Systematic Review: Interface Design Study in eCommerce for Elder

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Abstract. Digital shopping increase and become vital during the lockdown pandemic COVID 19. The extreme users who crucially needs are the elder, baby boomers and the silent generations (above 55 years old) with consider as high risk group of people with COVID 19. On the other hand, the difficulties while using eCommerce by elder is commonly found, which can be causes by some factors. The usability issue because the limitation of users' experience and lack design of eCommerce. This research needs to answer the possibilities problem from various disciplines in relation of usability of eCommerce and find the gap research in gerontechnology focused on design interface for eledr in the last 10 years for future research in experience and interface design for elderly users.

Keywords: gerontechnology,eCommerce, elderly, interface design, mobile application, website.

1 Introduction

eCommerce in Indonesia has been growing up in the last ten years. Even though in 2020, especially in the pandemic era, eCommerce faces a decrease higher than 50% of their selling percentage, according to Indonesian Statistic Data [1]. In these pandemic years, eCommerce can be seen as the best option for customers without spending time taking a risk going to the physical store. ECommerce customers mostly are millennials which only less than 20% are elderly age, 55 years old above.

There is a gap between elder and technology usage even though there are many possible approaches from the usability principles of technology to make eCommerce applications useful for extreme users, including the elder.

Some research has been done regarding this topics. In order to improve innovation and possible solution, systematic literature research is critical to do as a part of the research pipeline.

This literature research is done to answer the research questions on how eCommerce usability has the design to accommodate elderly user? This question is the beginning to develop a possible idea to approach the usability design in eCommerce for the elderly. In order to answer these questions, this research highlight the last ten years as basic study to see in a decade of deisgning progress of eCommerce for elder since 2011 to 2021 of study to find the potential research gap in future research.

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2 Literature Study

2.1 e-commerce

In this research, the e-commerce definition focus on Electronic Commerce (e-commerce) which refers to any process that entails exchanging ownership of or rights to use goods and services via electronically linked devices that communicate interactively within networks. There are three classifications of e-commerce based on the transactions: Business to consumer e-commerce, business to business e-commerce and consumer to consumer e-commerce [2].

There is some platform to be developed for e-commerce activities; common terminals, telephone terminals and information kiosk. The common terminal is the most usable platform these days using the visual channel of communication. Telephone terminal using speech technology for input and output by using telephone devices. An information kiosk is not effective for many users and as a public device, there is some adjustment for public behaviour uses [3]. There are some similarities using these media by considering the user which elder on 55 years old above.

2.2 Elderly

Globally, there were 703 million persons aged 65 or over in 2019. The region of Eastern and South-Eastern Asia was home to the largest number of older persons (261 million), followed by Europe and Northern America (over 200 million). Indonesia has the highest population aged 65 years or over among The South East Asia countries. In 2019 there are 16,374 thousand people and predicted increase in 2050 to become 52,494 thousand people [4].

This research focuses on age 60 years above albeit, there some possibilities to include the user on the pension age, 55 years old (based on the regulation from the Indonesian Ministry of Labour) [5][6].

3 Methodology

In order to upscale the frontiers of interaction design especially in usability design of eCommerce for the elderly, this research has a deep understanding of the possible research that has been done before through systematic literature review. As the methods of systematic review have been applied to different types of research questions, there has been an increasing plurality of types of a systematic review.

Generally, a methodology used to conduct the systematic review according to Newman is separated into 8 steps. These are; Develop research questions, Design Conceptual Framework, Construct Selection Criteria, Coding Studies, Select studies using selection criteria, Develop search strategy, Asses the quality of studies, Synthesis result of individual studies to answer the review research question and Report Findings [7]. Or on the other hand, it can be separated into three steps: planning the review, conducting the review and reporting the review [8].

The first step is planning the review which consists of two steps, there are: formulate the problem and develop and validate the review protocol. Second, conducting the review including search literature, screening for inclusion; assessing quality; extracting data; analysing and synthesizing data. Finally reporting review from the study finding (figure 1).

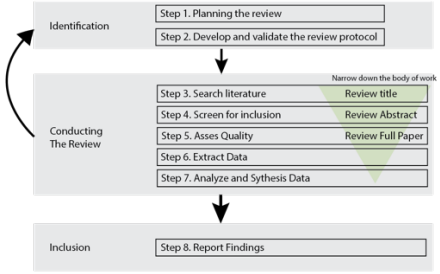

Figure 1. Process of Systematic Literature Review [8].

3.1 Identification

In this step, the review planned by considered questions research, keywords and databased. The question research is to find how the research developments in interaction design, ecommerce, elderly in the last 10 years, since 2011-2021. To find relatable topics, there are some keywords are used; "elderly" OR "aging" OR "elder" OR "older people" OR "older adults" AND "eCommerce" OR "online shop" OR "online shopping". There are 44 papers founded related for the keywords from google scholar databased which were collected systematically using number in google drive and sorting in google sheet.

3.2 Conducting The Review

The papers were sorting through some steps by narrowing down the body work review title, abstract and full paper. From the 44 papers in the identification phase, it all eliminate because 6 papers are found outdated (which were most of the time was published in 2003), 1 book and book chapter, 2 thesis, 1 article, 1 teaching module and 2 papers is on the specific topic which were not quite related either on elderly or eCommerce. In this step, there are 31 papers were selected to analyse for the next step.

3.3 Inclusion

In this phase, review has iterative phase to review the paper in detail regarding the methodology and possible criteria to answer the research questions.

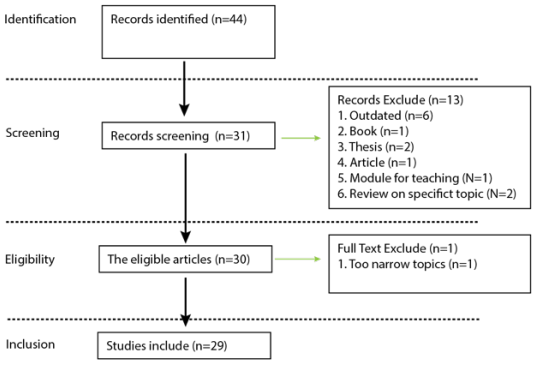

Figure 2. Literature review process in research of eCommerce and elderly.

4 Analysist

There are 29 papers passing the steps of systematic literature which can be categorized from design, information technology and economic. The papers were categorized into: title, published year, discipline, publisher, keywords, methods, findings and possible thigs that related with the research questions.

Table 1. Paper Analysis

Paper	Method	Findings	Related to future research
(9)	☐ Explain concept of social commerce for design web 2.0 ☐ Literature Review	Social commerce concept focus on user, applied principles of customer needs, balancing between elements for web design commerce, experience designing.	Design the eCommerce models to approach the future potential elder user.
(10)	☐ The acceptance touch screen apps for elder in area of low internet access in Taiwan ☐ Embedded mixed-method research	Finding lower of user depression and possible to develop other kinds of application such as in healthcare and entertainment	Digital device approaches for elder user in different sectors-healthcare
(11)	☐ Behaviour and satisfaction elder buy food in food retail ☐ Qualitative & Quantitative	The research finding three factors for elder to shopping: convenience, valuable, related product. Offline stores need to improve positive experience to shop	Possible behaviour for elder who choose eCommerce to adapting physical store
(12)	☐ Design project to produce design guide ☐ Project development	Suggest sets of design guidelines for elder in multi-touch interface In detail and comprehensive.	General guideline for interface design
(13)	☐ Compare senior consumer behaviour in Poland to US and western Europe ☐ Literature research	Comparative findings the customers behaviour in Poland between US and Western Europe.	Reference for research study in Indonesia
(14)	☐ Suitable B2C for elder as customer ☐ Mixed Method Research	User test visual design of ecommerce for Thai elderly	Paper guide for testing on several e-commerce websites
(15)	☐ Comparative paper studies	Certain knowledge of elder and factors that impact the acceptance and usage of mobile commerce	User test reference and academic basis (HCI approach)

(16)	☐ Situation analysis, benchmarking, quantitative research, selected methods of financial analysis	Commercial businesses can be successful in innovating if understand the market dynamics and changing perspective of various kinds of elder as potential target	Factors impact for customer
(17)	☐ assessment framework, GUI for elder in experience ☐ User test	Some issue according with GUI causing difficulties for elder.	The assessment framework can be do as parameter for user test in the future
(18)	☐ quantitative data collection trough Structural Equation Modelling (SEM) and analyzing by using AMOS 17	The order factors of the model are termed usage, financial returns and owner satisfaction and then followed by performance	Measurement for website usage from owner perspective goals
(19)	☐ Situation analysis, benchmarking, quantitative research, selected methods of financial analysis	Some factors influence customers when choosing and buying electronics online. The behaviour strategic of eCommerce business affected by online shopping behaviour.	Develop understanding in eCommerce and user behaviour
(20)	☐ Healthy Ageing in Scotland (HAGIS) is intended to build a longitudinal sample, linked to administrative data	Age and the contextual situation have impact with e-commerce, and implications for access and capability, and link to questions over isolation.	Connection between eCommerce and aging society
(21)	☐ Literature review	Guidance of designing the universal principles of design in relation with aging 65 years old from (physical aging, visual ability, visual guidance and hearing capability	Fundamental for practical guides design for older adult,
(22)	☐ The quantitative literature	Factors that impact with usage of internet in aging people: higher income, higher education, primary social inequality, etc	Can be used in background research and basic internet usage in general for elder
(23)	☐ Comparative Method	The results show that UTAUT and MATH are able to explain more than 70% of the variance in Internet adoption intention for elder	Factors that support behaviour user using technology according situation where the technology was adapted for elder
(24)	☐ Designing Method and evaluation	The implementation of proposed guidelines in elderly mobile assistive system enhance access	Full iteration design process for develop prototype and user test.

	Prototype for health care	to the interface and increase usability of the system.	
(25)	☐ Usability testing based on visual interface design in menu and content.	Findings is crucial to improve accessibly of touchscreen mobile for elder	User test based on two classifications: 1. Menu-Oriented Navigation (Tab menu, Side drawer, Springboard) 2. Content-Oriented Navigation (Lists, Gallery and Grids, Cards)
(26)	☐ Technical process	Contribution for new design in specific case study of behaviour	Guide to redesign web, scientific proofed by usability metric
(27)	☐ Case Study, 3-year, multiphase research project, the overall goal of which was to improve elders' participation in and with organizations.	Organizations have to review their policies and practices and constantly monitor their performance in conjunction with elders.	The literature for the background of the condition of the elderly is related to aging, participation and well-being. The level of participation of the elderly in social organizations to improve the standard of living
(28)	☐ An observation study conducted on 10 elderly participants to empirically identify complexities in eCommerce.	26 design guidelines were proposed in five categories based on the results.	Difficulties that possibly facing by elderly using eCommerce First, complicated navigation was one of the main barriers to elderly users. Second, too many interaction elements on a screen confused the participants, which made it hard to decide which one to interact with. Third, difficulties in personalization and the payment process could lead elderly users to quit using the application.
(29)	☐ Case study on customer purchase issue	The relation between attitude and acceptance model in purchasing online	Behaviour analysis is seen from the technology model and the relationship between the three
(30)	☐ 1. User survey based on System Design 2. Card Sort selection & prototyping.	Prototype design	Method can become as reference for user test in future development design (contextual inquiry, card sorting, dan prototype & user test)
(31)	☐ quantitative-qualitative	Theoretical Frameworks to understand technology adoption behaviour DTPB.	Adapted theory for behaviour of user and design in usability in technology
(32)	☐ Ethnography research and developing approaches to	lessons, methods and strategies to recruit and maintain an older adult user network to serve a wide array of projects	How to approach and collect data with the elderly sample group and research management.

	elderly group and training member in gain the data.		
(33)	☐ Qualitative Data	Formulate indicator stimulate growth of the online services markets targeted to the elderly. The dynamic growth of markets can have a positive influence in many economic aspects including promotion of an active and positive aging among European elderly, and prevention from long lasting stress as a result of digital, social and financial exclusion.	The impact of growing ecommerce and possible future research for some stakeholder including elder in economic independence
(34)	☐ Data sampling quantitative	Significant differences in online information search as well as shopping regarding gender, status of employment, and education. Moreover, individual variables were differently related to online shopping behaviour. Variable: 1. Socio-demografic variables: (Gender, age, education employment & income) 2. Individual variables (Shopping orientations (Experience, service, price, convenience, and brand orientation) 3. Need for emotion (NFE). (the "tendency or propensity for individuals to seek out emotional situations, enjoy stimuli, and exhibit a preference to use emotion in interacting with the world" 4. Fashion leadership (FL).	Variables can be as a background to consider user
(35)	☐ Effect of usefulness and perceive ease of use in Taiwan Agriculture Food ☐ Qualitative data and survey		Factors supports customers choose products besides PU dan PEOU
(36)	☐ Find out impact of mobile banking experience for elder ☐ Design/methodology/approach	There is linking between mobile banking experience and customer trust. Social dimension and trust play big impact in age 65 while positive affective and trust has deeper impact for age 55-64 years old	References to answer the possible ecommerce activities for elderly (from 2 group of age), questioner for secure the transaction used by eCommerce.

(37)	☐ Observe factor of elder customer's perception to purchase online ☐ Qualitative and quantitative study in Malaysia	Study shows elder prefer to purchase online payment based on the ease of use and safety of the website.	Case study in region - Malaysia

5 Discussion

Based on the systematic literature review, this research topic was related with other knowledge. There are 10 papers from business, economic, management which most of those are focused on the customer behaviour, in this cases elder ages 55 year old above using eCommerce which using various method including literature review (9)(13)(15)(27), comparative method and data sampling to user through quantitative and qualitative studies (11)(18)(29)(34)(36)(37).

Other discipline which has contribution in this research is from computer science, informatic engineering, and information system. Most of the paper using method for general research founding such as design guideline and assessment framework for user test (12)(24)(25)(30), while the others specifically research on the case study to explain the user test and redesign phase (17)(23)(26)(31). Interdisciplinary and multidiscipline terms of technology and elder people called Gerontechnology is appeared specifically in the paper which choose qualitative and quantitative data which specific applied to understanding elderly behaviour in using of internet banking in UK (31). The rest of the paper including design (28), medicine and public health and femine care (10) (21), regional development and international studies (19), social science(20), new media and society (22), film and television (33), adult and continuing education (35). Both of the papers are reviewed to answer the research questions in visual design perspective to build the guidance of interface design in eCommerce for elderly.

6 Conclusion

According to the analysist and discussing, this systematic literature research can provide information and data to answer how is relation of eCommerce and elderly.

Possible approach for multidiscipline and interdisciplinary study from business, (including management and marketing), computer science (informatic engineering and information system) and major perspective in design, not only in theoretically or methodology but also in user test to know the user perspective while using the application.

Narrowing the research into designing the interface design can specifically using papers that focusing on fundamentals information from various discipline to measure the performance website (18), technology acceptance among the elder (22), challenges on interface design that possibly faced by elder as user (25), design principles that applied in the similar media(28), the technology approaches for elderly (31).

The result of this research will be applied in the future research especially in prototype development and questionnaire test for iterative design phase to finding the problem and solve the difficulties.

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