User Satisfaction Determinants for Digital Culture Heritage Online Collections

Zaihasriah Zahidi
Faculty of Creative Multimedia,
Multimedia University,
Cyberjaya, Selangor, Malaysia

Yan Peng Lim
Faculty of Creative Multimedia,
Multimedia University,
Cyberjaya, Selangor, Malaysia

Peter Charles Woods
Faculty of Creative Multimedia,
Multimedia University,
Cyberjaya, Selangor, Malaysia

***Abstract*—The aim of this paper is to identify the possible determinants that influence user satisfaction in the context of digital cultural heritage (DCH) online collections. The data was collected in 3 stages. For the first stage, literature studies were conducted in understanding the general overview about user satisfaction in various web-domains. Next, think-aloud protocol was conducted with a group of general user with nil background of cultural heritage. Two existing digital culture heritage online collections were used as the vehicle to get the findings. Lastly, existing studies on Herzberg Two-Factor Theory in web-environment context was adapted and adopted in identifying the possible hygiene and motivator factors which influence the user satisfaction in this context of study.**

Keywords—User experience; user satisfaction; digital culture heritage online collections

I. INTRODUCTION

User satisfaction is one of the components in human computer interaction. According to Merriam Webster [1], satisfaction is defined as "the act of providing what is needed or desired". In any interaction between a user and an interface, achieving user satisfaction is the key in determining the successful of a product or a system Alawneh, Al-Refail and Batiha [2], user satisfaction is subjective to measure. Factors that influence a user to feel satisfy is unique to one another depending on individuals' needs, expectations and existing experience when interacting with an interface [3]. Generally in web environment, satisfied user may "spend longer at a website, may revisit the website later, and may recommend the website to others [4]. Thus, investigating possible website features of a web interface contribute to the satisfaction would be useful to study.

Despite vast area of studies had been conducted about user satisfaction in web environment [5][6][7], the studies related to user satisfaction in digital cultural heritage (DCH) online collections domain are limited [8]. UNESCO defined DCH as "…made up of computer-based materials of enduring value that should be kept for future generations". DCH online collections are usually online-based repositories of digitised cultural heritage assets [9] as a means of preservation. Preservation is nothing without public access. Hence, many major museums nowadays are going digital by digitising physical exhibit items and publish them online for worldwide audience.

The lack of findings on what makes user satisfies and dissatisfies specifically in DCH online collections may result to poor user experience (UX). User satisfaction is the result of good UX. The goal of UX is to create an overall positive experience for the user through the utility, ease of use and pleasure provided when interacting with an interface [10]. Europeana in its Strategic Plan 2011 – 2015, has recognized the importance of user satisfaction in DCH. In Malaysia, one of the agendas in National Policy of Creative Industry [11] is to urge user satisfactory studies towards the digital content of cultural heritage.

The aim of this paper is to identify the possible determinants that influence user satisfaction in the context of DCH online collections. The objective of this paper is to identify possible DCH web features that could be user satisfaction determinants. The determinants are important to be identified in understanding what makes such online collections produced are meeting the users' needs, expectations and existing experience. It is to provide insights that DCH online collection is not just a means of cultural heritage preservation but also is significant to the human-computer interaction context. This study uses existing studies of Herzberg's Two-Factor findings as guidance in assisting the identification of DCH web features.

Herzberg's Two Factor Theory is a motivation theory based on two factors, which are motivator and hygiene factor. The theory derived based on studies about factors that lead to workers' satisfaction (motivator) or dissatisfaction (hygiene) in a working environment. Motivator factors are fulfilled by intrinsic feeling such as work achievement, job recognition, work itself, level of responsibility, advancement and growth. On the other hand, hygiene factors are the jobs' basic needs such as company policies, supervision, working conditions and salary [12]. If these needs are not fulfilled, workers tend to feel dissatisfied.

In referring to Herzberg's theory, Zhang, Small, von Dran and Barcellos [4] proposed that creating a motivating website is similar to create a motivating workplace. In web environment, hygiene factors consists of the functionality of the website feature. For instance, a search feature in a website is useful in assisting user to seek for information by keywords. With such feature, it complements user-searching behaviour beyond clicking on navigations links or buttons. If such feature is absent, it might cause user dissatisfaction in seeking information by searching using keywords. Motivator factors in a website can be seen as factors that enhance user satisfaction. It is beyond the hygiene factors which might be subjective to the users. For instance, the usage of multimedia elements in a

website to attract user. The usage might impress user and hence increase the overall user satisfaction. However, if such feature is absent, user might not feel dissatisfied and only will leave user a neutral feeling towards it. Both hygiene and motivator go hands in hands. The hygiene factors must be present or else users will feel dissatisfied but if motivator factors are absent, it might leave user with neutral feeling but dissatisfied as long as the hygiene factors are fulfilled.

Questions that directed this study are:

1) What are the user satisfaction determinants of DCH online collections?

2) How would Herzberg Two-Factor Theory be applied to determine the user satisfaction determinants?

II. User Satisfaction in Various Domains

General review of user satisfaction in various domains was conducted in this paper. The definitions of user satisfaction and factors to influence it according to different domains were gathered to make it more comprehensible. The five (5) different domains that are selected are end-user computing, websites, e-satisfaction, e-retailers/e-services, online digital libraries and online tourism websites. Although all domains are web-based, each has different purposes and functions. Because of the differences, it is essential to study and identify what are the common definitions and factors to influence user satisfaction. This is to get the general overview of user satisfaction for web-based environment. Table 1 provides the definitions of user satisfaction in various web domains.

With the many definitions of user satisfaction being defined differently in different contexts, it can be seen that user satisfaction is subjective to measure and unique depending on the purpose of the interface or system. It is depending on the users' type, purpose and needs in interacting or using the interface or system.

TABLE.I. User Satisfaction Definitions in Various Web Domains

Domains	Definitions
End-user computing	"…is defined as the opinion of the user about a specific computer application which they use" [13]. "the extent to which users believe the information system available to them meets their information requirements" [14]. "a perceptual or subjective measure of system success" [15].
Websites	"stickiness and the sum of all the website qualities that induce visitors to remain at the website rather than move to another site" [16]. It relates to the user's attitude about the website – how enjoyable it is to use it [17].
E-Satisfaction	Ability for a service portal to be compatible with citizens' needs, desires and expectations [2].
E-Retailers/E-Services	"Customer satisfaction means how a company provides, supplies or deliver products or services to meet customer needs and wants" [18].

III. Factors to Influence User Satisfaction

There are many factors influencing user satisfaction. Usability, learnability, functionality, accessibility and ease of use are the factors to influence overall user satisfaction [19]. Aesthetic, [20] interface design and joyful of use also could influence the factors [21]. Table II below displays the summaries of the factors to influence user satisfaction according to 6 different domains.

TABLE.II. Factors to Influence User Satisfaction According to Various Domains

Domain	Authors	Factors to Influence
1. End-user computing	[22]	"Content, accuracy, format, ease of use, timeliness, satisfaction with system's speed, system reliability in End-User Computing Satisfaction (EUCS) that influence most end-users' satisfactions"
2. Website Design	[23]	Site organization, information content and navigation and revisit the website.
	[24]	Visual design, information architecture, information design, navigation design, content and interaction design
3.E-Government Services	[2]	• Security and privacy • Trust • Accessibility • Awareness of public services • Quality of public services
4.Online Tourism Websites	[25]	• Functionality • Usability
	[26]	• Information and process • Value added • Relationships • Trust • Design and usability
	[27]	• Ease of use • Joy of use

		• Content • Interactivity • Transaction support • Added value • Appearance • Clear navigation paths
	[28]	• Information quality • Security • Website functionality • Customer relationships • Responsiveness
	[29]	• Interface • Perceived quality • Value
	[30]	• Click Stream Paradox • Security Value Information • Accuracy • Interactivity • Loading Speed • Purchase Influence Recommend-ability
5. Online Shopping Websites	[31]	• Convenience • Merchandising • Security • Serviceability
	[32]	• Navigation • Usefulness • Convenience • Ease of use • Sub-experience (substitutability) • Enjoyment (interactive elements with users)
	[33]	**Computer factors** • Neat interface • Consistent web design • Updated information • Security in payment method **Human factors** • Global search feature • Humor • Links to similar websites • Feedback features • Visitors count **Entertainment** • Enjoyable • Pleasing • Entertaining **Informativeness** • Provide resourceful and relevant information **Irritation** • The website is frustrating **Usefulness** • The website can improve shopping performance, productivity and effectiveness **Attitude** • Feel satisfy with the service provided **Flow** • Judging the website as interesting, fun, exciting and enjoyable **Purchase Intentions** • Intent to purchase soon

		Revisit Intentions • Intent to revisit soon
	[34]	• Usability • Information quality • Visual appeal
6. Digital Online Libraries	[35]	• User friendly interface • Simple interface to access rich information maintained by cataloguers for decades
	[36]	Ease of use predominantly by having: • Use clear and simple terminologies and instructions to be understood by general users • Consistent interface Replacing text buttons with graphical icons to increase user's attention • Easy navigation to reduce cognitive effort for information searching
	[37]	Users prefer: • Updated content • Structured and leveled information presentation • Easiness of user to discover information • Learnability
	[38]	Social metadata features; Information contributed by users through: • Tagging • Comments • Reviews • Ratings • Recommendations evaluate the content.

IV. METHODOLOGY

The study of this paper was conducted in 3 stages. Below are the details of each phase:

Stage 1

The objective of Stage 1 was to have a general overview about user satisfaction specifically in web-based environment domain. The definitions and factors to influence user satisfaction were reviewed based on literature and existing studies. Various domains were selected including end-user computing, website design, e-government services, online tourism websites, online shopping websites and digital online libraries. Each domain differs from one another in terms of purpose and functions. Despite the differences, it is important to discover the common factors in influencing user satisfaction for web-based platforms in general.

18 papers inclusive of different domains were chosen to study the factors. Factors of each paper were accordingly listed. Word frequency and thematic analysis were used to categorise similar categories that represent common meaning. Based on the word frequency, similar words that represent similar meanings were coded and frequencies of words were recorded. Twelve (12) themes were emerged during the analysis stage by using thematic analysis. The themes were listed from the most rated frequency to the least according to the chosen literature studies.

The themes were:

1. Content and information
2. Interface & consistency
3. Website functions and features that promote ease of use
4. Easy navigation
5. Security
6. Positive feelings towards the website
7. Value added
8. Accuracy
9. Revisit website
10. Trust to the resources
11. Relationship among users
12. Accessibility

Stage 2

Data collected in this stage was to explore whether existing DCH online collections are able to satisfy general type users. Two (2) existing DCH online collections were used as the vehicle to get the findings as shown in Figure 1 and Figure 2. Both were labeled as Website A and Website B. Website A contains Malaysian culture heritage whilst Website B is more global but mainly about the Western content.

Website A

A non-commercial and approved concept of online metadata archive platform for Malaysian culture and heritage content. Users are able to contribute content that is related in forms of photographs, videos, links and oral stories to the website upon the website admistration approval. No user account is required in order to use this website.

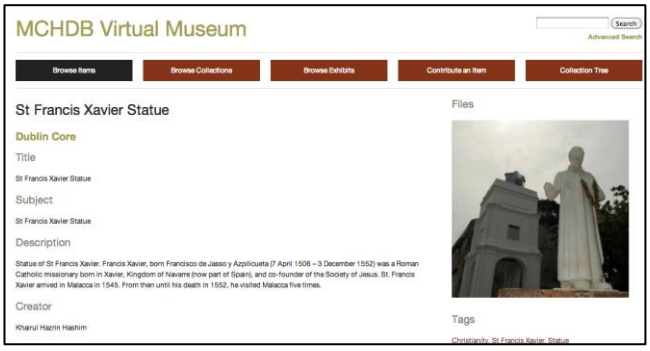

Fig.1. Malaysian Culture & Heritage Digital Bank [39]

Website B

A commercial user-generated of global content which display historical images with the concept of "pinning

photographs on the map". User needs to create an account in order to contribute photos but are free to browse through the collections as guest.

Fig.2. Historypin [40].

The criterion of the chosen websites were 1) public-accessed online platform 2) purpose of website is to archive cultural heritage content 3) interface and approach in displaying content of both website must be dissimilar between the two websites. The relevance of these would help the authors to explore more in understanding the factors that could influence user satisfaction in the context of this study.

A purposive sampling was adopted in the study. Fraenkell and Wallen [41] defined purposive sampling as "a non random sample selected because prior knowledge suggests it is representative, or because those selected have the required information". 14 participants were involved in this test, consisting of 8 undergraduate students, 3 postgraduate students and 3 academic researchers. These participants represented the general users who were not engaged with cultural heritage background.

Think-aloud protocol was applied with purposive sampling. Samples were asked to browse two (2) DCH online collections websites and were assigned to complete the tasks given. The gist of the tasks was searching for information by using the websites' user interface. Tasks created were based on the UX component suggested by Hartson and Pyla [42] which are usability, usefulness, emotional impact during interaction and savouring the memory after interaction. Oral data were then recorded and transcribed. Appropriate data and evidence recorded in Stage 2 with the identified themes in Stage 1 were taken into consideration in suggesting possible hygiene and motivator factors.

Results indicated that general users showed satisfaction when a website provides:

1) Attractive layout and visuals with dynamic interactivity that captures users attention.

2) Content are organised neatly and brief descriptions to assist users with information seeking behaviour.

3) Usability of the interface is expected to be there but it will not influence their overall user satisfaction.

Stage 3

The objective of this stage was to identify possible hygiene and motivator factors of DCH online collections. The identification were referred to the findings contributed by Zhang, Small, von Dran and Barcellos [4] as it suggested website features that could be able to provide user satisfaction based on Herzberg Two-Factor Theory. In Stage 3, the themes emerged in Stage 1 and think-aloud protocol evidences in Stage 2 were used to identify possible hygiene and motivator factors in DCH online collections setting.

The stages involved in this study are summarised as in Figure 3 below.

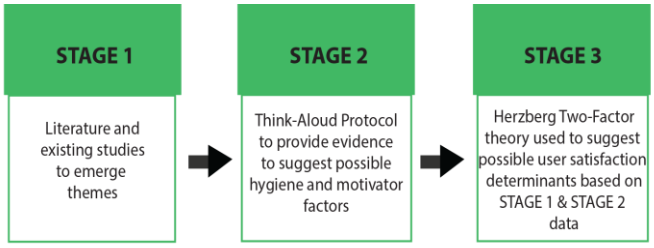

Fig.3. Stages involved in this study.

V. FINDINGS

A. Possible User Satisfaction Determinants of Digital Cultural Heritage Online Collections

The results of this study referred to Zhang, Small, von Dran and Barcellos [4] findings in determining websites features that could be able to satisfy users according to Herzberg Hygiene and Motivator Factors. The theorized examples of possible both hygiene and motivator features in DCH online collections environment were suggested based on the think-aloud-protocol findings and secondary data. Table III shows the possible hygiene and motivator features in DCH online collections:

TABLE.III. POSSIBLE HYGIENE FEATURES IN DIGITAL CULTURAL HERITAGE ONLINE COLLECTIONS

Herzberg's Hygiene Factors	Specific Example of Herzberg's Hygiene Factors	Theorized Application to the Web Environment	Theorized Examples of Possible Hygiene Features in Web Environment	Theorized Examples of Possible Hygiene features in Digital Cultural Heritage Online Collections Environment
Working Condition	Light, temperature, furniture, office size, "tools or equipment" to get tasks done, first impression or general appearance	First impression or general appearance	1. Brightness of the screens/pages 2. Utilization of the screen size (viewable size of the screen) 3. Screen background color and pattern 4. Sharpness of displays (including images) 5. Eye catching image(s) or title on the homepage that makes you want to continue exploring the site	1. Overall layout is simple & neat 2. Overall layout is consistent in every pages 3. Color & design theme is consistent 4. Color & design theme is bold and attractive 5. Interface designed creates the expectation of "fast information searching" 6. Website is responsive regardless different screen devices
		Basic functions/features that help to get tasks done	6. Live/broken links 7. Consistent use of link colors within the web site 8. Existence of unloadable items that are not central to the task (e.g. non-found images are used as bullets or decoration) 9. Need to scroll to view the homepage 10. Need to scroll to view the detailed/content pages 11. Robustness of the web interface (user mistake-tolerant, few bugs) 12. Stability of the site: should be consistently available for access 13. Support for different platforms and/or browsers 14. Search function/engine to work with large amount of info on the web site	1. Search feature 2. Tag feature 3. Comment feature 4. Geo-location feature 5. Google Street View feature 6. Account Login
Company policy and administration	Procedures or rules of doing things; pace of feedback from administration; privacy and proper use of employee's private information; in general the bureaucratic aspects of the working environment	Requirements for doing tasks	15. Length of the procedure to complete a task (e.g. steps/pages/actions to go through in order to get certain info) 16. Time on learning to use and becoming skillful at using the site	1. Fewer clicks to get information needed
		Feedback or response	17. Length of a page's loading or responding time 18. Indication of system action time expectation (e.g. long loading time warning)	1.Faster content loading 2.Notify user current status of action (e.g: loading time)
		Access restriction	19. Access restrictions (e.g. one needs to pay a fee, to sign on, to enter a password, or to provide some private info before one can access task-related info)	1. Account login is needed to secure activities performed 2. Automatic account login with social media account
		Privacy and data confidentiality	20. Collection of user's data without user's knowledge (including using cookies, write to user's local machine) 21. Informing users that their information will be collected 22. Declaration of specific use of the information that users need to provide (e.g. declare for statistics only, not to provide to the venders, not for marketing purpose, etc.)	1.Deposited data by users need to be original

Interpersonal relations	Co-workers attitudes, perceptions and trust	Credibility of owners/designers and the website: trust and trustworthy	23. Identification of site owners/designers 24. Credibility of the website owner/designer 25. Credibility of the website (e.g. the site won awards) 26. Number of times the website has been visited (e.g. shown by a counter)	1.Content is certified & verified by authority 2. Credibility of the websites (e.g: the site won awards) 3. Visitors counts 4. Familiar content will attract users to browse
Interpersonal relations	Co-workers attitudes, perceptions and trust	Web owners/designers' attitudes and perceptions	27. Information about improper or controversial materials 28. Indications of gender or racial/ethnic biases and stereotypes	1. Disclaimer about the royalty of the content provided as a user-generated content
Supervision	Authority; guidance & support; availability of the supervisor; technical support	Authority and availability of owners/designers	29. Authority of the web designer/owner 30. Indication of the purpose or objective of the web site or potential audience 31. Availability of designer/owner for further information (e.g. email)	1.Clear purpose of website is presented to the user 2. FAQ provided for users 3. Direct communication between user and website by providing email, address, person in charge 4. Expand communication by suggesting to Add in social media accounts (e.g: Facebook, Twitter, Google Plus, LinkedIn)
		Navigation	32. Working navigation aids (buttons or links) where necessary 33. Be able to know where to get started with the site's primary features 34. Be able to determine current position within the site 35. Simple and clear directions for using the website	1. Navigation is simple 2. Navigation is straightforward 3. Navigation that reduce confusion 4. Navigation with less clicks 5. Navigation that obvious 6. Navigation enhances effective information searching

TABLE.IV. POSSIBLE MOTIVATOR FEATURES IN DIGITAL CULTURAL HERITAGE ONLINE COLLECTIONS.

Herzberg's Motivation Factors	**Specific Example of Herzberg's Motivation Factors**	**Theorized Application to the Web Environment**	**Theorized Examples of Possible Motivation Features in Web Environment**	**Theorized Examples of Possible Motivation features in Digital Cultural Heritage Online Collections Environment**
Work Itself	Work-related tasks are challenging, stimulating, interesting, meaningful, useful, creative, fun	The information seeking tasks	36. Interestingness of the browsing task 37. Challenge of the browsing task 38. Usefulness of the browsing task to job/work, school, etc. 39. Meaningfulness of the browsing task 40. Fun to explore	1. Interaction is highly interactive 2. Content delivered in non-formal way 3. More visual in delivering about content 4. Use interesting, never seen shots 5. Provide updated content 6. Avoid delivering common content
	Quality of the information content: what a website covers ** (relevant, timely and current, complete and accurate, objective and novelty, understandable, consistent)		41. Task-relevant information 42. Relevant links (to the task, context, or information content) 43. Amount of irrelevant information (such as online ads, meaningless images) 44. Up-to-date information 45. Indication of addition of new information in the future 46. Complete/comprehensive/inclusive/adequate coverage of information 47. Precise/accurate and referenced information 48. Objective, unbiased information 49. Indication of limitations of information (e.g. source, coverage, date last modified) 50. Novelty and interesting information 51. Understandable information 52. Appropriate detail level 53. Coherent content that supports the web site's intended purpose/objective	1. Brief information to deliver content 2. Detailed information is presented by choice (e.g: click here to know more) 3. Extra information is presented via external links 4. Present user with the numbers of items in the collections 5. Present user with the latest addition in the collections 6. Present user with the latest contributor of the item 7. Brief description to describe an item should be standardised 8. Standard metadata is used to described items 9. Information delivered should be understandable for all range of age

		Presentation/organization on of information: how a website covers information ** (information architecture, aesthetic and affective, learning consideration)	54. Logical organization of information within the website (e.g. by topic, by date, from broad to narrow) 55. Familiar terminology 56. Consistent use of terms and graphics 57. Overview, table of contents, summaries/headings 58. Scannability of a page (incl. chunks, screen uncluttered, highlights, etc.) so that users can easily scan the page to get info without reading line by line 59. Visually pleasing screen layout 60. Visually pleasing color use 61. Multimedia that adds information value 62. Variety of media (audio, video), formats (visual oriented or analytical oriented), types (use of examples, questions, plain descriptions) for different learning or thinking styles 63. Use of humor	1. Content is presented in media-rich form of information 2. Content is presented in visually engaging way 3. Content is presented in interactive way 4. Content is presented précised & briefly 5. Detailed content is presented optionally 6. Content is presented with high quality of photographs 7. Content is presented with rare and interesting collections of photographs 8. Content is presented with additional information using external links 9. Content is presented in comprehensive manner 10. Content is presented clearly 11. Content is structured effectively based on information hierarchy 12. Content is categorised using proper taxonomy 13. Content is indexed using standard indexing system 14. Content is tagged properly
Achievement	Successful task completion.	Task completion	64. Achieved results for the task 65. Quality of the task results 66. Time spent on the task 67. Problems solved (e.g. users may encounter unexpected problems while conducting the task and eventually solve the problems)	1. Searchable is important because once a keyword is not searchable, frustration appears 2. Search suggestion to assist search activity 3. Broken links should not make exist to avoid frustration
Responsibility	Certain control or power over the environment; make job related decisions with a minimum supervision	User control	68. User control of amount of information accessed 69. User control of procedures/steps of accessing information 70. User control of difficult levels (or details/depth) of information to be accessed (e.g. headings and details in a page allows a user to decide to either read heading or go for more details) 71. User control of pacing (how fast to go through the website) 72. Opportunities for interactivity	1. User has the authority to contribute content 2. User has the authority to comment on content 3. User has the authority to remove contributed content
Advancement & Growth	Professional advancement; Growth potential in task capability, knowledge or skills	Knowledge or skills gained	73. New skills, knowledge gained by doing the tasks on the website	1. Feel empowered when discovering new information 2. Feel proud after discovering familiar local stories
Recognition	Recognition by peers or supervisors for performance; real skills and capacities are put to use on jobs	Recognition by owners/designers on knowledge and skill levels	74. Assumed/recognized audience's knowledge and skill levels	1. Reward active contributor with online recognition

VI. DISCUSSION

The study suggests that the user satisfaction determinants for DCH were identified supported with literature studies and according to user's evidences. These findings would be useful as a stronger guidance for designers to present the content of a cultural heritage online collections in a website that satisfies user by considering the user satisfaction determinants.

Interesting data from Stage 2 suggested that general users which are students associate user satisfaction with the overall vibrant and bold interface of the website while general users which are the academic researchers link user satisfaction with the quality of content provided in terms of information architecture and comprehensiveness of the DCH content. In terms of interactivity and advanced use of interaction in such websites, general users (students) highly appreciated it and gives them a sense of joyfulness to explore the website more with the interactivity. In contradiction with the general user (academic researchers), majority ignored any advanced

interaction. Such features did not influence them to be satisfied with the website due to occupied daily tasks and prefer the standard way of web-based interaction with fewer clicks. Although users are the same user type, they possess different needs and demands. For instance, students have the willingness to explore the website more with the advanced type of interaction provided while the academic researchers refuse to explore further due to busy work demand. These are the important aspects to be understood in examining what makes user satisfies or dissatisfies when interacting with DCH online collections.

Existing studies on Herzberg's Theory were adapted and adopted in determining the user satisfaction determinants. Zhang, Small, von Dran and Barcellos [4] findings indicated examples of both hygiene and motivators of web features in a general context of web-based environment. Based on these fundamental and understanding, this study had extended existing studies and interpreted it in the context of DCH. With the data from literature studies and think-aloud-protocol, the validity of the findings can be assured.

VII. Recommendation and Future Work

Results of this study were based on a small-scale sample and only consider a single type of user which is the general user with nil background of cultural heritage. For future work, it is recommended to apply this study to users with cultural heritage background. Different sample of background would give different perspective. This can be useful as an additional guidance to the designers to consider when designing a DCH online collections websites.

VIII. Conclusion

In conclusion, possible determinants of user satisfaction in the context of DCH online collections website were identified in this study. Although the findings represent the general users, however it still considers users different needs for both students and academic researchers. It is difficult to design a website that meets all types of users' needs but at least it can be done by fulfilling the general determinations of user satisfaction.

References

[1] Merriam-Webster.com. 2014, http://www.merriam-webster.com/dictionary/satisfaction

[2] A. Ali, H. Al-Refai, K, Batiha, "Measuring user satisfaction from e-government services: Lessons from Jordan," Government Information Quarterly, 2013, 30(3), pp. 277-288. [Online]. Available: 10.1016 / j.giq.2013.03.001. [Accessed: Aug. 10, 2014].

[3] Zaihasriah Z., L. Yan Peng, P. C. Woods, "Understanding the User Experience (UX) Factors that Influence User Satisfaction in Digital Culture Heritage Online Collections for Non-Expert Users," Science and Information (SAI) Conference, London, August, 27-29, 2014.

[4] P. Zhang, R. V. Small, G. M. von Dran, S. Barcellos, "Websites that Satisfy Users: A Theoretical Framework for Web User Interface Design and Evaluation," Proceedings of the 32nd Hawaii International International Conference on System Sciences, Maui, Hawaii, January, 5-8, 1999.

[5] P. Zhang, R. V. Small, G. M. von Dran, S. Barcellos, " A Two Factor Theory for Website Design," Proceedings of the 33rd Hawaii International International Conference on System Sciences, Maui, Hawaii, January, 4-7, 2000.

[6] L. Xiao, S. Dasgupta, "Measurement Of User Satisfaction With Web-Based Information Systems: An Empirical Study," Proceedings of the 2002 Americas Conference on Information Systems, August 9-11, 2002, Dallas, TX.

[7] T. W. Zazelenchuk, E. Boling, "Considering User Satisfaction in Designing Web-Based Portals," Educause Quarterly, 1, 2003. [Online]. Available: https://net.educause.edu/ir/library/pdf/eqm0315.pdf. [Access: January. 2, 2014].

[8] M. Heo, "User Satisfaction with portals: Testing for Factorial validity and Invariance Across Age Groups," Online Information Review, 37(5), 2013, pp. 804-820. [Online]. Available: DOI 10.1108/OIR-06-2012-0099. [Accessed: June. 10, 2014].

[9] P. Koo Yuen, C. K. Ramaiah, "From Picture Press: An Online Exhibition of the SPH Photographs Collection," Journal of Library & Information Technology, May 2013, 33(3), pp. 208-221. [Online]. [Accessed: June. 23, 2014].

[10] S. Kujala, V. Roto, K. V. V. Mattila, E. Karapanos, A. Sinnela, "UX Curve: A method for evaluating long-term user experience," Interacting with Computers, September 2011, 23(5), pp. 473-483. [Online]. Available: DOI: 10.1016/j.intcom.2011.06.005. [Accessed: June. 10, 2014].

[11] Malaysia National Policy of Creative Industry. Ministry of Information, Communication and Culture. 2010. [Online]. Available: http://www.kpkk.gov.my/pdf/dikn.pdf. [Access: April. 3, 2013].

[12] R. Ewen, P. Smith, C. Hulin, C, E. Locke, (1966), "An empirical test of the Herzberg two-factor theory," Journal of Applied Psychology, 1966, 50(6), 544-550.

[13] Doll, W. J. & Torkzadeh, G. (1988). The Measurement of End-User Computing Satisfaction, MIS Quarterly, 12 (2), June 1988, pp. 259-274. [Online]. Available: http://www.jstor.org/stable/248851. [Accessed: June. 10, 2014].

[14] B. Ives, M. H. Olson, J. J. Baroudi, "The measurement of user information satisfaction," Communications of the ACM, 26 (10), October 1983, pp 785-793. [Online]. Available: 10.1145/358413.358430. [Accessed: Aug. 1, 2014].

[15] J. Ang, S. Koh, "Exploring the Relationship Between User Information Satisfaction and Job Satisfaction," International Journal of Information Management, 17(3), June 1997, pp. 169 – 177. [Online]. Available: DOI: 10.1016/S0268-4012(96)00059-X. [Accessed: Aug. 5, 2014].

[16] J. Holland, S. M. Baker, "Customer Participation in Creating Site Brand Loyalty," Journal of Interactive Marketing, 15(4), Autumn (Fall) 2011, pp. 34-35. [Online]. Available: DOI: 10.1002/dir.1021. [Accessed: Aug. 19, 2014].

[17] M. D. Samsur R., S. M. Zabed, Ahmed, "Exploring the Factors Influencing the Usability of Academic Websites: A Case Study in A University Setting," Business Information Review, 30(1), 2013, pp. 40 – 47. [Online]. Available: doi: 10.1177/0266382113482557. [Accessed: Aug. 10, 2014].

[18] Hong-Youl, H., J. Swinder, "An Empirical Test of a Proposed Customer Satisfaction in e-Services," Journal of Services Marketing, 22(5), 2008, pp 399-408. [Online]. Available: DOI 10.1108/08876040810889166. [Accessed: Aug. 12, 2014].

[19] H. Petrie, N. Bevan, "The Evalution of Accessibility, Usability and User Experience," The Universal Access Handbook, C. Stepanidis (ed), CRC Press, 2009. [Online]. Available: www.crcpress.com/product/isbn/9780805862805. [Accessed: Aug. 10, 2013].

[20] K. Reinecke, T. Yeh, L. Miratrix, R. Mardiko, Y. Zhao, J. Liu, K. Z. Gajos, "Predicting Users' First Impressions of Website Aesthetics with a Quantification of Perceived Visual Complexity and Colorfulness," Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, 27 April – 2 May, 2013, Paris, pp. 2049-2058

[21] A. Miniukovich, A.D. Angeli, "Quantification of Interface Visual Complexity," Proceedings of the 2014 International Working Conference on Advanced Visual Interfaces, New York, pp. 153-160.

[22] Azleen I., Mohd Zulkeflee A. B., Rahida A. R. & Mohd Rushdan, Y, "End-User Computing Satisfaction (EUCS) in Computerised Accounting System (CAS): Which the Critical Factors? A Case in Malaysia," Computer and Information Science Journal, 1(2), February 2009, pp. 18 – 24. [Online]. Available: DOI: 10.5539/cis.v2n1p18. [Accessed: Aug. 15, 2014].

[23] J. W. Palmer, "Web Site Usability, Design and Performance Metrics, Journal Information Systems Research, 13 (2), June 2002, pp. 151-167. [Online]. Available: 10.1287/isre.13.2.151.88. [Accessed: Aug. 15, 2014].

[24] J. J. Garrett, "The Elements of User Experience: User-centered Design for the Web," Indiana:New Riders Publications, 2003.

[25] M. T. Lu, W. L. Yeung, "A Framework for Effective Commercial Web Application Development," Internet Research: Electronic Networking Applications and Policy, 1998, 8 (2), pp. 166–173.

[26] N. H. Hashim, J. Murphy, R. Law, "A Review of Hospitality Website Design Frameworks," Information and Communication Technologies in Tourism 2007, pp. 219-230.

[27] H. S. Jung, M. Baker, "Assessing the Market Effectiveness of the World Wide Web in National Tourism Offices," in D. Buhalis, A. M. Tjoa, & J. Jafari (Eds.), Information and Communication Technologies in Tourism 1998, pp. 93–102). New York: Springer-Wien.

[28] C. I. Ho, Y. L. Lee, "The Development of an e-travel Service Quality Scale," Tourism Management, 2007, 28(6), pp. 1434–1449.

[29] J. E. Mills, A. M. Morrison, "Measuring Customer Satisfaction with Online Travel," in A. J. Frew, M. Hitz, & P. O'Connor (Eds.), Information and Communication Technologies in Tourism 2003, pp. 11–28, New York: Springer-Wien.

[30] A. Sambhanthan, A. Good, "Critical Success Factors for Positive User Experience in Hotel Websites: Applying Herzberg's Two Factor Theory for User Experience Modeling", 2013. [Online]. Available: http://arxiv.org/pdf/1302.5196.pdf. [Accessed: May. 15, 2014].

[31] R, Banjbarian, S. Fathi, Z. Rezaei, "Factors Influencing on Customers' E-Satisfaction: A Case Study from Iran," Interdisciplinary Journal of Contemporary Research in Business, January 2012, 3(9), pp. 257-272.

[32] T. L. Childers, C. L. Carr, J. Peck, S. Carson, "Hedonic and Utilitarian Motivations for Online Retail Shopping Behaviour," Journal of Retailing, Winter 2001 77(4), pp. 511 -535. [Online]. Available: DOI: 10.1016/S0022-4359(01)00056-2. [Accessed: May. 15, 2014].

[33] A. V. Hausman, J. S. Siekpe, "The Effect Of Web Interface Features On Consumer Online Purchase Intentions," Journal of Business Research, January 2009, 62(1), pp. 5-13. [Online]. Available: DOI: 10.1016/j.jbusres.2008.01.018. [Accessed: May. 15, 2014].

[34] C. Jones, S. Kim, "Influences Of Retail Brand Trust, Off-Line Patronage, Clothing Involvement And Website Quality On Online Apparel Shopping Intention.," International Journal of Consumer Studies, November 2010, 34(6), pp. 627-637. [Online]. Available: DOI: 10.1111/j.1470-6431.2010.00871.x. [Accessed: May. 15, 2014].

[35] S. Davidson, S. Matheson, "The Evolution of Providing Access to Information: The Fall of the Online Catalog," Legal Reference Services Quarterly, August 3, 2007, 26(57). [Online]. Available: http://ssrn.com/abstract=1337063. [Accessed: Oct. 2, 2014].

[36] W. Hong, J.Y. L. Thong, W. Wong, K. Tam, "Determinants of User Acceptance of Digital Libraries: An Empirical Examination of Individual Differences and System Characteristics," Journal of Management Information Systems, 2002, 18(3), 97-124.

[37] G.Tsakonas, C. Papatheodorou, "Exploring Usefulness And Usability In The Evaluation Of Open Access Digital Libraries," Information Processing & Management, May 2008, 44(3), pp. 1234-1250. [Online]. Available: DOI: 10.1016/j.ipm.2007.07.008. [Accessed: May. 15, 2014].

[38] K. Smith-Yoshimura, C. Shein, "Social Metadata for Libraries, Archives and Museums Part 1: Site Reviews," Dublin, Ohio: OCLC Research. [Online]. Available: http://www.oclc.org/research/publications/library/2011/2011-02.pdf. [Accessed: May. 15, 2014].

[39] "Malaysian Culture and Heritage Digital Bank," 2008-2013. [Online]. Available: http://mchdb.org. [Accessed: Apr. 15, 2013].

[40] "Historypin," July. 2012. [Online]. Available: http://historypin.com. [Accessed: May. 11, 2013].

[41] J. R. Fraenkel, N. E. Wallen, "How to design and evaluate research in education," Seventh Edition. New York: McGraw-Hill, 2010, pp. 7.

[42] R. Hartson, and P. S. Pyla, "The UX Book: Process and Guidelines for Ensuring a Quality User Experience," Waltham: Morgan Kaufmann, 2012, pp. 1 – 36.