cynthia D. Spurr, Patricia J. Carchidi, Anne F. Kittler et al. "A cost-benefit analysis of electronic medical records in primary care." The American journal of medicine 114, no. 5 (2003): 397-403.
14. Klompas, Michael, Jason McVetta, Ross Lazarus, Emma Eggleston, Gillian Haney, Benjamin A. Kruskal, W. Katherine Yih et al. "Integrating clinical practice and public health surveillance using electronic medical record systems." American journal of public health 102, no. S3 (2012): S325-S332.
15. Likourezos, Antonios, Donald B. Chalfin, Daniel G. Murphy, Barbara Sommer, Kelly Darcy, and Steven J. Davidson. "Physician and nurse satisfaction with an electronic medical record system." The Journal of emergency medicine 27, no. 4 (2004): 419-424.
16. Ludwick, Dave A., and John Doucette. "Adopting electronic medical records in primary care: lessons learned from health information systems implementation experience in seven countries." International journal of medical informatics 78, no. 1 (2009): 22-31.
17. Rector, A. L., W. A. Nowlan, S. Kay, C. A. Goble, and T. J. Howkins. "A framework for modelling the electronic medical record." Methods of information in medicine 32, no. 02 (1993): 109-119.
18. Hartswood, Mark, Rob Procter, Mark Rouncefield, and Roger Slack. "Making a case in medical work: implications for the electronic medical record." Computer Supported Cooperative Work (CSCW) 12, no. 3 (2003): 241-266.
19. Davidson, Elizabeth, and Mike Chiasson. "Contextual influences on technology use mediation: a comparative analysis of electronic medical record systems." European Journal of Information Systems 14, no. 1 (2005): 6-18.
20. Barrows Jr, Randolph C., and Paul D. Clayton. "Privacy, confidentiality, and electronic medical records." Journal of the American medical informatics association 3, no. 2 (1996): 139-148.
21. Bouamrane, Matt-Mouley, and Frances S. Mair. "A study of general practitioners' perspectives on electronic medical records systems in NHSScotland." BMC Medical Informatics and decision making 13, no. 1 (2013): 1-12.
22. Øvretveit, John, Tim Scott, Thomas G. Rundall, Stephen M. Shortell, and Mats Brommels. "Implementation of electronic medical records in hospitals: two case studies." Health Policy 84, no. 2-3 (2007): 181-190.

23. Sood, Sanjay P., Stacie N. Nwabueze, Victor WA Mbarika, Nupur Prakash, Samir Chatterjee, Pradeep Ray, and Saroj Mishra. "Electronic medical records: A review comparing the challenges in developed and developing countries." In Proceedings of the 41st Annual Hawaii International Conference on System Sciences (HICSS 2008), pp. 248-248. IEEE, 2008.
24. Likourezos, Antonios, Donald B. Chalfin, Daniel G. Murphy, Barbara Sommer, Kelly Darcy, and Steven J. Davidson. "Physician and nurse satisfaction with an electronic medical record system." The Journal of emergency medicine 27, no. 4 (2004): 419-424.
25. Klompas, Michael, Jason McVetta, Ross Lazarus, Emma Eggleston, Gillian Haney, Benjamin A. Kruskal, W. Katherine Yih et al. "Integrating clinical practice and public health surveillance using electronic medical record systems." American journal of public health 102, no. S3 (2012): S325-S332.
26. Wang, Samuel J., Blackford Middleton, Lisa A. Prosser, Christiana G. Bardon, Cynthia D. Spurr, Patricia J. Carchidi, Anne F. Kittler et al. "A cost-benefit analysis of electronic medical records in primary care." The American journal of medicine 114, no. 5 (2003): 397-403.
27. Tange, Huibert J., Arie Hasman, Pieter F. de Vries Robbé, and Harry C. Schouten. "Medical narratives in electronic medical records." International journal of medical informatics 46, no. 1 (1997): 7-29.
28. Rector, A. L., W. A. Nowlan, and Shazia Kay. "Foundations for an electronic medical record." Methods of information in medicine 30, no. 03 (1991): 179-186.
29. Hillestad, Richard, James Bigelow, Anthony Bower, Federico Girosi, Robin Meili, Richard Scoville, and Roger Taylor. "Can electronic medical record systems transform health care? Potential health benefits, savings, and costs." Health affairs 24, no. 5 (2005): 1103-1117.
30. McDonald, Clement J. "The barriers to electronic medical record systems and how to overcome them." Journal of the American Medical Informatics Association 4, no. 3 (1997): 213-221.

