KADİR HAS UNIVERSITY
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INFLUENCE OF SMARTPHONE USAGE TO MOBILITY OF VISUALLY IMPAIRED: STUDY IN JAKARTA, INDONESIA

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SUPERVISOR: ASST. PROF. DR. ÇİĞDEM BOZDAĞ

MASTER'S THESIS

ISTANBUL, JUNE, 2017

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KADIR HAS UNIVERSITY

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I, SABILUL MAARIFAH KARMIDI;

Hereby declare that this Master's Thesis is my own original work and that due references have been appropriately provided on all supporting literature and resources.

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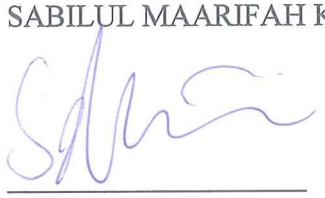

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ACCEPTANCE AND APPROVAL

This work entitled **INFLUENCE OF SMARTPHONE USAGE TO MOBILITY OF VISUALLY IMPAIRED: STUDY IN JAKARTA** prepared by **SABILUL MAARIFAH KARMIDI** has been judged to be successful at the defense exam held on **01/JUNE/2017** and accepted by our jury as **MASTER'S THESIS**.

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LIST OF ABBREVIATIONS

ATM	: Automated Teller Machine
BBM	: BlackBerry Messenger
CMS	: Content Management System
CSS	: Cascading Style Sheet
GPS	: Global Positioning System
HTML	: Hypertext Markup Language
ICT	: Information, Communication and Technology
IDR	: Indonesian Rupiah
ITCFB	: Information and Technology Center for the Blind
ITU	: International Communication Union
JAWS	: Job Access with Speech
Kartunet	: *Karya Tunanetra* –blind community in Jakarta
NVDA	: NonVisual Desktop Access
OS	: Operating System
OS	: Operating System
Pertuni	: *Persatuan Tunanetra Indonesia* (Indonesian Blind Union)
PHP	: Hypertext Preprecessor
PPUA	: *Pusat Pemilihan Umum Akses* (Center of Accessible General Election)
RAM	: Random-access memory
RS	: RuneScape
SEO	: Search Engine Optimization
SMS	: Short Message Service
SNS	: Social Networking Site
SQL	: Structured Query Language
TV	: Television
VI	: Visually Impaired/ Visual Impairment
WHO	: World Health Organization

ABSTRACT

KARMIDI, SABILUL MAARIFAH. *INFLUENCE OF SMARTPHONE USAGE TO MOBILITY OF VISUALLY IMPAIRED: STUDY IN JAKARTA*, MASTER'S THESIS, Istanbul, 2017.

Smartphone is no longer unusual among visually impaired users, especially those with digital literacy. Availability of applications with various purposes lead to question on what kind of influences smartphone usage brings to their mobility and independence. Considering the external situation such as the lack of public facilities, smartphone's and applications' shortcomings also their level of digital skill. Phenomenological study was selected as the most appropriate approach to elaborate respondents' individual experiences. The research was conducted through in-depth interview and observation method to six blind and three partially sighted respondents with three different levels of digital skill in Jakarta, Indonesia. The findings are portrayed as experienced by respondents in descriptive manner and provided in themes emerging from study. Implication of the study discovered that smartphone works as an all-in-one assistive technology. Using smartphone brought positive influences to mobility and independence of people with visual impairment. Although not necessarily linear, influences appeared more on people with higher digital skill. Despite offering positive impacts like convenient travel, flexibility, productivity and independence, barriers are still visible such as technical shortcomings, environment disintegration and human ability, which lead to dependence on other people on some important aspects.

Keywords: mobility of visually impaired, smartphone, digital skill, assistive

ÖZET

KARMİDİ, SABİLUL MAARİFAH. *GÖRME ENGELLİLERİN HAREKETİNE AKILLI TELEFON KULLANIMIN ETKİSİ: CAKARTA, ENDONEZYA ARAŞTIRMASI*, YÜKSEK LİSANS TEZİ, İstanbul, 2017.

Görme engellilerin, özellikle dijital ortamda okuma, yazma ve paylaşım alanında yer alanların akıllı telefon kullanması artık olağandışı bir durum değildir. Çok amaçlı uygulamaların hali hazırda bahsedilen dijital ortam aktivitelerinin gerçekleştirilebilmesi amacıyla kullanımı, görme engellilerin bu uygulamaların kullanımı bağımsızlık ve hareketlilik açısından sorgulanabilmektedir. Kamuya açık alandaki tesislerde mevcut olan, akıllı telefon özellikleri ve akıllı telefon uygulamalarındaki eksikler, hem dış etken olarak hem de dijital yetenek şeklinde etkilemektedir. Fenomenoloji temelli araştırma, adayların kendi deneyimlerini en uygun anlatabildikleri yaklaşım olarak seçildi. Bu araştırma, derinlemesine mülakat ve gözlem yöntemiyle Cakarta, Endonezya'daki üç alanda farklı dijital yeteneklere sahip, üç kısmi ve altı tam görme engelli aday ile yapıldı. Araştırma bulguları betimsel bir şekilde, davalılar tarafından tecrübe edildiği gibi aktarıldı ve araştırma vasıtasıyla ortaya çıkan çerçevede sağlandı. Araştırmanın bulguları akıllı telefonun derlitoplu bir yardımcı teknoloji olduğunu gösterdi. Akıllı telefon kullanımının görme engellilerin hareket özgürlüğüne ve dijital ortamda bağımsızlığına olumlu etki verdiği görüldü. Doğrusal olmamasına rağmen, olumlu etkilerin dijital yeteneğe daha fazla sahip olanlarda daha fazla oluştuğu görüldü. Uygun yolculuk, esneklik, verimlilik, ve bağımsızlık gibi olumlu etkileri sunmasına rağmen, teknik eksikler, çevre bozuklukları, ve insan kabiliyeti gibi bazı önemli hususlar üzerinde diğer kişilere bağımlılık yaratan engeller hala görülmektedir.

Anahtar Sözcükler: görme engelliler hareketi, akıllı telefon, dijital yeteneği, yardımcı teknoloji

CHAPTER 1 INTRODUCTION

2008 Health Survey reported Indonesia to take 0.9% on visual impairment (VI) and was one of the highest in Southeast Asia (Harimukthi & Dewi, 2014). Indonesian Ministry of Labor's data stated there were 2,137,923 visually impaired (VI) among the working age population (Primus, 2016). Despite the 'correct' thinking that disability is never the problem; VI realizes that it is handicapping them in daily activity (Dodds, 1993). The other common problem for VI is how to know their current position and reach other destination (Terven, et al., 2014). Therefore increases the perception regarding VI individuals as not being able to *fit in* (Naraine & Lindsay, 2011) and live normally within society (Irwanto, et al., 2010).

Smartphones are everywhere and becoming more sophisticated (Su, et al., 2014). Indonesia is among countries with most smartphone users (Wahyudi, 2015), where VI also have been active users since screen reading application, such as *Talkback* or *VoiceOver*, is included (Rodrigues, et al., 2015). Besides, mobile technology is also rising the possibility for assistive technology based on IT to support a better life quality for VI (Hakobyan, et al., 2013). A number of assistive technologies have been reported to be assistance for people with VI[1].

Now, innovation on various application such as full text-to-speech navigation system (Ahmetovic, et al., 2016) and object identifier (American Foundation for the Blind, n.d.) is also increasing the possibility for VI to gain independence on conducting their daily lives without needing separate tools. Study by Anwar & Johansson (2015) also reported that smartphone is crucial to maintain communication and support business for Indonesian blind micro-entrepreneurs.

1.1. BACKGROUND TO RESEARCH

Law No. 4/ 1997 of Indonesia stated that the country is responsible to provide reasonable accommodation for disabled people (Irwanto, et al., 2010). However, mobility is still an issue even in Jakarta. Despite being the capital city of Indonesia and the largest metropolis

[1] See Ahmetovic, D. et al., 2016. *NavCog: turn-by-turn smartphone navigation assistant for people with visual impairments or blindness.* Montreal, W4A '16 Proceedings of the 13th Web for All Conference

in Southeast Asia (Susilo, 2007), Jakarta is is not supported by adequate transportation systems and show a spatial mismatch (Winarso, 2011).

The region lacks public transportations in quantity and quality. Besides that, sidewalks and pedestrian facilities received very little attention and fell into disrepair (Lo, 2010). Lift turned into storage room and public ignore the initial use of the facilities (Irwanto, et al., 2010). Mostly, people with VI are relying for others' help or use cane to roam around (Mahmud, et al., 2014). According to survey done by Januardy, et.al (2015) in 59 public facilities (transportation and buildings), Jakarta is not accessible, noted as; 1) It is found that the gap between station and bus/ train is big and uneven 2) There is no braille information in all stations 3) Only some train stations provide audio announcement 4) Unavailability of guidance blocks, and 5) Unavailability of lift. Most of the time, VI will depend on personnel who according to the same survey sometimes is not available or does not intent to help

Socially, they are also frequently excluded from various activities. Thus, VI organizations and communities are giving support such as by focusing to educate in certain field like internet empowerment[2], computer training[3], and university preparation training[4]. Yet, formal education, workforce and society in general are not equally supportive. As Agas (2009) reported, many people still hesitate to interact with VI because they found it difficult to communicate. They are stigmatized as helpless thus continuously marginalized. It is not a secret that many educational institutions are rejecting VI students. In Jakarta, only a few schools accept them (Winardo, 2007). Even if they were admitted to one, study materials are not quite friendly.

Despite the applications which purposes to solve obstacles of VI, the conditions mentioned above challenge the extent of smartphone's functionality as assistive technology for VI users in Jakarta. Since, various assistive technologies need to be well

[2] See Hidayat, F., 2016. *RIAT Resmikan Pelatihan Internet Bagi Penyandang Tunanetra.* [Online] Available at: http://www.beritasatu.com/digital-life/367696-riat-resmikan-pelatihan-internet-bagi-penyandang-tuna-netra.html (in Indonesian)

[3] See Renato, Y., 2017. *Festival Mitra Netra Tampilkan Keterampilan Anak-anak Tuna Netra.* [Online] Available at: http://photo.liputan6.com/read/2859281/festival-mitra-netra-tampilkan-keterampilan-anak-anak-tuna-netra (in Indonesian)

[4] See Christyaningsih, 2017. *Pertuni Tingkatkan Akses Penyandang Tunanetra ke Perguruan Tinggi.* [Online] Available at: http://nasional.republika.co.id/berita/nasional/umum/17/03/18/omzb0m384-pertuni-tingkatkan-akses-penyandang-tunanetra-ke-perguruan-tinggi (in Indonesian)

integrated to environment to work well[5]. Besides, many smartphone applications that intends to be assistive fall short in accuracy or reliability[6] and potentially useful applications have shortcomings in accessibility from improper labels to unclear layouts that don't work well with screen reader that "read" information on phone screen (Langston, 2015). Thus, most of the time VI users felt that without someone whom they could rely on for help, they would possibily have an insurmountable barrier to phone's configuration and installment (Rodrigues, et al., 2015).

Experiment of mobile vision as assistive technology by Manduchi (2012) showed that even with "ideal" system plus carefully designed targets, detection and guidance can be difficult and time-consuming in some environments. Meanwhile research by Wentz, et al. (2017) showed that mobile banking feature still caused frustration regarding accessibility to VI users even though it can provide certain level of independence to their financial lives.

1.2. PROBLEM STATEMENT

Availability of diverse applications in smartphone leads to question, what kind of influences smartphone usage brings to their mobility and independence, considering external factor like the lack of public facilities, smartphone's and applications' shortcomings also their level of digital skill.

1.3. PURPOSE OF RESEARCH

This study expects to discover what kind of influences smartphone usage brings to mobility of VI in Jakarta. The influences are including the effectivity and transformation it brings as assistive technology to their independence, activity and mobility. The research will also relate study result to their computer skills, background, and access to the smartphone itself.

[5] See Duarte, K., Cecilio, J., Silva, J. S. & Furtado, P., 2014. *Information and Assisted Navigation System for Blind People.* Liverpool, UK, International Conference on Sensing Technology.
[6] See Mehigan, T. J. & Pitt, I., 2012. *Harnessing Wireless Technologies for Campus Navigation by Blind Students and Visitors.* Linz, Austria, Springer.

1.4. RESEARCH QUESTION

This study is guided by following research questions:

1) *What is the influence of smartphone usage to mobility of VI in Jakarta?*

And following sub-research questions:

2) *How effective smartphone is in assisting daily life of VI?*

3) *How does smartphone usage transform the life of VI?*

1.5. STUDY OBJECTIVES

As VI people are also actively using smartphone, their mobility in Jakarta should also be positively influenced. The development of applications which are made for various purpose should also support their mobility which was not facilitated before. Smartphone might not be able to completely assisting daily life of VI to the extent of living as independent as sighted people, making the effectivity of smartphone in assisting daily life of VI might still need improvement in various field. However, their life will be completely transformed within some crucial field through their familiarity and usage of smartphone.

1.6. SIGNIFICANCE OF RESEARCH

As technology is making its way to reduce the barrier and gap in many fields, this research is hoped to provide an insightful information and be an eye opener for smartphone producers, application developers and different professional working in the related area to keep creating different features on smartphone which can benefit both people with and without impairment, especially people with VI.

In the field of scientific research, this research is expected to increase the materials to deepen the knowledge of relation between smartphone and assistive technology to VI especially in the urban area of developing country. It is also expected to be a reliable source for studies related to new media, technology and disability in the level of higher studies. The research is also hoped to be a constructive learning material for government

and official organization to pay more attention to the well-being of VI citizens through technology.

1.7. OVERVIEW

This research is classified into five chapters. Chapter one has elaborated background of study about problem faced by VI people to conduct their activities. Chapter two explains the study with related concepts. Chapter three includes the methodology employed by this research. Chapter four delivers the result finding of the study. Chapter five elaborates the summary of study and implication of the research.

CHAPTER 2 THEORETICAL FRAMEWORK

VI are severely limited in their mobility and other activities of daily life that rely upon vision (Adebiyi, et al., 2017). Challenges involved independent mobility like navigation, obstacle avoidance, and distance estimation which (Maidenbauma, et al., 2014) lead to decreased independence.

Smartphone becomes more ubiquitous throughout everyday life. It enables people to access abundant information and service through widespread connectivity, which directs to everyday tasks empowerment (Rodrigues, et al., 2015). Since the tool has shifted from a single purpose device to multi tasks like navigating, listening to music, accessing internet and texting (Rodrigues, et al., 2015), smartphones also have proven fame among VI (Ashraf & Raza, 2014). Especially, since the availability of screen reader which allows VI to participate using the technology.

In this case, however, screen reader is merely becoming the 'vision' for VI to access smartphone with many applications. Available for different purposes, some applications are aimed directly to be assistive technologies for VI such as *TapTapSee* which helps identifying information about taken pictures, *Android Money Reader*, and *Be My Eyes* which provides volunteer to guide via phone camera. Some applications are also affected VI users such as to maintain communication and support business[7]. Research by Hargittai & Hinnant (2008) indicated that the ones most able to use new media can use them to improve their lives in ways than the ones unable to. I tried to look up whether such aforementioned applications influences moblity looking to digital competencies and technology use (van Dijk, 2006) for VI in their daily lives.

2.1. VISUAL IMPAIRMENT

VI *"interact with their environment in a markedly different way from that of sighted individuals"* (Harper, et al., 2005) because they are lack of ability to see (D'Atri, et al., 2007). VI often have effective, albeit inefficient, work-around that render individual

[7] See Anwar, M. & Johanson, G., 2015. Mobile Phones and the Well-being of Blind Micro-Entrepreneurs in Indonesia. *EJISDC,* 67(3), pp. 1-18.

problems into more nuisances. Collectively, they can lead to decreased independence (Bigham, et al., 2010).

VI are people with low vision or blindness. WHO defines low vision as moderate and severe VI with *"little visual acuity less than 6/18 but equal to or better than 3/60"* while blindness is defines as *"visual acuity of less than 3/60 with little light perception or not at all"*[8]. People with blindness and low vision are impaired, because Dunn (2015) implied when activities that are routinely performed by people (e.g. walking and reading) are somehow restricted or cannot be done in accustomed ways, it makes the person a part of the impaired.

2.2. MOBILITY OF VISUALLY IMPAIRED

Mobility of VI means the possibility of freely moving, without support or any companion, at home, in public and private buildings, and in open spaces (D'Atri, et al., 2007). Different source tells, 'mobility' refers to ability to move safely, efficiently, and effectively, such as walk without tripping or falling, cross streets, and use public transportation (VisionAware, 2016). Mobility is required to perform many activities of daily life, such as, dressing, shopping, cooking and visiting friends. (Hache, et al., 2011). Szlyk et.al (1997) administered five items clustered into a "mobility" category, determined in a factor analysis of the subjects' responses: "finding a seat in a movie theater," "finding particular items in a store," "walking outdoors at night," "participation in social gatherings," and "walking through shopping malls." (Turano, et al., 1999).

Harper & Green (2002) suggested mobility as one task in travel activity, which other tasks can be identified as follows: (see Figure. 2.1.)

x Obstacle avoidance

Clear-path ahead, where a clear forward path at leg height and head height is available;

The need to have sufficient space at the side, such as wall on side or other identification;

Path level changes, such as identification of step up path.

x Orientation and navigation

[8] See World Health Organization, 2011. *International Statistical Classification of Diseases and Related Health Problems 10th Revision.* Geneva: WHO Publication.

Orientation is capacity to track current position while respecting the environment and to find a path to destination (Terven, et al., 2014). VI needed orientation and navigation to inform their position or location accurately. Example: *Safe pavement and safe path following, safe traffic crossing, route finding,* and *indication when reaching destination*.

x Environmental access

-Hazard minimization: *Safe traffic crossing for pedestrians, indicators* (e.g. end of pavement and traffic crossing), *sited street furniture to avoid being an obstacle*.

-Information and sign: *Information about location, notices of public transportation and access to street signage.*

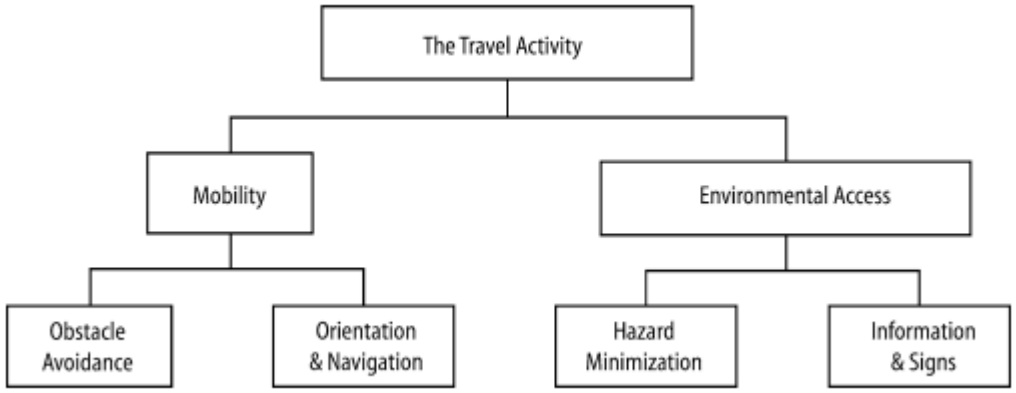

Figure 2.1. Task within travel activity

Hersh & Johnson (2008) resumed some concepts used in mobility research:

-*Near space and far space*. Near space is a space around the person's body which requires mostly only short range assistive device like cane or by touch. While far space is far away geographical space, which requires travel.

-*Past experience and new experience*. The past experience involves storing and recalling spatial information of certain journey when it is repeated. While new experience relates to application of previous experience and knowledge to a new spatial task.

-*History of VI*. Particularly in empirical studies like psychology, background of VI leads to different cognitive approaches and travel strategies. Late VI will have visual concepts which will contribute yet also causes them to encounter problem developing new strategy to their mobility. While early VI will adapt to rely on other sources than sight as information. Some of them also have well-developed mobility strategy to travel independently.

-*Body-centered and external referencing strategies*. The first referencing strategy refers to a method on pointing object/location by using body or movement. The second referencing strategy refers to a way on using other object in the near-space.

-*Cognitive maps*. It is a map different from map normally used by sighted people. It is done by storing the order or the relationship between several variables that can be physical objects or abstract ideas.

The mobility will show how VI users make their move within their area. The aspects within mobility will also help to determine what kind of independence VI gains on their lives as they applied the investigated aid to their activities.

2.3. SMARTPHONE

Smartphone is a mobile phone offering advanced capabilities including access to email and the internet (Vodafone, 2013). Smartphones are spreading and becoming more sophisticated, with ever-growing computing, networking, and sensing powers. This has changed people's daily life (Su, et al., 2014).

From a communication device, mobile phone becomes a multitasking tool such as navigating, listening to music, accessing information and texting. Smartphones enable access to plentiful information and services through broad connectivity; they have the potential in empowering everyday tasks (Rodrigues, et al., 2015).

According to ITU data in 2012[9], approximately 50% adult population of developed countries own a smartphone and smartphone is growing in developing countries. Android and iOS are two biggest smartphone operating systems (OS) that have been dominating the market since 2012[10]. The smartphones of these OS are mostly devices with touch screen-based interface and having on-demand ability to provide computational resources such as data and software via network, allowing diverse applications to be installed in the phone.

Touch screen interfaces offers flexibility of presentation and control. It also can display different interfaces on the same surface, such as scrollable list, a *QWERTY* keyboard or a telephone keypad (Kane, et al., 2008). The new multi-touch interfaces even allow users

[9] See International Telecommunication Union (ITU), 2012. *Key statistical highlights: ITU data release June 2012*

[10] According to International Data Corporation (IDC) Worldwide Quarterly Mobile Phone Tracker 2015.

to interact using single and multi-finger gestures such as flicking, rotating and pinching (Wu & Balakrishnan, 2003).

2.3.1. Smartphone as Assistive Technology for Visually Impaired

VI need some forms of assistive technology to access the non-disabled world (Ellis & Kent, 2011). They require assistive technology to help mobility and attain independent travel within community environment (Hersh & Johnson, 2008). Assistive technology is piece of equipment or product with system, whether obtained commercially off the shelf, adjusted or customized, which is utilized to enhance, sustain or improve capabilities of disabled people (Shinohara & Wobbrock, 2011).

Assistive technology involves using assistive product to fill the gap between the needs of user interface of the device and the user's ability (Verstock, et al., 2009). As Hollier (2007) implied, which is also designed to temporarily modify a product into an accessible format (Australian National Training Authority, 2005). More recently, the idea of taking an integrated approach to developing assistive technology solutions has been proposed and implemented in some cases (Hersh & Johnson, 2008). This will, in a way, allow VI to be able keeping up with non-VI to achieve the same goals.

Recent smartphone are mostly available with touch screen. It offers flat interface without audio and tactile feedback, making significant barrier and difficulty to locate items on the screen without seeing. Yet, smartphones have proven their popularity among VI users (Ashraf & Raza, 2014). This makes most mainstream smartphones have started including pre-installed accessibility tools and applications, such as screen reader which function is to verbalize everything on the screen including text, control buttons, graphics and menu into a automated voice (Mulfari, et al., 2015).

Android's *Talkback* and iOS' *VoiceOver,* each operating system's built-in assistive technology are screen reader's example which enable VI to discover interface components by dragging their finger around screen or doing a number of swipe-tap gestures and receiving audio feedback (Rodrigues, et al., 2015). Screen reader becomes the link for VI to access additional, third party's applications available in each OS online store and the eyes which 'see' the other materials available on smartphone. It is becoming tool to replace a diminished part of the body (Hollier, 2007).

Some other accessibility measures include allowing exclusive use of text prediction and functionality to allow zoom function and text-to-speech (Techdis, 2010 cited in Ellis & Kent, 2011 p.134). More recent discovery was GPS and mobile telephone technology that had begun impacting the improvement of feasible orientation and navigation assistive technology (Hersh & Johnson, 2008).

Many assistive technologies also appear as applications which simplify the development from the design perspective and promise a faster processing in the future device (Terven, et al., 2014). Smartphone's ability to download applications, enables users to carry them as assistive technologies in their pocket (Morris & Mueller, 2014). The applications themselves are available in various types and purposes from entertainment to productivity. Some are even designed for the visually disabled such as *TapTapSee*, which helps identifying objects by photographing them[11] and *NavCog* that helps blind people navigate their nearby environment through subtle vibrations on smartphones or by whispering into their ears through earbuds (Basulto, 2015).

Innovative assistive technology establishes a potential tool to help VI. Computer vision-based applications enhance their orientation and mobility also recognize objects and printed material. More update system even attempted to support interaction (Terven, et al., 2014). It shows how assistive technology makes environments more accessible for VI or in the other way, as Hersh & Johnson (2008) phrased, *being the physical enabler to social inclusiveness.*

However, assistive technology is also a user-centered system. VI's deep knowledge must guide the development of the application to system testing and ongoing refinement. Only then can the system functions meet user expectations. For example, to be able using assistive technologies on smartphone, VI needed screen reader to help assessing as the vision when using smartphone. In the emerging level of accessing various applications, there were very few people, normally those with specialist knowledge of the technology, who were able to participate (Ellis & Kent, 2011). Different smartphone's model might also challenge the effectivity of assistive technology (Manduchi, 2012).

Yet in a way, smartphone may be one of the few media in which interactions are not mediated by the disability-related stigma and where a person with disability can feel like

[11] See American Foundation for the Blind, n.d. *TapTapSee - Blind and Visually Impaired Camera.* [Online] Available at: http://www.afb.org/prodProfile.aspx?ProdID=1938&SourceID=102

a "person first" (Goggin & Newell, 2003). It becomes a way technology can be used by VI learners, allowing them productivity, independence and participation in academic and everyday life. Burgstahler (2002) proposed the following ways technology can provide to people: (a) Obtain access to all kinds of educational options, (b) Participate in experiences not otherwise possible, (c) Succeed in work-based experiences (Sanchez, et al., 2007). Also as Crandall, et.al (1999) indicated, that VI became safer, more independent and more precise during travel.

Other emerging problem is that some applications might still create barriers despite possible benefit. Lack of awareness has resulted failure to consider the needs of people with impairment during the design and evaluation of software and hardware (Ellis & Kent, 2011). Incompatibility or improper interoperation with assistive technology that VI computer users typically employ to convert text into audio output (Nomensa, 2006), many ecommerce provide menu as an unlabeled image, making screen reader cannot find it[12], page with fixed font sizes and colors preventing adjustability (Vicente & López, 2010), and accessibility problem in finance app and web brings negative impact on self-employed or entrepreneur with VI[13] are some cases which excluding impaired people to join technological development.

This research is conducted with smartphone as the VI mobility's enabler. Such devices have allowed the launch of many applications that increasingly "come out of the box" as a widely used accessibility tools and developed with more handy features that help users in facing obstacles (Mobile Future, 2010). Thus becoming a medium to indicate mobility improvement of VI.

2.4. CONCEPT OF ACCESS

The US Department of Commerce (2000) found that only 21.6% of impaired individuals have internet access compared to 42.1% of individuals without impairment. Results also

[12] Royal National Institute of Blind People; AbilityNet; Dublin City University and Socitm Insight, 2005. *eAccessibility of public sector services in the European Union. Report for the UK Presidency of the European Union.* [Online] Available at: http://www.cabinetoffice.gov.uk/newsroom/news releases/2005/051124_eaccessibility.aspx

[13] See Wentz, B., Pham, D. & Tressler, K., 2017. Exploring the Accessibility of Banking and Finance Systems for Blind Users. *First Monday*, 22(3).

showed higher internet access and computer usage on employed disabled people. It indicated that the problem may involve different factors.

Since 2002, more researchers suggest to go 'beyond access' and pay more attention to social, psychological and cultural backgrounds as relation to internet access. Disconnectedness does not happen because of a single factor such as impairment. A model which extends the concept of access by van Dijk (2005) describes the phases leading to characterization of new media usage achievement. There are four concepts:

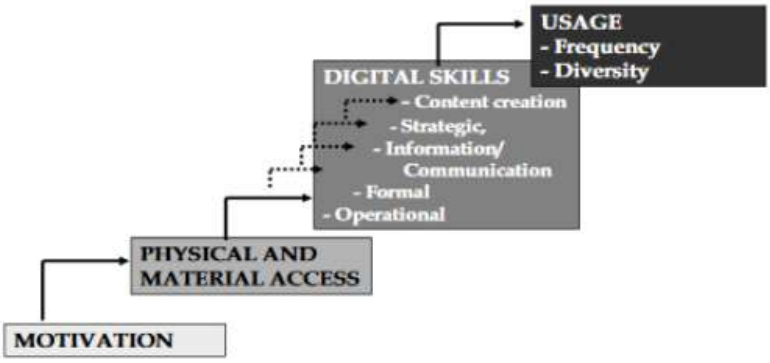

Figure 1.2. Concept of Access

 Motivational access

It shows the wish to be connected to internet which supporting factors based on German and American surveys[14], including; no need or significant opportunities, no time or liking, rejection of the medium, lack of money, lack of skills.

x Material and physical access

Van Dijk (2006) combines a resource based on a social position and network approach. Differences in physical access are linked to a circulation of resources (mental, temporal, social, material and cultural) that in turn accounted for by ascribed categories such as sex, age, personality, intelligence, ability and position in society (labor, education and household position).

x Digital skills

Previously, this category only paid attention to operational skills (van Dijk) or instrumental skills (Steyaert)[15]. However, many scholars paid attention to the use of

[14] See Dijk, J. A. v., 2006. Digital divide research , achievements and shortcomings. *Poetics,* Volume 34, pp. 221-235.

[15] Steyaert, J., 2002. Inequality and the digital divide: myths and realities. In: *Advocacy, activism and the internet.* Chicago: Lyceum Press, pp. 199-211.

content-related skills as requirement on using internet and computer successfully. Van Deursen and van Dijk refined the concept of digital skills into six types based on its relation to medium and content. The medium related digital skills are; operational skills and formal skills. While the content related digital skills are: information, communication, content-creation, and strategic skills (van Dijk, 2012).

1) Operational skill is action required to operate digital medium.
2) Formal skill needed to handle formal structures of the medium like browsing
3) Information skills are involved searching, selecting and evaluating information in digital media such as search engine
4) Communication skills are contacting, mailing, creating online identities, draw attention and giving opinions
5) Content creation skill is making contribution to the internet with particular plan
6) Strategic skill is ability on using digital medium to achieve specific personal and professional goals

x Usage

It refers to how individuals use the internet technology itself. Despite having the skills, some people do not actively use the internet. Factors like; usage time and frequency, number and diversity of usage applications, broadband or narrowband use, and more or less active or creative use determine or influence how someone uses internet. Most internet users is relatively passive and consuming. Advanced computer and internet users have active contribution such as creating personal website or weblog, posting on community board and doing activities related to educational, business and work purpose besides information and communication channel.

Concept of access demonstrates indicators on aspects for assistive technology to influence VI's life and mobility. Digital skills and usage may indicate relation of their fluency and utilization of the devices and thus conveys impact of its usage to their mobility which identify to possible different connectivity and influence to mobility.

2.5. Conclusion

People with VI are somehow restricted to perform regular activities and caused their mobility to be limited in certain ways. The development of smartphone allow VI to take

the benefit of being users through the availability of screen reader which also lead to access more applications with assistive functionalities. This kind of technology is proposed to allow VI's involvement within regular activities independently, participation in work and educational activities and also ability to travel easily on their own.

The idea of technology's influence to mobility of VI however separated by possible external barrier like inaccessibility. However, aspect of access within the users to technology is also becoming a crucial matter that determine the depth of smartphone influence to mobility of VI users, since assistive technology is user-centered, the knowledge of related topic also becomes one of the main factor.

CHAPTER 3 METHODOLOGY

This chapter provides methodology used to answer the thesis' research question. The provided information in this chapter is expected to help future research with similar objective. This chapter consists of: *Design, Preparation, Phenomenological Study, Participants, Sampling, Data Gathering, In-depth Interview, Participant Observation, Secondary Data, Ethical Consideration, Data Analysis, and Trustworthiness.*

3.1. DESIGN

Research design is a reflexive development of work through every stage of project (Hammersley & Atkinson, 1995). This study used qualitative method started by collecting casual information (such as various news articles and forums), gathering literature review and learning about potential respondents. Qualitative study gives opportunity for innovation and to work more with researcher-designed frameworks (Creswell, 2003). The study's subject was Android-based and iOS-based smartphone VI users in Jakarta with different level of digital skill.

I used phenomenological study with purposive snowball sampling. Phenomenological study defines what an experience means for the person living in the experience and offer ability to provide a comprehensive description of it (Moustakas, 1994). I used in-depth interview to explore respondents' perspectives, opinions and experiences on how smartphone influences their mobility and transformation in conducting activity. And participant observation to collect respondents' usage of smartphone during their activity. I also employed secondary data as additional input to provide a new perspective to existing data, use data elements that have not been fully analyzed, and form a base for comparison with newly collected data (Ritchie, et al., 2013).

3.2. PREPARATION

Before entering the research field, I made sure that the objectives of this research were set: 1) study influence of using smartphone to VI mobility in their environment 2) learn

the effectiveness of smartphone 3) to examine transformation upon using smartphone. I talked to some people I thought would be suitable as respondents and asked various questions regarding research topic informally. This was to gain some insight related to recent phenomena according to the subject. Besides that, I also searched some informations regarding research.

During research, I tried to provide time for the entry process and seek an opening through, to be able discovering the players and the operations of the world within (Rossman & Rallis, 2012). However, I fully realized the personal bias present that I am not a VI and had only worked with VI that provided me informal understanding about issues they are facing. To compensate this bias, I had interview session with several respondents and staffs from Mitra Netra foundation informally provided guidance. I was guided academically by a supervisor. In the sense where I built closer rapport to achieve objectives, casualty was involved at some points.

Participants were members and people involved with Kartunet, a community focusing on development of people with disability mainly VI through ICT (Permana, 2016). This was to assure participants' digital skill at least at the very basic. The community is mainly run by VI and volunteers. It organizes online-based programs through website and social media and weekly computer learning program[16]. I contacted some respondents through personal contacts and the others via recommendations. Interviews were done face-to-face with help of recorder in fairly quiet place and observations with note without causing harm to respondents.

3.3. PHENOMENOLOGICAL STUDY

To fulfill the objective of this thesis, I conducted study with phenomenological approach, where researcher looks up to understand the profound meaning of someone's experiences and how she articulates these experiences (Rossman & Rallis, 2012). It was Alfred Schutz (1899-1959) who is considered as the scholar whose works launched phenomenological social science. The process includes studying a small number of participants through engagement to develop forms and relationship of meaning (Moustakas, 1994).

[16] See www.kartunet.com/profil/

It requires researchers to set aside their experience to understand participants. I studied participants through direct interaction to learn common experiences and highlight differences. Phenomenology gravitates to meaning and reflectivity, it is caught up in a self-reflective pathos, discerning meaning in sensing the world of things, others, and self (Manen, 2016). Qualitative researchers conduct study in their original settings, to understand phenomena in the significance people bring to them (Denzin & Lincoln, 2000). This is like how Welman & Kruger (1999) stated that phenomenologists' concern is to understand social and psychological phenomena by the perspectives of people involved.

In adopting phenomenological study, one must learn to regard data which are objects, events or activities that were not 'seen' before to be 'facts that were there all the time'[17]. This approach involves a return to experience in order to attain complete descriptions that provide the basis on structural analysis depicting the essences of experience (Moustakas, 1994). Phenomenological study is appropriate for this research because VI are audiences whose assumptions and opinions affect their perception, also how they are identified.

3.4. PARTICIPANTS

In phenomenological study, the sample selection requires individuals who have experience with the topic and are able to communicate it. Thus, I seeked voluntary participant of acquaintance, friends, and friends of friends, whom I know or recommended as Android-based and iOS-based smartphone users with certain digital skill. The digital skill are divided into three: 1) *advanced*; involvement with internet marked by active contribution to achieve their professional and personal goals through web development, programming, blogging/ social media posting; 2) *average*; involvement with internet marked by semi-active contribution to achieve their professional and personal goals like basic knowledge of simple programming, irregular blogging/ content creation; 3) *low*; less involvement with internet compared to two previous categories, passive and consuming usage of internet, less understanding of digital practice derived from van Dijk (2005)[18].

[17] See Psathas, G., 1989. *Phenomenology and Sociology: Theory and Research.* Washington DC: The Center for Advanced Research in Phenomenology and University Press of America, Inc.
[18] See Chapter 2, Concept of Access

I recruited participants via *Whatsapp* messenger, SMS and phone call to follow up agreement. Later on, I interviewed and observed participants according to appointment. I targeted those in Kartunet, a blind community founded by four visually impaired people which focus is on disability empowerment for its members and disabled people in general through the use of internet technology. I also had previously volunteered with the community for six months, where it provided an easier access to meet the people and assured the required criteria was fulfilled (Taylor, et al., 2016). However, by previously volunteering does not mean I have gained full rapport, it only switched on the green light to participants' trust as researcher needs to blend into the situation if observations are to be made of the participants in their natural settings (Moustakas, 1994).

The study involved nine respondents consisted of three for each category as presented in Table 1. Respondents were those with both low vision and blindness of different causes such as glaucoma, retinal detachment, birth defect, or cataract with different activities and occupations. The participants' background enabled researcher to achieve a deeper understanding of participants' experience and to cultivate a rich description of that experience (Creswell, 2009).

Table 3.1. Respondent's data

No	Age	Sex	Phone OS	Digital Skill	VI	Since	Education	Going Out	Other Phones	Occupation
1	28	M	iOS	Adv	B	2000	BD	Occasional	Symbian	Internet Marketer
2	24	F	iOS	Ave	B	Birth	BD	Occasional	Android	Freelancer
3	42	M	iOS	Low	B	2001	D	Regular	Symbian (2)	Phone Operator
4	29	F	iOS	Ave	LV	1994	BD	Regular	No	Content/ Social Media Administrator
5	22	M	Android	Adv	LV	Birth	EB	Regular	No	Student/ online seller
6	25	F	iOS	Low	B	2004	EB	Regular	No	Telemarketer/ student
7	28	F	Android	Ave	B	2012, LV 2006	D	Regular	BlackBerry	Businesswoman/ teacher
8	27	M	Android	Adv	B	2000	BD	Regular	Symbian	Private tutor
9	30	M	Android	Low	LV	1991, B 1988	PB	Occasional	Symbian	No

***B:** Blind **LV:** Low Vision **BD:** Bachelor's degree **D:** Diploma **EB:** Enrolling student of bachelor's degree **PB:** Postponing bachelor's degree*

3.5. SAMPLING

If the study population cannot be traced through official statistics, a sample frame will need to be specially generated (Ritchie & Lewis, 2003). I employed judgement sample or purposeful sample to select respondents. In the research, snowball sample took the role

of selection, where it starts with one person or small number of people, win their trust, and ask them to introduce others (Taylor, et al., 2016). I reached other respondents through some VI respondents I have known who gave recommendation according to the requirements. . In this research, I took nine participants.

Snowball sampling has advantage like enables access to hidden populations stigmatised in the society or considered different. Since the process involves recommendations from known person, trust may be developed and it can also produce in-depth results relatively quickly (Atkinson & Flint, 2001).

3.6. DATA GATHERING

I gathered the data through in-depth interview and participant observation during August 2016 in Jakarta and nearby areas where respondents' activities were conducted. I was always carrying the recorder and notes during the data gathering process. The qualitative approach combines more of a literary form of writing, text analysis programs, and experience in doing open-ended interviews and observations (Creswell, 2003).

All respondents fully realized my goal and what I did throughout the process of data gathering. Prior to that, I also asked for respondents' consent by reading the agreement terms and requested for their signatures. This was to *"acknowledge that participants' rights will be protected during data collection"* (Creswell, 2009).

3.7. IN-DEPTH INTERVIEW

Each interview lasted around 45 minutes to 80 minutes with open-ended and close-ended questions. Seidman (2006) noted the origin of in-depth interview as interest to understand the existed experience of others and the importance they make of that experience, yet an interview is still a particular type of purposeful conversation (Wildermuth, 2017). The interview guide was prepared beforehand but new questions emerged during interview session.

I reached respondents by visiting their houses or places they decided. The interview was done face-to-face, which has been long claimed to provide a stronger basis of a

connection between researcher and participant, helping interviewee to respond in a free ranging and full way (Ritchie & Lewis, 2003).

I recorded the interview using a recorder application in smartphone application. Interview was done in the quietest place available although some small noise still reached. All the interviewees were those agreed to sign the Letter of Consent after I read the points. The questions were asked in Indonesian and translated into English for this publication.

3.8. PARTICIPANT OBSERVATION

I started the observation based on respondents' decision as the starting place to follow their journeys and activities including house, office and institution. I observed respondents by following their activities and focused on their mobility, smartphone usage demonstration and integration to their activities, and congruence with the interview. In this case, as Spradley (2016) defined, researcher was present at the scene of action but did not participate with other people around to any great extent.

Participant observation was performed within the range of 6 hours to 12 hours depending on respondents' activities. I used notebook and pen to take note. Smartphones used were respondents' own devices. Respondents' activities were not simulated. I also did not suggest respondents in a sense of giving out advice throughout the session or offer any new instrument because qualitative researchers *tend to collect data at the site* where participants experience the problem in study, they do not take them into lab (a simulated situation), nor do they normally send out instrument for them to complete (Creswell, 2007).

3.9. SECONDARY DATA

Secondary data can provide a new perspective to existing data, utilize elements of the data that have not been fully analyzed, or form comparison with newly collected data (Ritchie, et al., 2013). I studied various concepts and previous researches to obtain further data and information. Journal articles, textbooks, newspaper articles and conference proceedings were employed to complete this study. Information regarding VI was gathered through database of Indonesian Ministry of Social Affairs, Indonesian Central

Bureau of Statistic and many academic articles as a triangulation to ensure the validity since different data sometimes emerged due to error caused by various reasons.

3.10. ETHICAL CONSIDERATION

The study involved human as the research object, thus ethical issue was taken as important matter since the beginning. Attention to ethical issues in qualitative research is being increasingly recognized as essential (Christians, 2000).

As mentioned above, I read and explained points in Letter of Consent[19] to respondents prior to data gathering. After that, respondents were also guided to put their signatures on. I gave information on contact number and email of associated institution in which respondents could reach if any inconvenience occurred. Respondents were joining the research based on their own willingness. As researcher is required to conduct an assesment of risks and benefits of research and to ensure that subjects grant informed consent to participate (Taylor, et al., 2016).

Other than that, respondents were also fully informed regarding to the purpose and objective to this study and that their answers will be kept confidential only for this study and academic purposes. During the research process, I also attempted to create comfortable climate and conduct the procedure in a way which would not intimidate respondents. There were no abuse or harm both psychologically and physically to respondents during the research development.

3.11. DATA ANALYSIS

Phenomenology implies a process which emphasizes the unique own experiences of research participants (Groenewald, 2004). The data analysis was based on interview transcription and note of participant observation. The analysis used phenomenological analytic by Moustakas (1994) which includes *phenomenological reduction*, *imaginative variation* and *essence*. It is basically descriptive analysis with development of meaning through the phases.

[19] See Appendix A

Phenomenological reduction is the step where researcher describe what is seen between the relationship of self and phenomenon. It is done through *horizonalization* where every similar statement of all respondents considered as equal and classified as one, *delimited meanings* which is used to explain the different statement emerged, and *individual/ composite textural description* to portray the complete experience. It is a purposeful opening by researcher to the phenomenon "in its own right and its own meaning" (Hycner, 1999). *Imaginative variation* involves structuring themes for all the experience. Groups of themes are typically made by gathering units of meaning altogether (Creswell, 1998). *Essence* is the step to integrate all textural descriptions and develop the meaning out of them. At this point, according to Sadala & Adorno (2001), researcher "transform participants" everyday statements appropriate to the scientific discourse of the research.
Miller & Salkind (2002) explained procedures on conducting a phenomenological study by: 1) Analyzing the data begins with identifying significant statement of participants that capture research topic, 2) Reduce significant statements to meaning units or themes. Researcher looks for overlapping and redundant statements to combine them into meaning units, 3) Analyze the context in which individual experience the meaning units, because it is a structural experience where to understand phenomenon, setting also needs to be understood, 4) Write detail analysis of the essence of participants' experiences. Essence captures common experiences by participants.

3.12. TRUSTWORTHINESS

Trustworthiness of research is needed to ensure the quality of findings in a qualitative study. Reliability and validity is a common question in qualitative research because it does not follow the same scientific procedures as quantitative research (Cho & Trent, 2006). I adopted Guba's (1981) criteria that should be considered by researcher to achieve trustworthy study (Shenton, 2004).
First is credibility, which researcher fulfilled through provisions mentioned such as: 1) *the adoption of research method* in which I used phenomenological study by looking up to procedures mainly by Moustakas (1994) and supporting sources like Giorgi (2007), van Manen (2016), Hycner (1999), and Psathas (1989). For the updated works, I looked up to some researches with similar method/ topic such as M. Joseph (2010) and Candido

(2008); 2) *the development of early familiarity with the participants* in order to gain adequate understanding and establish trust. I was a short-term volunteer in the community which members I invited as participant, however I was not immersing myself and realized my position as researcher; 3) *triangulation*, where researchers search for unify among distinguished and multiple information sources to form themes in study (Creswell & Miller, 2000). Identifying Denzin (1978) four types of triangulation, I used multiple sources by interviewing and observing multiple participants (across data sources) and conducted research through interview, participants observation and secondary data (across methods); 4) *tactics to help ensure honesty in informants* was employed by explaining research purpose since the very beginning and giving opportunity for potential participants to withdraw, during the data gathering participants were also given Letter of Consent to sign which clarified their ability to withdraw at any point, lastly I tried to build rapport before and during the research.

Secondly, transferability is concerned to trustworthiness. It is whether one study's finding can be applied to other situation (Merriam, 1998). However, Erlandson, et. al (1993) noted that observations are defined by specific context where it occurred. Replying to this, Bassey (1981) stated transferability is possible others may relate to the findings if situation is similar. Thus, this research finding might be applicable to the other situation where it involves VI with digital skill and a smartphone user. Third, dependability which involves research process complete details. It can be seen through the research design, implementation and operational detail of data gathering which I explained earlier in this chapter and implication of the project which can be found in the fifth chapter. Fourth, confirmability which concerns to objectivity. I have explained earlier in this chapter on what bias I have yet, I tackled that through various methods such as triangulation and other steps I have explained.

CHAPTER 4 FINDINGS

This chapter elaborates study in four sections; *Presentation of finding* summarizes research questions and research method employed in the study, *Findings* gives details of research results, *Summary* abridges result of finding elaborated in the previous section to the next chapter.

4.1. PRESENTATION OF FINDINGS

The purpose of this study is to find out the influence smartphone usage has to mobility and life of VI with different level of digital skill, have accessed computer in their life and also own an Android or iOS-based smartphone. To achieve goal of the research, I used a question and two sub questions as follow:

1) *What is the influence of smartphone usage to mobility of VI in Jakarta which environment is relatively inaccessible?*
Sub questions:
2) *How effective smartphone is in assisting daily life of VI?*
3) *How does smartphone usage transform the life of VI?*

I gathered data through in-depth interview and participant observation during August 2016 in all around Jakarta. Each interview lasted around 45 minutes to 80 minutes with open-ended and close-ended questions. The interview was done face-to-face between each respondent and researcher. Participant observation was performed with between of 6 hours to 12 hours. Numerous journal articles, textbooks, newspaper articles and proceedings were also employed to complete this study.

4.2. FINDINGS

The findings are divided into themes drawn from research results which have been analyzed with a set of method presented in the previous chapter and linked to the research

questions. Additionally, relation of respondents' digital skills and background is also presented as different aspect that emerged in the study.

4.2.1. Answer to Research Questions

Based on analysis done to the research data using phenomenological analytic, the findings show similar practices that often appeared among respondents and they can be classified into different themes based on *research questions*. The themes are also constructed from *the experiences of participants* not as an individual but as part of pattern formed by the similarity and *convergence of experience within different individuals* (Ayress, et al., 2003). Themes come from the data of study and from researcher's prior theoretical understanding of the phenomenon under study (Ryan & Bernard, 2003). Although, some experiences and practices also appeared less prevalently among respondents. Themes represented below are according to their frequency.

RQ: What is the influence of smartphone usage to mobility of VI in Jakarta?

Most of the times, mobility of VI is defined or linked to freely moving (D'Atri, et al., 2007), ability to move safely (VisionAware, 2016), spatial task (Hersh & Johnson, 2008), or set of movement needed to perform activities (Hache, et al., 2011; Syzlik et al., 1997). However, the research showed that influences of smartphone to mobility of VI involved activities with both physical movement and non-physical movement. In fact, most of them showed that the latter influence emerged dominantly.

Travel

VI usually need assistive technology to support mobility and keep travel independently within environment (Hersh & Johnson, 2008). This part is result finding related to travel activity that involved possibility of freely moving, without support or any companion, at home, in public and private buildings, and in open spaces (D'Atri, et al., 2007). Smartphone allowed all respondents despite digital skills to be involved in independent *far-space mobility* to reach varied places including regular, known, unknown or difficult to reach destination by using several transportation-based applications alternately. The applications let VI to take a semi-private car or motor taxi to their intended destination

by connecting them to nearby drivers. This aspect was especially influencing four blind respondents of different digital skills who relied solely to the applications when going out, while the rest of respondents still utilized different alternatives like escorted by family, using motor taxi and taking public transportations. A mid-skill and a low-skill respondents with highest visual acuity still took public transportations despite many transits and change of modes where they faced no problem.

Five blind respondents of all digital skills conquered navigation on the road like checking destination or direction and looking for traffic by regularly using navigating application for trip with transportation. One partially sighted respondent with low-skill had tried using navigating application to help him in new spatial task for *near-space mobility*. *"We used google maps, we were confused we kept turning and turning. But in the end we found it"*. However, he did not indicate a regular usage of the application. Findings emerged that all respondents commonly relied on body-centered reference (partial vision and/or sense of touch), conventional assistive technology (white cane), or other people's assistance.

Productivity

Productivity is closely related to the use and availability of source, also linked to the conception of value (Tangen, 2002). Meanwhile Japan Productive Centre (1958) defined productivity as personal issue related to improvement of one self and his/her surroundings which involving achievement with available material, capital and technology (Tangen, 2006). Based on these definitions, all respondents except one respondent with least digital skill demonstrated various utilizations of diverse applications on smartphone to improve themselves, conduct their activities and achieve their specific goals. Work, business, education, organization and financial transaction were the purpose discovered among respondents' smartphone usage.

Followings are the use of various applications by all respondents: 1) Social media was helping respondents' business, used to help professional activity of one respondent in managing company profile, and providing references for other respondent's academic life; 2) Social media manager became alternative as an all-in-one management tool of professional social media accounts; 3) Email was used to support one respondent's work involving checking, reading and sending message; 4) Mobile-banking supported easier

and safer online financial transaction without the need to reach ATM or using inaccessible secure remote; 5) Learning applications provided various educational assistances for respondents to learn different subjects such as languages and religion; 6) Document reader opened access for respondents to read text-based files; 7) Instant messaging services bridged respondents' professional communication with colleagues, clients, and customers; 8) E-commerce facilitated the need of trade where it opened up opportunity for respondents to be online seller; 9) Camera provided portable tool for photograph that will be used in respondent's website later; 10) Online storage helped respondents to integrate files between phone and computer; 11) Online library helped respondent to borrow books online.

Results presented that the utilization of applications in productivity aspect appeared to equally influence respondents of average-skill more than others. Out of 11 applications utilized, seven were used by different respondents of average digital skill, who typically employed three to five applications. Other digital skills showed a lot of utilizations from one of their respondents' productivity and less or no utilization from the others. Such as exposed by one advanced-skilled respondent who employed four applications, while the other two respondents only used two. One low-skilled respondents used three, another one used one, and the other used none.

Information

All respondents had used various phone features for purposes like communication and accessing info via browser, social media and news applications, where the last application was generally owned by all respondents except third respondent who only used his phone to call and learn chatting. Two average skilled respondents downloaded documents. Sixth respondent used learning application for her study and religious purpose. Some respondents were still occasionally using SMS. Second respondent used an assistive application to read scan result.

Entertainment

Almost all respondents also used their phone to have fun. The most used applications were games of different types such as text-based, audio-based, RS (games for the blind) and quiz. Only third and seventh respondents did not have any games or downloaded

'fun' applications on their phone. Some respondents also used music player or listened to music via application. Respondent 9 also used TV streaming application. While first respondent of advanced digital skill used some other applications such as location-based SNS, radio and video streaming and audio description.

Environment Identification

Morris & Mueller (2014) emphasized that smartphone puts assistive technology within pocket with its download-ability, making it a *physical enabler* (Hersh & Johnson, 2008) for VI to access environment and recognize object. Yet, looking to the research findings, only two out of nine respondents had been using assistive applications, respondent 2 of average digital skill and respondent 8 of advanced digital skill. They used phone of different OS but engaged with two applications of the same functionalities; *talking camera* which basic principle is to help app user to position phone's camera via voice guide while taking picture of face (Fueneco, 2016), and *money reader* which integrates phone's camera and image processing technique to recognize a money currency through audio announcement (Paisios, et al., 2012).

Respondents considered the applications as useful. Respondent 8 stated that he used money reader applications almost daily in all physical money-related activities including paying for motor taxi and occasional shopping, which was seen during the observation. Meanwhile, respondent 2 stated that she used both applications quite often whenever she needed, although she was mostly seen to be cashless during payment process or utilize online shopping. Yet, study also discovered that respondent 2 had been using more assistive applications such as object identifier, book reader and words-in-picture reader. Respondent 2 exhibited the function of object identifier application which informed her the places in surrounding area during trip with a car. Words-in-picture reader helped her to access various digital content on internet.

RQ: How effective smartphone is in assisting daily life of VI?

Higher internet access and computer usage were present on employed disabled people (See Chapter 2), showing that different elements involve in the usage of technology rather than just impairment. Similar results were also discovered in the research. The influences

that emerged on various aspects of VI's life, despite providing opportunity as physical substitute, are still related to several factors that lead to effective usage achievement.

User's Knowledge

User's knowledge helps assessing various applications. It is needed to guide on using the technology and in the end, be able to participate as user. This aspect showed that a respondent with the least digital skill was affected negatively. While other respondents of all digital skills could come up with solution or found alternative despite being affected.

Typing on touch screen were mentioned by three respondents of all digital skills as *annoying, difficult for fast typing, not comfortable* and *distracting especially while on the road*. However all three respondents found alternative for their typing activities to physical keypad on the same or different phone, one of them also preferred *voice note* feature which allowed him to simply record his message. On the other hand, a respondent of low digital skill did not only find typing on touch screen as difficult, but generally thought touch screen as confusing for most activities like replying message, inputting numbers and answering call, *"when I wanted to answer I just turned off the VoiceOver in the end"*. He also had someone installed application on his phone. An average-skill respondent admitted inability of using navigating application as the reason she did not use one. Meanwhile, other respondent of the same skill still could not find a comfortable way on using navigating application while walking,

> *"I haven't learned how to use the map, so it's like that. I haven't discovered a comfortable way to use it, I mean my right hand will hold the cane and my left hand holds the phone*". (Respondent 7 on navigation assistance)

Low-skill respondent successfully found his desired application which was the reason he used smartphone frequently. Inaccessibility came as a problem in the beginning of application usage, experienced by respondent 8 who found many mobile banking features were unreadable and needed him to rename them for future use. Many respondents mentioned confusion and weird sensation while using Indonesian screen reader which

made them opted to English screen reader, although some still occasionally altering to native language when needed.

Significance of Usage

This themes shows the influence of smartphone usage through its importance aspect among users. Despite their purpose to assist VI, object identifying application did not or had not yet come as crucial or important for some respondents of all digital skills who said that it was *only for fun, fulfilling curiosity* or *not useful*. Others did not find it useful because of daily activity with low mobility. However, an advanced and two average skilled respondents admitted that such applications were useful such as to read money and 'see' surroundings. Smartphone usage showed its significance mostly through its online transportation application. Respondents conveyed that it had been really useful, alternative to uncomfortable public transportation, increasing independence for all and facilitating mobility,

> *"When it is past the dusk, at that time my sight will be decreased, so rather than crossing the roads, looking for minibus, those are awful, I better take Uber"*. (Respondent 4 on online transportation)

Navigating applications were also mentioned by some as important. It helped directing whilst on the journey both by vehicle and on foot. Other significances of smartphone usage were for communication, education, informational and work purposes through applications like social media, messenger, email, learning and news application. Respondent 7 even used an inaccessible social media to boost her business. Respondent 2 used camera and messenger to get help from friends to pick clothes when she was alone. One blind with advanced skill felt the significance of having 'rename' feature on screen reader to change the label of many unreadable and inaccessible applications.

Usability of Applications

Usability of applications refers to aspect of smartphone applications/ features where its usage actually helped respondents to do certain things related to their mobility and life independently. This is examined through study findings linked to components of

learnability – easiness to do basic task; efficiency – quickness to perform task; and *utility – availability of needed features* (Nielsen, 2012). All respondents experienced both positive and negative sides of this aspect except respondent with lowest digital skill who did not quite explore his smartphone. Application-based transportation proved to show the highest usability, thus deemed effective for all respondents. It helped respondents to travel without assistance, except third respondent who did not independently conduct his travel as he depended on others' help for its usage and even installation, although he did use the service alone. A respondent of average skill had had been using online delivery features of an application-based transportation for her business.

Various utility emerged among respondents, except one respondent of low digital skill. Applications that showed utility are like e-commerce that helped to shop, social media for personal and professional use, online file storage, object identifier, audio recorder that helped recording from far away, mobile-banking for independent financial transaction, radio and news application to access information, and voice note which provided faster and simpler alternative of typing. A respondent of average digital skill also told that the availability of physical keypad on her smartphone put a good combination of accessing applications and typing easily as she needed. Some positive elements are categorized into; *excellence of application* where no problem encountered during usage; *accuracy* where application worked as expected; *accessibility* which eased respondent to conduct activity on phone; *flexibility* which characterized phone as a whole; *adequate* to support respondents' needs; *responsiveness* which increased practicality of applications; *affordability* that opened door for using smartphone; and *clarity of signal* which benefited while accessing information.

Yet, respondents also experienced the opposite. One average and one low-skill respondents with regular activity outside felt that application-based transportation was not *efficient* enough for their daily need. One respondent of average digital skill discovered the *utility* of social media for professional mean yet did not meet the *learnability* and *efficiency* component in it because the social media was inaccessible therefore required her to be assisted on using it. An advanced-skill respondent also needed other people's help to use renaming feature in his phone, which purpose is to use inaccessible applications. Besides that, unfeasibility for writing long document, inability to save file, manual registration requirement to use application, and navigating

application that guided walking with too many unnecessary turns are other experiences that presented missed usability aspects to achieve effectiveness of using smartphone for respondents. These can be categorized into; *inaccessibility* that made respondents needing assistance and unable to use application; *phone's specification* that impacted respondents to limit their access to more diverse applications/ features; *inaccuracy* of application that made it less satisfying, unable to be accessed, and caused to conduct wrong operation; *disadvantaging policy* of application that limited or stopped respondents' access to certain applications, not for its technical or user ability's factor but rules of the application; *irresponsiveness* which reduced efficiency and practicality; *over-advertisement*; *battery drainage*; *bad connectivity* that lead to less optimal use of application feature; *simplification,* which made phone version of all things provided less features compared to web version counterpart and brought less satisfying experience.

RQ: How does smartphone usage transform the life of VI?

Assistive technologies facilitate the life of VI by becoming a substitute to their vision, so does smartphone. Research showed that through the use of smartphone, their life transformed by the availability of more accessible features and facilties also by looking at their ability to conduct life independently.

Accessibility

Seven respondents had lost vision before old cellular phones became affordable and two respondents turned blind when phone's screen reader was not around yet. Looking back, all respondents had some experiences with their old cellular phones while indirectly compared them with their present smartphone and confirmed changes to a more accessible and supportive device afterwards. Although at many points, respondent 3 of low digital skill stated otherwise.

-Multitask Ability

All respondents who lost sight before screen reader experienced using silent phone, memorizing keypad and phone numbers, could only use phone for calling, and sending message but unable to read incoming message without assistance. After screen reader, all respondents admitted that they experienced limited choice of features, relatively frequent

technical error, and inaccessible content. Smartphone brought them diverse choices of features and applications according to their needs and likes in more accessible medium. Screen reader also became more responsive. Respondent 3 however, did not seem to receive many changes besides using communication feature.

Accessing information:

"Since I like reading, I am happy that I can get e-book now, I can download app to read news and sort of things". (Respondent 4).

Blind assistance:

"*I also installed android money reader… now I use it almost every day"* (Respondent 8)

Transaction:

"All the money transfer apps sort of, they were not even existed during nokia time… Now, I feel more convenient to transfer and do many things via phone" (Respondent 2)

-Increased Connectivity

Even though respondents had experienced using mobile internet before owning smartphone, they claimed that the connection used to be really heavy, slow, and limited. However, the connection had grown more stable and became less of a problem when they accessed all the internet-powered applications. It was only respondent 3 who was still actively using his old phones said that he used to be able checking email on his phone but right now he could not.

-Convenient Navigation

"When I wanted to write C for example, it would be in the keypad of number 2 and I'd need to press 3 times… when I was still using nokia, it was really manual, I really had to be super patient to read each pages"

Above was the representation how VI used to operate mobile phones, as told by respondent 8 which also represented other respondents' experiences. Using smartphone put a change to the way they operate their phones. Not only the availability of screen reader widened their opportunity to access the features of the device, smoother user interface also lead to a more comfortable navigation.

-Alternative Options

Using smartphone brought opportunities for respondents to be provided with many alternatives through service on applications. These alternatives include; *transportation* – where respondents can reach semi-private transportations of their choice as they need rather than coping with difficulty to use public transportation which is relatively inaccessible, quite expensive, and sometimes unprofessional; *communication/ information* – respondents are provided with many choices of medium to communicate with others through text or voice and access to various accessible sources of information from a flexible device unlike in the past where it was more limited; *transaction* – respondents have better access to daily activity like shopping, money transfer, or selling goods through various online applications that they choose.

Independence

In the past, many respondents of all digital skills were less confident to go on their own, only taking the small-size public transportation and heavily depended on someone else to go out and walk. One respondent even decided to work from home to avoid going out too much. They all had tried going out alone, but mostly preferred to have companion and at certain points of their journey needed help. Some respondents had always been going out alone or without companion of sighted people, yet some problems often arose like falling to the gutter, passing farther their initial destination, being unable to cross the road or difficulty to see the transportation's number. Problems to reach certain places where transit was needed also became respondents' discouragement. Other than that, some respondents felt that they used to feel like a burden when they should ask for help, such as for transferring money in ATM.

Using smartphone contributed to some changes in respondents' life. It made their life easier and more comfortable. All respondents also started to go out on their own without

worry or did not feel to be burden to family by asking to be escorted anymore. They became less likely to encounter previous hardships like falling, inability to cross road, passing farther than initial journey or difficulty to see detail, because they could use online transportation which would reach them right away. Respondent 8 of advanced digital skill who used to be annoyed going to new places because of the hassle, started to feel comfortable going to many places on his own after using application. Besides that, respondents also told about increased confidence of going out alone, because application-based transportations have better policy and regulation for customer service, as respondent 1 of advanced-skill said, *"We can complain directly and the company will return our money"*. Time estimation also became feasible and direct trip was possible. They also started to shop on their own by using application and did the transaction independently without asking other people. Respondent 7 of average-skill stressed on the easier uninstallation process of applications on smartphone compared to computer, which freed her to try out as many educational applications as she wanted without being too worried about technical problem. Even respondent 3 of low digital skill could go out on his own by using application help, although to be noted, he did not conduct the trip process on his own such as transportation-booking or even installation of the application and no other changes were seen.

Yet, it is not that respondents became assistant-free. Only the three respondents who are all partially sighted, seemed to be able moving without helps in different level. One partially sighted respondent with average digital skill seemed to walk almost freely and could handle obstacle without any assistance at home, public places and stairs. Other partially sighted respondent of low digital skill needed white cane once he was out of his usual space and crossing the road. The third partially sighted respondent was only seen walking alone without problem in very short distance and asked for various assistances in other activities. All the blind respondents, despite digital skills, needed assistance when walking indoor (including public places like cinema and mall) or outdoor while some carried white cane or using body reference like touching object in places other than their home environment. Some of the blind respondents faced serious obstacles while walking, like bumping into objects continuously and inability to predict object blocking their way which caused their mobility to slow down.

4.2.2. More Than Digital Skills

This research presented respondents who belong to three different digital skills and different backgrounds as presented in chapter 3. Looking to the age, youngest respondent is present in the advanced digital skill, while the oldest respondent is in the low digital skill, with the age gap of 20 years between them. The average of group ages also appears to be linear, where the oldest have the lowest digital skill ranging from 25-42 years old. However, research findings also showed that age and digital skills were not the only the factors which affected the numbers and effectiveness of influences smartphone brought.
According to Hersh & Johnson (2008), history of VI contributes to the approach of mobility in which late VI will have more problems developing strategy. It is partially true because; looking to the way one average-skill respondent who has been blind since birth could utilize many applications as her vision-substitute that in a way, increasing her mobility and access to more varied activities; and seeing how one respondent of low digital skill who became blind after reaching his 20s encountered a lot of difficulties and was fairly discouraged to use many features of smartphone, therefore caused him to be quite dependent on others. However, it is also not definite, as two respondents of advanced-skill who became blind during their childhood showed different independence in their mobility and while conducting activity. Respondent 1 was fairly dependent as seen while operating internet-banking and looking for objects[20]. On the other hand, respondent 8 was relatively more capable to attain independence on the same activities through the usage of applications.
Other than digital skill, reaching effective usage of new media also involves motivation, physical and material access, also usage factor.

Motivation of Usage

Despite the aspects that made smartphone applications became highly effective on helping respondents' mobility, this research found that respondents favored some smartphone's functions but also put less liking to some and showed more or less desire to be connected with certain applications. They found many applications to work well or knew the existence of possible useful application yet did not always choose to use them

[20] See Appendix C, Textural Description of Respondent 1

although it resulted to their dependence on others. Reasons like unnecessary, unwillingness to pay, and uninterested are stated by respondents of all digital skills to different applications.

Assistive applications are left out by all partially sighted and four blind respondents of all digital skills, although most of them had a fairly difficult time accessing environment and often asked for help. Two advanced-skill respondents did not use mobile banking, despite knowing that it means dependence on others whenever they want to conduct financial transaction. Application-based transportation did not always tempt an average-skill respondent who is partially sighted for regular use, because public transportation is still cheaper and manageable.

Physical and Material Access

According to Manduchi (2012), smartphone model might also challenge effectiveness. Some respondents, despite being skillful digitally, were not using some useful applications because of their phone's specification. Some respondents chose not to use applications they considered helpful because of their activities, such as the same regularity throughout the week to the same place which made uncertainty to be almost zero or occasional activity outside that lead to stable mobility within known area.

Respondents also provided different answers not to actively pursue the benefit of smartphone to their life, such as *mental-related issue* like fear to cause a problem while using the device or laziness to use applications; *social-related issue* like rejection and discouragement from certain institution or society; and *material-related issue* where it brought an ideal condition and support to respondents despite impairment, like availability of helper or private vehicle.

Usage

All respondents were all using their phone every day for communication purpose, exhibited by the use of instant messaging service. Eight respondents employed their phone frequently for various purposes like information access, vision assistance and navigation purposes. A respondent of low digital skill stated that he even used smartphone more than computer to access various things, while some respondents of higher digital skills insisted that both devices had different function. Respondents of all digital skills

accessed different applications regularly for their frequent needs such as social media, map (activated during trip), money reader and news application. Yet, respondents of all digital skills also did not use smartphone features and applications when compared to those of the same level of skills. And specifically, only third respondent of low digital skill who left his smartphone only for communication purpose while actively used his other phones for various activities.

4.3. SUMMARY

These findings discovered some influences of smartphone to VI's mobility and other fields. Respondents' experiences are varied and seeing back to their digital skill, there were some relations although not all showing linear result. The findings also showed how a shifting to using smartphone gave some positive transformations while also stagnantly kept them on requiring assistance of others and inability to solve emerging obstacles on their own. All respondents found smartphone to be effective, useful and seemed practical enough on supporting their life in the different level of usage despite different digital skill and type of VI, except for respondent who was not fluent enough to operate a smartphone and still preferred old phone. Common themes emerged in this study where they all provided information about the way smartphone facilitated VI, what kind of challenges and difficulty they could overcome after using one, also the obstacles that still could not be solved by using a smartphone. This finding leads to implication and discussion available in the next chapter.

CHAPTER 5 CONCLUSION

This chapter discusses implication and includes six sections which involves: *Summary of study, Delimitation and limitation, Difference from literature review, Implication, Recommendation, and Closing.*

5.1. SUMMARY OF STUDY

Using smartphone influences VI in the aspects of; *travel* specifically far-space mobility and navigation; *productivity* by enhancing access to conduct their activities; *information* as smartphone provides connection to data acquirement from various sources; *entertainment*; and *environment identification* by providing vision substitute or assistance and becoming a physical enabler for their impairment. Yet, the device does not always effectively influence VI because there are factors like; *user's knowledge* in regards to VI's ability as smartphone users to operate their device; *significance of usage* which relates to the importance of certain features or applications for VI; and *usability of applications*, an aspect that shows whether certain facility of smartphone really helps VI by looking at its benefit and the simplicity of operation. Nevertheless, smartphone increases the level of device's *accessibility* for VI and transforms their *independence* in some aspects.

Every respondents considered smartphone to be helpful and great assistive technology however respondents with low digital skills used it less practically and less significantly. It showed how respondents' experiences confirmed the *concept of access by van Dijk (2005).* Respondents of lower skill showed *rejection to medium* (smartphone) and *lack of skill* that led him to require much assistance. Yet, this does not mean that the number and type of influences went linear following the level of digital skill. Despite less skilled with computer, one average skilled respondents used many blind assistive applications that helped her daily life. A respondent of low digital skill also had been using navigating application while some respondents of higher digital skills did not know how to. These may relate to *material and physical access* also *usage factor*. *History of VI*[21] also affected the usage of smartphone, where assistive applications did not budge all the partially

[21]See Chapter 2, Mobility of Visually Impaired

sighted respondents who still relied on vision occasionally. Blind respondents needed applications' or others' help to conduct some activities. Respondent who lost vision later in life also showed more dependence and rigidity to use smartphone.

Smartphones did not transform most respondents' independence while accessing environment on foot, since based on the research, it did not provide applications with assistive characteristic to the extent as completely freeing them from the assistance of others specifically in the *spatial task* involving *near-space mobility* and *specific environment access*. Respondents' experiences also did not show good integration between environment and assistive applications, although it surely made environment more accessible for them. Research also presented that smartphones, like other assistive technology, is a user-centered system that required certain level of knowledge to be able accessing application and achieve benefit its function.

5.2. LIMITATION

This study reflected mobility experiences of VI on using smartphone by looking at the influences it gave and recounting the effectiveness it had also the change it brought to their life. The main source of the research was people with VI, where the perspectives were attained.

The observation result may only grab some aspects of their mobility without great depth since it was only done in one day for each respondent and only researched based on solely digital skill. Extended observation for more than one day was also seen as not possible because most respondents did not have regular outdoor activities where they had to make a lot of journey, access a lot of roads or go to unfamiliar places and the rest were working in an office where they were not required to move a lot for long period of times. The availability of certain application also allowed them to avoid too many movements to achieve goals that were assumed to require mobility.

Sometimes author had to be involved in assisting respondents during their activity due to some reasons such as absence of other people known by respondents who could help during emergency situation, absence of other people in general which made respondents asking for help to author, respondents were naturally holding onto author, or respondents' possibility of falling.

5.3. DIFFERENCE FROM LITERATURE REVIEW

This study presented influences of using smartphone to VI and their experiences. The study was shaped on the topic of VI's mobility. The research showed through phenomenological study that smartphone offered some helps and facilitated VI's mobility, life and various activities.

This research supported and enriched all the findings by previous studies where mobile phone helps enhancing navigation which is a part of mobility; smartphone application helps blind people navigate their nearby environment (Basulto, 2015); availability of navigating application for smartphone that helps blind person (Ahmetovic, et al., 2016); and smartphone is becoming multitasking, including as navigation (Rodrigues, et al., 2015).

However, other results also emerged which altered definition of mobility as ability to navigate (see Harper & Green, 2002) and aspects that involved physical movement (Syzlyk, et al., 1997; D'Atri, et al., 2007; Terven, et al., 2014) in fundamentally geographical space, and between locations (Green, 2002). This research presented results where mobility can shift after the existence of technology, which in this case is smartphone. Mobility of VI is no longer solely measured by how far they can access their surrounding but also by how many influences a smartphone can give to their life without literal movement. As how it is discovered in this study, where influences of using smartphone emerged mostly through aspects that do not involve physical activity at all.

The existence of mobile phone has offered great influence to connectedness among people to time and places, including the VI. Mobile devices present novel opportunities for information technologies where ubiquity and portability offered better access to people, in this research's case such as possibility for VI to be able 'seeing' through picture[22], as how the finding of this study has also demonstrated through respondents' activities.

[22] See Adams, D. & Kurniawan, S., 2014. A Blind-Friendly Photography Application for Smartphones. *SIGACCESS NEWSLETTER,* 108(January), pp. 12-15.

5.4. IMPLICATION

Implications were formed out of finding results regarding influence of smartphone to VI people's mobility. The presented material are based on content of chapter 4, textural descriptions, and themes available in appendices.

5.4.1. Mobility of Visually Impaired after Smartphone

Mobility of VI is formed by many factors. All the factors determined their mobility and influences smartphone brings to it. By simply being a digitally skilled did not take respondents to experience many influences from the features their devices offered. Other factors seen in the research were background of VI, preference, motivational access, physical and material access also knowledge regarding the specific technology, smartphone. All partially sighted respondents did not consider assistive application as important enough since they still could see, although they also used some applications from smartphone that elevated and changed pattern of their mobility. Meanwhile two blind respondents clearly stated the importance of assistive applications in their daily life and lead them to use some of them regularly. Preference brought different perspective related to personal choice. Some respondents still preferred using conventional services, asking for assistance albeit knowing utility of certain application they could install on smartphone. Some referred unfamiliarity to their regular routine as ineffectiveness of using application for regular mobility or felt that asking for help would be easier.

Physical and material access which involved phone's quality came as other implication of smartphone influence to respondents. Using various smartphones with different specifications lead some respondents to opt out from some facilities offered because they realized their phones were not up to handling such kinds of capacity and ability. Respondents' knowledges became other factor to influence mobility. Respondents who could operate navigating application receive benefit of it while the ones couldn't despite still did not experience anything, believed that using it would bring greater effectiveness. Different respondents talked about walking guide applications that they never heard of or had difficulty using since it would make both hands full of assistance while mobilizing.

Other than various factors that emerged, mobility of respondents also changed after smartphone. Being mobile did not always mean moving anymore. Watching movie, shopping, and working were some of mentioned activities that no longer required 'movement'. Application like audio description, ecommerce, messenger and various productivity support applications were applicable and practical enough to help respondents accessing various things in one device without moving. Yet they were still doing some activities considered to be part of mobility. Smartphone became really important, despite some dissatisfaction and problems mentioned. Life of VI received many influences and especially brought more independence to their lives in various arena with sense of definite safety, unlike in the past where memorization always played a role and many problems could arise unpredictably.

5.4.2. Implication for Activity of Visually Impaired

Other than mobility, respondents' various activity were also supported and facilitated. Influences of smartphone in fact appeared more in varied activities of respondents. Smartphone simplified and eased their lives through connectivity and accessibility via a single flexible device. Results even showed that all respondents were helped by smartphones in work, business, education and information, such as one respondent with lowest digital skill whose actual activity on his smartphone was mainly communication, since he did not use his phone to access applications that helped his mobility.

These diverse fields that were influenced by using smartphone, indirectly related to increasing and decreasing respondents' conventional mobility. The availability of applications like messenger, learning applications, ecommerce, news and many others, brought access to respondents to different things without the need of taking their body to walk. Like a respondent who honestly acknowledged how he always invited buyers to his house to take products rather than have a meeting outside (see Appendix D).

5.4.3. Consideration of Producer and Application Developer

Accessibility seemed to be less of a concern for respondents, despite some applications were still fairly unusable. Accessibility might come as a concern for general application

developer to consider, as VI was considerably active users among others where they also used the application quite regularly. But, phone producer might also want to launch variants of good quality smartphone with physical keypad, as it became problem for VI users to conduct activity that required lots of typing by using touch screen. Assistive application developer might also want to consider exploring environment, putting emphasize on accuracy and carefully integrating application with its targeted object before releasing assistive application to public, as some respondents still felt that such application was not practical in their area. Developer could also gathered input from government or area's landscape expert pre application's production.

5.5. RECOMMENDATION

This study focused on influence smartphone brings to mobility of VI. Many insights have been gained from the study yet many different questions also emerged as this research only took VI's perspectives considering their digital skill and very brief general background such as type of blindness and activity. I believe factors like personality, daily environment and the device itself will draw a better understanding on influence of smartphone to their lives. As van Dijk (2005) also elaborated in his concept of access, motivation, physical and material access also usage factor are three other concepts besides digital skill that characterize achievement of new media usage. Personality might be explored by psychologist who can have a better understanding of preferences and liking VI have on assistive technology. Daily environment will be able providing deeper understanding on relation of technology's effectiveness and support of environment. Meanwhile perspective of device type will be better researched by respective expert who can relate to VI. Conducted in qualitative manner, this study did not cover wider participants. Despite being deeply researched, different perspective such as through quantitative method which generalized manner can bring countable experiences and will provide more diverse information to those who are interested to the basic research regarding this area of topic.

Through this study, I also hope that professionals involved in the area of application development can get better understanding on what VI needs but not yet fulfilled. Developers can research further to gain more knowledge to behavior and condition of VI

and problems they faced in the area where environment is less supportive. Besides that, policy maker might be able to improve practical implementation on regulations that directly and indirectly impact VI. Government also can have a better integration in the environment and develop a friendlier and more accessible living area for the VI to be able attaining the benefits of assistive technology.

5.6. CONCLUSION

Possessing digital skill has helped VI to improve their life by utilizing technology no different than what other people use. Digital skill, in fact, contributes to a more active and productive use of smartphone that helps activities of VI. The existence on smartphone and various functions it offers to VI brings positive breeze. In fact, through the study result, it was discovered that progressive influences are present and life quality of VI are indeed evolved in some aspects. Nevertheless, many expectations of assistive technology that purpose is to improve functional capabilities of individual still have not acquired yet. VI still faced difficulties and shortcomings such as through technical problem, insufficient knowledge of the technology, and lack of integration despite being capable technically, let alone those with less technical capabilities.

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APPENDIX A LETTER OF CONSENT

Respondent's Letter of Consent
(page 1)
Influence of Smartphone Usage to Mobility of Visually Impaired People in Jakarta

Through this letter, I want to ask for your participation in a research of smartphone usage influence to mobility of visually impaired in Jakarta, which expectedly will contribute knowledge and information related to development of more accessible technology for visually impaired in Indonesia and globally to support their productivity and daily life.

My name is Sabilul Maarifah Karmidi and the result I obtain in this research will be used to fulfill the requirement of New Media post graduate degree in Kadir Has University. Doing this research, I am supervised by Asst. Prof. Dr. Çiğdem Bozdağ.

Thus, I look for your participation as research respondent whom I will interview and observe. There is not faulty or subliminal elements and reason on doing this research. As the party who agrees to spare time being in the research, I wish to explain some points as follows:

1. I will keep all your data in the research confidential. You may ask not to publish name or any information that may lead to self identification as respondent in this research, other than by your consent to do otherwise. The final research will be put to use as solely study purpose that involves me, supervisor and institution.

2. This research project anticipates you to answer every question asked and show honest daily behavior in the social and personal life. If there is any discomfort, worry or other negative emotion caused by it, you may ask to alter the question or put it off-record.

3. I do not promise any direct benefit after being respondent in this research. Your participation is entirely helping to convey information of related topic that has not fully explored and supporting researcher to finish her study. There is no compensation or profit involved in this research.

This letter brings your to fully understand the respondent role as explained by researcher before the signing process.

Respondent's Letter of Consent
(page 2)
Influence of Smartphone Usage to Mobility of Visually Impaired People in Jakarta

I, _____, have agreed that researcher has explained rights, conditions and points related to my role as respondent in this study. I understand that in this research, there is neither direct advantage nor compensation I will receive. By giving my sign, it marks my agreement to participate in this research.

As respondent, you can contact researcher through email address available below if you wish to draw from the research. If there is any unexpected consequences related to this research in the future, you can contact my supervisor Asst. Prof. Dr. Çiğdem Bozdağ or Kadir Has University, Institute of Social Science. You can ask for copy of this document as personal record.

Date : / /
Name :
Sign :

Thank you for your participation,

Sabilul Maarifah Karmidi
New Media MA Program
Kadir Has University
Email: sabilul.maarifah@stu.edu.khas.tr

Asst. Prof. Dr. Çiğdem Bozdağ
New Media Department
Kadir Has University
Email: cigdem.bozdag@khas.edu.tr

Institute of Social Science
Kadir Has University
Email: sbe@khas.edu.tr

Kadir Has University Institute of Social Science is the insitution that supports researcher's study program

APPENDIX B INTERVIEW GUIDE

GENERAL INFORMATION

Name: (Optional)

Self: (Age, birthday, sex, family/ living partner, education, occupation, salary, role in community, daily activity)

Phone: (Smartphone and others)

HISTORY OF BLINDNESS

What kind of visual disability do you have? Have you ever been able to see normally before? When was your first time losing sight?

DIGITAL SKILL

1.Experience on using computer pre-visual impairment

2.Computer usage post-visual impairment

3.Frequency on using computer

4.Understanding of basic technical aspects (turning on and off computer, updating software/OS, managing shortcut, installing software, fixing volume)

5.Understanding of accessing computer and internet (typing some documents, opening browser, accessing web and its information, using social media and blog)

6.Understanding of advanced soft skills (programming, web developing, coding, advanced blogging)

THESIS TOPIC

1.Smartphone

What is your impression? How long have you been using iOS/ Android based smartphone? Why do you choose iOS/ Android based smartphone?

2.Function

What applications do you have and their purpose? What does it feel not having your smartphone? What blind assistive application do you have?

3.Activity

Explain your daily activity, frequency of going out, people you meet/ talk to

4.Effectiveness

Frequency of using smartphone (and compared to computer)? Why do you use your smartphone? Advantage and drawback of smartphone? What applications do you frequently use? How does it support your daily life?

5.Mobility

Describe your experience accessing familiar and non-familiar area, shopping, traveling alone, taking public transportation, taking stairs and finding seat in public place, joining social gathering

6.Change

Experience on using other cellular phones and the difference with smartphone? Drawback and advantage? Describe any transformation you feel in life before and after smartphone?

APPENDIX C TEXTURAL DESCRIPTION

A phenomenological study … is one focusing on descriptions of what people experience and how it is that they experience what they experience. (Patton, 1990)

Textural Description of Respondent 1

Respondent 1 is Dimas, an internet marketer who is also the founder of Kartunet community. He is currently 28-year-old. Dimas lost his vision partially when he was in the 6th grade in 2000 because of glaucoma. Glaucoma is *a term of various ocular disorders with multi-factorial aetiology united by a clinically characteristic intraocular pressure-associated optic neuropathy… its progression can lead to complete loss of vision* (Casson, et al., 2012). Then, he completely lost his vision when he was in the first grade of junior high school. He does not have light perception since 2014. Dimas has bachelor degree in English Literature and had always attended public school since elementary.

His phones now are Iphone 5SE and Nokia 6600. He uses his Nokia 6600 for faster SMS and call, however, he also uses his Iphone 5SE for the same purpose. Yet, Nokia 6600 is mainly utilized when he takes public minibus for safety reason. He uses *VoiceOver* as screen reader on his phone. His very first phone was Nokia 3310 which did not have screen reader feature, he had to memorize all the buttons and people's numbers. Also, he could only send message and was unable to read any incoming messages, *"I could type message but I couldn't read"*. His first smartphone was Iphone 4S which he bought when he was in Australia in the end of 2013 from an online commerce forum. He changed his phone because of its capacity and features such as RAM and camera. He chooses Iphone for its accessibility, *"For iphone, all of them will certainly be accessible".*

Dimas works from home, his jobs include activity such as writing on his own website and SEO to get income from advertisements and occasional website making. He uses *Pages* to manage his fan page. He also uses *Camera* to take pictures and later on put on his blog. He will ask people to take picture, *"I can just ask someone to take my picture".* Dropbox is regularly used by Dimas to automatically save audio recording. His monthly income is not fixed, however he had once earned around IDR 14 million[23] in a month. Dimas chose to work at home in the beginning because he thought that standard salary would not be even compared to expense he should spend for conventional motor taxi which would certainly be his main transportation since he does not have good orientation and it made him not courageous enough to take regular buses, *"I wasn't brave enough to just go here and there".*

Before, Dimas would mainly go out with other people when he had to. He was only courageous enough to take minibus on his own to reach Mitra Netra, because minibus is small and he knew the place. Currently, Dimas will use online transportation apps[24] from his Iphone such as *Uber, Go-jek* – Indonesian motorcycle taxi app (Ford & Honan, 2016) or *Grab* – Southeast Asian based taxi app (Panji, 2016) interchangeably to reach his destinations, *"Well, just take gojek, you'll be there…. I ride all of it. I ride grab often and gojek too. I've taken gocar too. I will just pick which one has promotion"*. He will also utilize *Google Map* for obvious reason like direction and several other reasons such as surveillance to avoid drivers on taking advantage of his visual impairment by making him lost in the journey and asking for more charge on fee, also as control of distance. He rarely takes public transportations since the availability of online transportation apps even to reach places he is familiar with. When he does, he will be accompanied and dropped on the stop. For Dimas, online transportation apps are more convenient

[23] 1 USD = 13,291 IDR | 1 TRY = 3,579 IDR /per April 10th, 2017 (XE.com)

[24] All the mentioned applications companies are offering taxi, car and motorcycle to accommodate customers in Jakarta, Indonesia.

because when something happens to customers, direct complain can be made and customers' money will be returned.

His daily activity involves regular access to *Facebook, Email,* Blog, Website and all incoming notifications. He is actively using *Facebook* every day, where he will get news from peers and write status to reach audiences. He never uses *Instagram* although he installed one due to inaccessibility. He uses *Whatsapp Messenger* every day without any problem where he does various things such as advertising products and working. He also uses different messenger apps such as *Line* and *BlackBerry Messenger*. He installed *Telegram* on his phone, but never uses it due to inaccessibility and he he opens it through website. He is also using ecommerce apps such as *OLX*[25] – Indonesian based ecommerce and *Tokopedia* (Fajrina, 2014) or commerce forum like *Kaskus,* to sell-buy product and connect with potential buyers/sellers/clients. Dimas is using internet banking for various transaction and always asks someone to read the pin that needs to be input from the token.

Dimas learned computer after he became visually impaired in Mitra Netra Foundation, where he was taught about talking computer (screen reader) and Microsoft Office such as Word, Excel, Power Point and Access. He can create website and understands programming language such as HTML, PHP and SQL which he learned by himself. He uses JAWS as screen reader on his laptop. He does not repair computer and will ask his brother to do so. He prefers doing some activities from Iphone rather than computer, because of accessibility factor. However, he never writes or work on phone because it is annoying. He has occasional activity outside home in a week where he will try to finish everything in a day, including meeting friends if possible. Dimas does not like to go out or hang out too much. Yet, he is occasionally using *FourSquare* for location check-in. He has assistive apps on his phone such as *Be My Eyes* and *Taptapsee* but never really uses them, stating that it was a nuisance, difficult and distracting. *Taptapsee* is taking too long. Dimas does not go to nearby market on his own, yet when he was asked about a turn in the road nearby his house by *Uber* driver, he directly mentioned the right place from the surrounding.

Dimas always goes to cinema with someone else, because he needs someone to tell the scenes without dialogue. However with Iphone, he had tried watching movie on his own with the help of audio description app[26]. He is also accessing various entertainment such as watching vlog on *Youtube,* listening to music and streaming radio via *TuneIn.* He has *MTVplay* – television app[27] but it is always error.

Dimas has just moved from his previous home for a month. He walks while feeling the wall and furniture. At noon, Dimas usually stays at home with his mother, a retired small hair salon owner in her fifties. Meanwhile, his father is an employee in a public hospital and his younger brother by 9 years is at school. However, during my visit Dimas was home with his brother who helped finding his shoes when he would leave home and assisted him to the *Uber* car he ordered. Additionally, before the car arrived, Dimas also asked me to see whether it had come. Other than that, Dimas walked slowly on his own while trying to find an object to feel and carrying his cane which he opened after reaching destination. Dimas also picks his own clothes by feeling the textures.

Textural Description of Respondent 2

Respondent 2 is Andira, a 23-year-old who has been blind since birth, "I still can see light", said she, on her blindness. She has an iphone 6 which she has been using for 2 years and has started using iphone since 2012. She admitted to use her iphone more frequently compared to computer, although she also uses her computer every day. She also has an Android-based

[25] Previously named Tokobagus and Berniaga, local ecommerce services, it was acquired by OLX and changed name (OLX.co.id)

[26] See Andronico, M., 2013. *Smartphone App Helps the Blind Go to the Movies* [Online] Available at: http://www.laptopmag.com/articles/smartphone-app-helps-the-blind-go-to-the-movies

[27] See iTunes, 2017. MTV. [Online] Available at: https://itunes.apple.com/us/app/mtv/id422366403?mt=8

smartphone, Samsung A3, *"but I rarely use it… I tend to prefer iphone. It's more convenient, like it's more accessible, it has more apps, and then the navigation is also easier, and to type is also easier"*. She can post articles on website and she has blog which she made herself even though she never posted anything and cannot customize too much. She mainly involved with Kartunet community in public relation division.

Andira was introduced to computer during the 5th grade and has been using JAWS screen reader since then. She was studying in special school during her early elementary school days, but moved to public school later on, because she fulfilled the criteria to enter one. In her early days before using smartphone, she was normally accompanied by her mom to go to school and would go shopping with someone. She rarely took public transportation when going out. Mostly she would take a taxi or go with friends. She happened to take *transjakarta*[28] with other's companion and take college shuttle bus with friends, where she almost fell while getting off.

Nowadays, she is still shopping with someone, asking someone to buy for her, or sometimes using *Go-jek* service to shop. She also does online shopping through via various ecommerce apps like *OLX*, *Tokopedia*, *Lazada*, and *Bukalapak*, which she claimed to be, "*Quite accessible, at least I can still use them, I can still outsmart them all, probably 90% accessible … it's more convenient to open from apps".* She also uses *BBM* for occasional shopping. It is supported by owning mobile banking app on her own, which makes her feel more convenient to transfer money on her own rather than using internet banking, which requires her to wait for someone reading the pin. However, she had to use some tricks to make mobile banking app more accessible by giving new label to it first.

Generally, Andira favors assistive apps and considers them useful. She uses *VoiceOver* in English, because according to her, Indonesian one is weird. She has tried barcode reader app to read product, *"It is actually worth it. Abroad it's really useful but here I don't know".* She also uses *Recognizer*, which she uses to read money quite frequently. *BlindSquare* is another assistive app that she has, which will tell direction while walking, *"it is quite right, here it might be still inaccurate sometimes ... It was quite accurate. So it was like telling what on my left was, for example there was a supermarket, and then there was shop or else, that kind of things, it would tell". Imove* is used when she wants to look around from the car. She uses applications with various functions such as to scan, scan writings (Voice Vision), read book, see colors, and direct while taking picture.

Figure C.1. BlindSquare, a walking guide application

Andira holds bachelor degree in law. Her current main work is freelancing on contract and partnership agreement making. She is also an occasional computer trainer for blind people, which will take her to travel to different cities and make her go out. From those works, Andira takes about IDR 2 million plus bonuses per month. She admits that she wanted a formal job yet has not received any response. Other than work, she also hangs out with friends such as going to the mall or restaurant. She enjoys going out with people and does not like going out on her own because she thinks it will be weird and also caused by some degrees of worry, *"No I guess, what if something happens"*. She always accesses public places with sighted people such as while

[28] Bus Rapid Transit operating in Jakarta

attending piano recital, going to official places (government offices, hospital), and watching movie in the cinema –although she prefers to watch without whisperer. However, she also goes out by herself sometimes with partial help of sighted people such as when visiting new places, where other people will assist her once she reached the destination, or when she was once obtained a different flight schedule that caused her to go alone, people in the airport helped her to certain level. She does not always carry her cane, especially when she knows she will go with someone. She does not mind taking stairs on her own, but said it would easy as long as there was someone.

Andira lives in an apartment with her 47-year-old mother and father, who own their own business as supplier of tools and equipment for oil and gas. She has lived there since she was in junior high school. She has memorized the area well and she can take the lift by herself. She also knows some of her neighbors well. At home, Andira stated that she put no interest in cooking-related activity. She will mainly be working, browsing on internet and sometimes covering songs and uploading it to *SoundCloud*. However, she mainly uses computer for these various activities, *"Of course (I'll work from computer)… like writing contract and so on, those are impossible from phone … When I want to type, typing something long I'll definitely use computer or laptop … Also if I'll look for a lot of things, then I'll browse from computer…. Browsing, reading, anything…. when I download something, because iphone cannot save file... When I want to upload I'll open Soundcloud from computer"*. She accesses SoundCloud from iphone, when she will only listen to the songs. She uses iphone to help her work like checking email, reading and sending work result. Social media like Facebook, Twitter, and *Path* are also available on her iphone, even though she rarely uses them. She also has *Instagram* but merely created an account so that friends can tag her. She uses her phone while on the move or when she wants to lie down. She also uses phone mostly for chat, Whatsapp is the application that she uses the most. There, she communicates either personally or via chat group. Whatsapp is also employed when she needs to choose clothes during special occasion by sending pictures of clothes or video-calling a friend. For entertainment, she also downloaded games such as *Uno* and *Monopoly*.

She uses Uber, *Grab* and *Go-jek* as main transportation when she goes out. It is more effective compared to taxi, which she told to be a hassle, *"now we can estimate how many minutes left to the destination and so on"*. She did take Uber car to reach her destination, which required a bit of help from the security to get into the car, because the car did not park closely to the higher floor of apartment's lobby like Andira usually experiences. She uses *Waze* during the journey and answered the driver's question after looking up to the app. Once she arrived in her destination, she was assisted by a friend from the gate until she sat down. She attended a meeting with various impaired people, which is one of her two communities related to disability. Other than that, her friends are mostly from university. During the meeting, Andira and other visually impaired members needed an interpreter since the presenter of the discussion was a mute girl.

With iphone, access has become easier and it is a helpful device compared to previous time, when her nokia 3310 did not even have voice feature, thus she had to memorize everything. So did her BlackBerry Apollo, even though it had screen reader feature, it did not have continuous update and often got error. Also, all her previous phones did not have many apps such as those which can check email or transfer money.

Textural Description of Respondent 3

Respondent 3 is Irawan, a 42-year-old man who became blind in 2001 because of glaucoma. He used to be able seeing light, but right now it becomes painful when he tries to. Irawan is one of Kartunet's pioneers. Irawan first knew computer during senior high school, when he was still sighted. At that time, he would only play games and later on, tried accessing internet through internet cafes. After blindness, he almost got the chance to own a computer, yet he was discouraged, *"I never touched that computer given by the community because someone did not like me getting it"*. After that, he got some other chances to learn such as with his wife's laptop or office's computers, yet he was afraid he would break them, *"That's probably just my excuse to not learn soon"*. He told his computer skill as the worst of all.

Irawan first used cellular phone around 1997, Nokia 5510. He still used the same phone after he became blind. Currently he has three phones, which are Nokia E63, Nokia E5 and Iphone 4S. He was using Iphone 3GS for two months in 2012, but had to sell it to pay his son's medicine, *"I hadn't learnt that much. I just owned it for about two months, even I didn't know how to open it".* He started using Iphone 4S since June 2016, because he wanted to learn how to use touch screen. He saw a device called *Micros* –a tablet used in cafes and restaurants during his sighted time, which gave him a picture of touch screen.

Irawan holds a diploma degree in tourism and was working in the same field before his blindness, including a bartender, waiter and steward in various hotels and cafes. Since 2004, he has been working as phone operator in Metro TV –an Indonesian private TV station. His work is mainly to receive call from two phones and occasional dial to different divisions of the office. He does not show any difficulty while pressing the phone or thinks for too long. His work does not require him to move a lot. His office room is also located near to the lobby. The mentioned location are the locations Irawan passes daily to reach his room in order, which are the main entrance, grand lobby, a turn to left after passing reception table and a straight path. All of them are about 20 meters in total. He earns about IDR 3,1 million a month. Irawan mainly goes out to toilet which is located in the second floor, he will go there by taking an escalator and with a cane in his hand. When he came back from toilet, he bumped into a chair which was put inorganizedly and was helped by security who stood nearby. Even though he has been working in the same place for years, he still walks to a slightly wrong direction.

To reach office, he used to rent a nearby studio where he could walk with someone's help. Later on, he decided to move to his parents' house and subscribed to a motor taxi, which he changed a few times because of the high cost and unprofessionality, *"when I called driver, he told me he could not come".* Sometimes he also used office's car, which picked employees and dropped them to their destination, however it was discontinued. Right now, he uses *Go-jek*, *Uber* and *Grab* to go to office, yet he does not use his own phone to order, *"I asked for my friend to book an order".* Even, Irawan does not have any online transportation app on his iphone. He will also be assisted to the motor taxi from the lobby since security will mostly be there. He considers online transportation app as useful, as he can go only with his wife (who is also blind) to go out and was also used when Irawan went to an event in 2015. However, he stated that he rarely went out or visited new places. And he also has opinions about all the online transportation app. *"When you use uber, you can still be get deceived when the driver's cunning, he'll get you lost first… if we carefully count the fare, grabcar is more expensive… gocar told me they didn't take any order over 70km"*. In which a conventional taxi also did to him previously, made the journey longer. During the observation, Irawan wanted to have dinner by ordering food from service of online transportation app. He asked me to read the menu of some restaurants. Irawan also takes bus or other public transportation once in a while, *"I am taking bus, but not by myself".*

Irawan is quite independent regarding financial matter, in which he will use SMS banking to do many things. Yet, he uses his Nokia E5 phone to do the business, so does browsing and reading news. When asked about using iphone for SMS banking, *"I am afraid when I use iphone, let's say I put the simcard on iphone and when I am in angkot checking credit balance or I want to transfer money, something will happen. You know that the more sophisticated something is, it becomes riskier"*. Irawan also sends SMS through his Nokia E63. His iphone is mainly used for calling and using Whatsapp, which he still learns about, *"I was almost dying just to reply"*. He also did not install Whatsapp on his own, but with the help of fellow blind friend. He was once trying to answer a phone call but wrongly pressed a button that muted his *VoiceOver* and needed someone to turn it on. He said that he just recently understood the term 'application'. He likes the physique of his Nokia phones better because iphone does not have buttons, *"Normally I would recognize that here there is keypad for menu, and here is this and after that is this, but this one isn't like that. So I was like, where should I go, where should I look for it, where is it"*. *"I was even confused how to enter the contact number, then input birthdays, I was even more confused, oh okay here's to input birthdays"*

Irawan has a son and wife, who live in other city to attend school. He lives with his 67-year-old mother who used to work in insurance company long time ago and his sister's family. At home, he washes clothes on his own, both with machine and hand, prepares lunch box, helps blending food, tidies up and also listens to audiobook which he integrates to a tape. He separates his wallet for different banknotes nominal and cards. He asked me the nominal he was holding. He used to try *Taptapsee* when he was still using iphone 3GS out of curiosity.

Textural Description of Respondent 4

Respondent 4 is Dhani, born in 1987 and Japanese literature graduate. Dhani has a low vision, whose remaining vision is about 25%, which is slightly declining since the first time she was diagnosed when she was 7 years old. She can see face but it came out blurry and during her university days, she told that she could see there was restaurant without knowing what it sold. *"I still can see pictures on websites… I still can read, read in the sense like how sighted people do it, I use magnifying glasses… before I could read books longer, now I got tired easily"*. Dhani studied in university by fully employing her limited vision and copying all her textbooks in bigger size. Dhani has a lot of comic books collection which she reads conventionally by using manual magnifying glasses. About magnifier app, *"I have tried magnifying app out but I got a headache instead".*

Dhani first knew computer during junior high school, where to access it she used her eyes. She did not like computer at that time, but began to love learning about it and started to actively using it after she learned about screen reader in 2009 in Mitra Netra. She is using JAWS screen reader now. Before that, she would mainly occupy her computer at home to listen to music and only visited internet café with friend to browse on internet. Dhani used to take part in writing feature articles for Kartunet. However, currently she is working with PPUA[29] (Tuesday-Thursday) and Pertuni[30] (Monday and Friday, remote). Dhani's works make her interact mainly with blind people and she rarely meets sighted people, other than her family, when she meets her old friends from university. Dhani works on various projects and regulations related to disability. She earns around IDR 2 million[31] monthly.

Dhani has just learned HTML, PHP, CSS, Wordpress, Sound Editing software and radio streaming a week before the interview. However, she had been an avid writer and actively written various articles in her own blogs and some magazines in the past. She used to be a content writer but due to her works, she no longer updates her blogs. She also uses Microsoft Office program finely. She works with computer such as managing office's website, writing, browsing and sending email, *"When I am browsing, laptop is more convenient".* She also uses computer to read ebook by the help of screen reader, which she scanned herself beforehand. Dhani is not reading braille book. During the observation, Dhani works on computer by activating screen reader and occasionally seeing the documents by zooming it in to 167%. She also keeps a notebook, where she wrote her to-do lists in triple size bigger than common handwriting.

Dhani's current phone is Iphone 4S, the second smartphone she has been using. Before that, she was using Samsung Galaxy Chat, an early android-based smartphone which she claimed to be terribly slow and annoying. *"The difference is like my life is going uphill… All my previous phones were accessible, but the accessibility levels were totally different, you know… the navigation on iphone is easier. Let's say I couldn't read the sentence clearly, I want to read per word, per letter, to make them spell it, it is really easy to do, using iphone is much simpler, just that. You just use it and this way is the short cut, and the setting can be changed right away*", she said, when asked to compare iphone and all her previous phones. Actually, before using smartphone she thought touch screen would be difficult, but she considered getting one to keep being well-informed.

[29] Pusat Pemilihan Umum Akses/ Center of Accessible General Election

[30] Persatuan Tunanetra Indonesia/ Indonesian Blind Union

[31] 1 USD = 13,291 IDR | 1 TRY = 3,579 IDR /per April 10th, 2017 (XE.com)

She uses her phone every day and likes its practicality. Dhani stated that she used phone more than computer. Dhani uses English screen reader most of the time, but intermittently changes to Indonesian screen reader when certain messages are not read clearly. Dhani mostly uses Whatsapp on her phone for various communication purposes, direct personal/professional communication, personal group chat with friends and community and also professional group chat. She rarely uses BBM and Line although she has them, because of the unbearable advertisements. She also still uses SMS occasionally and call feature.

Other than communication, Dhani also uses iphone to check social media like facebook and twitter, reading news from various Indonesian news apps such as Detik and Kompas, open English dictionary and listen to music. She mostly accesses social media to manage office's accounts besides directly opening the social media apps, she also uses Hootsuite to help managing all the accounts. She sometimes uses facebook to buy books or merely update status. Other than that, Dhani uses other apps such as mobile banking app, online transportation app like Go-jek, Grab and Uber, also keynotes. *"Since I already have mobile banking and I have understood how to do it, I'm sure how to it now, the transfer method, I start to shop online frequently (...) it's simpler and practical, I can do it by myself".* Before using mobile banking, Dhani was often discouraged to shop online because she would always need someone's help to transfer money.

Taking public transportation alone has been Dhani's habit even before she started using smartphone. However, she claimed to be worried and not confident because of her low vision when she had to take bus alone during her stay as a university student in the different city. She always went out with friends and had been informed by her mom about nearby places. In Jakarta, she has been always taking minibus, bus and train all by herself mainly by memorizing the color of the vehicles, because she cannot read the number. Public transportation that parks in front of a bus stop to gather a lot of passengers is a common problem in Indonesia, yet for Dhani it was an advantage since she could comfortably reach it and ask the driver. When taking train was considered too arduous to reach a certain destination, Dhani would ask her family to take her. After using smartphone, she still uses public transportation to go to office regularly, including taking minibus, train and bus on daily basis for economical reason. However, she will take *Uber* when she leaves office after dusk, because at that time her vision will be decreased and looking for public transportations will be too uncomfortable and can be dangerous. And when she has to visit certain place and considered taking public transportation too difficult, she has option to take the online motor taxi rather than asking his father to take her. Although to regularly take online transportation, Dhani thinks it is too expensive.

Dhani also uses Qibla app to get informed about direction of Mecca during prayer time, *"This Qibla app I don't use screen reader for this, I see with my eyes"*. She used to have Wattpad to look for story ideas, but she did not find it quite diverse or satisfying. She tried Taptapsee but found it to be limitedly free, thus she discontinued using the app and she does not use money reader. Dhani also does not use map, because she does not know how to use it. Dhani recently discovered National Library app but was disappointed because it required face-to-face registration first. She rarely play games, but has Brain Duel app in her phone. She has Bukalapak, an ecommerce app, yet she never used it because she is not fond of online shopping in general. *"I don't feel good if I buy without touching and holding it first. If I buy things online, perhaps it is just book"*.

For Dhani, iphone has efficiently fulfilled her needs, *"I am actually not a sophisticated person, I just need to communicate, finish my works, I can search for books, I can read ebooks. So far those are all my main needs, so I just keep using this phone for those purposes".* With iphone, she becomes more independent, things become easier in many aspects such as getting information and mobility. For her, iphone only has a drawback which is the size, *"since I still can see, so sometimes when I see the phone, it is really small"*. Dhani uses her phone unlike other respondents, who will put their phones next to the ear, she uses it in front of her eyes while also activating the screen reader. Dhani likes to visit bookstore during her spare time and scan all the books by its cover, title and author. She also has duty to mop the floor of her house in the weekend. Dhani can effortlessly take the stairs at her home and she said to encounter no problem while

accessing stairs in general, she even went hiking with some blind friends and sighted friends before. During observation, Dhani was tripped after she got off the train but she handled it herself and did not fall. However, Dhani watches movie in the cinema with a whisperer because she is not too confident to watch it herself and sometimes needs her mother's help to pick clothes.

Dhani lives with her parents, a retired construction company's contractor father who continues working independently in the same business field with colleagues and a retired senior high school English teacher mother, and an aunt. She has an elder brother, who never really stays home since his college years.

Textural Description of Respondent 5

Respondent 5 is Ary, a 22-year-old university student who has low vision since he was born. His remaining sight is about 10%, where he can see light, shape, sign and color. His vision has been stable throughout his life. Ary can also see people without recognizing the face. Ary proves this by telling the color of my clothes during interview. He can also read writing with fonts bigger than 20. Ary first learned computer when he was on the 4th grade and started learning Microsoft Office during the 5th grade. Ary is user of JAWS and NVDA screen reader on computer. He usually creates website using CMS or Drupal. He understands basic HTML, PHP, MySQL and have a blog which he writes on sometimes. Ary usually takes care if there is any software problems both on phones and computer on his own. Ary is involved in some communities for blind people development such as Kartunet and ITCFB[32], where he joins the IT division and content writing.

Ary is using Samsung J1, an android-based smartphone, which he has been using for a year. Android-based smartphone used Talkback as its screen reader. His very first smartphone was a local brand, Smartfren Andromax, a present from a friend in the end of 2014. Later on, he was also using Samsung Galaxy V for several months. Mostly, he uses his phone to access messenger and online transportation apps like *Whatsapp, Uber, Grab, Go-jek, Line, BBM* and Call feature. While using *Whatsapp*, he often prefers to use the voice note especially when he is with friends. Ary prefers to call without *Whatsapp* because it has slow connection. Ary does not use assistive apps and does not have interest in such apps because his phone's RAM is small. He also does not use map and prefers to ask people when he needs to, *"I can memorize nearby area, since I still can see, so it is just fine. I love sightseeing. I can memorize the route fast"*. Ary considers his phone to have fulfilled his needs but he refers to iphone as better to tackle more diverse applications, such as video editor, since even though android play store has some options, none of them is accessible.

Ary used to study in special school until 5th grade and continued his study in public schools after, encouraged by the existence of his neighborhood friend who was also studying at the same school. During his school days, Ary always went to school and came back with his father. He could take minibus back then, but stayed to be accompanied to save his stipend. Ary has only started to take public bus after he entered university, where he took it several times to visit his girlfriend. He also took train and *transjakarta* on his own before. Nowadays, Ary is still dropped to university by his father, but prefers to go back on his own by using online transportation app, because he can go back whenever he wants and he will not burden his father. Ary also uses online transportation app when he needs to go somewhere on his own or new places. Ary dislikes the public transportation and defends all the online transportation app, *"All of them are really helpful, y'know. (online transportation) If you think rationally, how anyone can even use their (public transportation) services, when the drivers are reckless, the transportation is also, the vehicles are all rotten like that".* Ary lives in a house that directly facing main road, it made him needed assistance to cross the road, however he does not do that anymore since the online transportation will directly fetch him in front of the house.

Ary's first phone was Nokia 2116, which did not provide screen reader, so Ary had to memorize the menu. He learned about screen reader on phone and asked a friend to install it on

[32] Information and Technology Center for the Blind

his mother's phone. Ary likes to use computer every day for various activities such as watching *Youtube*, reading news, downloading stuffs, playing games and trying out new software. He does not want to compare computer and phone, *"I need both of them. That can't be an option. They have their own segmentation"*.

He currently does not work and still gets stipend from his family around IDR 30 thousands daily, but Ary sometimes sells phone and computer accessories through dropship system which can earn him about IDR 400 thousands. He mostly uses *Line Messenger* for this for-fun business. His regular activity involves campus and Mitra Netra, which he visits every Friday to meet his friends and play some musical instruments. Ary was taught to learn piano keyboard by his friend's driver during 4th grade and later on also learned drum. He also watches TV at home. Ary usually will be helped when he picks clothes. Ary used to play Brain Duel but deleted it because of slow update. Ary also does not use banking app because he was rejected by the bank when he tried to register on his own by telling him the token was not accessible[33].

Ary only used braille during his school days but still can read it. Ary's friends are both visually impaired (from communities) and sighted people (from campus and various acquaintances). He never uses any application to help him recognize someone, he feels that he still can memorize voice well. He usually will hang out with people to the mall or cinemas or just wander around. Although admitting to often go out alone, during observation Ary mostly relied on me by holding my shoulder to assist him moving around, opening lunch package and looking for a seat in the park. Ary was only seen to walk independently without a problem while getting off the motorcycle and walk to the yard and later on greeted by his friend and sat on the nearby bench. He also went out to a nearby small shop located about 100 meters from the foundation, with his blind and low vision friends without carrying cane or feeling the wall. Other than that, Ary (along with his friends) also went to mosque located in front of the foundation which has stairs and he held onto the holder to go up. Ary never shops to minimarket on his own, he usually will ask his siblings or go with driver from online transportation app.

He lives with his parents and two younger sisters. His father and mother are senior high school graduates who own their own stationery store at home. His sisters are a recent senior high school graduate and a 2nd grader elementary school student.

Textural Description of Respondent 6

Respondent 6 is Precilia, a 25-year-old who became blind in 2005 when brain tumor attacked her eye nerve. She previously can clearly see people's shadow, shapes, pillar from far away, color, design and motives but it decreases greatly and she can only see lights like tinges or dots. Before losing her vision, Precilia had started learning computer at school. She first learned computer during her 3rd grade of elementary. Although was taught to type, she mostly liked to play games, drawing, chatting and emailing with her friend. She left computer once she owned a phone in her 1st grade of junior high school where she used it for sending SMS often, briefly before she suffered from brain tumor in her 2nd grade. After her blindness, she started learning computer in her 1st year of senior high school. She is mainly using JAWS as screen reader, even though she also has NVDA. Precilia does not own a blog and does not understand HTML, only occasionally use ready data for certain purpose. Precilia can download software. She has some social media accounts but never really put any content. She used to join Kartunet in 2012, where her main task was to sort articles and send them to editors.

Precilia started using iphone in 2014, which she is still using until now, iphone 4S, *"Now, it is slower"*. Before using iphone, Precilia used various phones such as Nokia 2600, 7610 and E63. Nokia 2600 did not have any talking feature. And the other phones, although geared with screen reader, did not cover a wide range of access to various needs such as social media. Precilia used braille during her school days, also in the exam where she would use braille exam paper while having a reading assistant next to her. During her high school time, she studied in an

[33] Ary actually applied for internet baking not mobile banking since it involved token, but most importantly he does not use any financial app.

inclusive school and brought laptop to school to type all the assignments. She went everywhere with her mom most of the time, but in senior high school she started to go back on her own by taking minibus and pedicab to reach her home.

She has been studying theology since January 2015, continuing her postponed study in different university. She works in the division of information of Standard Chartered Bank since 2011, where her main duty is to call credit card users and offer new programs from the company. She works with computer and phone. Precilia applied there, knowing of the vacancy regularly offered to disabled people. She earns about IDR 3,5 million each month. In the office, Precilia regularly interact with both disabled and sighted people. Precilia works from Monday to Friday, goes to university from Monday to Saturday and prays in the church on Sunday morning. She spends most of her free time finishing college assignments. She is using computer to browse on internet. She is also using Microsoft office such as Word and Power Point to finish her assignments, such as writing essays or creating presentation. She will also type important points from the recorded lectures in the computer.

She used *Uber* car that she ordered on her own to go to church and she generally will use various online transportation app like *Go-jek* and *Grab* to go out, which she considers better compared to public transportation that she rarely used at all post-online transportation app. However, she goes to work by occupying subscribed motor taxi because she is afraid that the driver of online transportation app will not know short cuts to avoid traffic jam. She also returns from office with the same motor taxi by calling the driver. Other than that, she is also using social media like *facebook* and *twitter* to get information and news updates. She rarely puts any content on her social media accounts. *Youtube* is one of her sources to find educational references, other than text-based sources she can find by browsing. She also likes to browse for lighter information such as people's biography. She also uses audio recorder to record lectures from class and employs *Dropbox* app to automatically save the recording to computer. Precilia tried out Taptapsee from a friend's phone but thought she did not need it too much because she has fixed schedules for all days. She also does not use particular assistive app such as *imove* or money reader. Yet, she carries a cane to the office and university.

During her pray in the church, she also listened to Bible app to understand discussed verse that was shown on the presentation slide. She also uses *Alkipedia,* a collection of Bible's history, to help her study. She is using *i-jakarta* to borrow book online. Besides that, she listens to audio book and sometimes play *Duel Otak.* She is using google map to help finding routes, shown in the journey to the church where she answered driver's question after looking to her phone. For her, smartphone increases accessibility to various applications and facilitate her activities. Smartphone is easier to use compare to older phones, where it would become slow when she opened social media or browsed something. By using smartphone, she also feels that access to social media has been better because it reaches more varied capability. She forgot to take her phone before and admitted things became awkward because she did not know what to do.

Precilia lives with her mother, grandmother, 2 aunts and 2 cousins. Her mother studied economy. She used to work briefly before married and continued working after Precilia's father passed away during her childhood time. She now has small catering business and actively doing service with the church. Her grandmother has a beauty salon. Precilia likes to cook, especially baking cake after her aunts taught her to use cup as measurements. She can and is only allowed to use small gas stove. In the office, she carries lunchbox, goes to the canteen or asks office boy to buy her food. She rarely visits new places due to her busy schedules, but when she does, she will usually go with someone else, such as to cinema, minimarket or concert. She picks clothes on her own by feeling the materials. During my visit to her house, she could go down slowly on her own from the terrace to the yard by passing 6-steps stairs. When she wanted to open the locked gate, her grandmother helped her because she could not find the lock. Arriving to the church, Precilia asked the gate to me and walked by touching the wall until she entered the room. Her mother assisted her to the chair which was located about 2 meters from the door. In the lunch time, her mother also took the food from open buffet for her. Precilia dropped a prawn cracker

while eating and kept touching the floor to pick it up but could not grab it. When she wanted to go to toilet, she asked me to go with her but could reach the closet on her own.

Textural Description of Respondent 7

Respondent 7 is Aryani, a 28-year-old teacher who became low vision when she was 18 years old in 2006 and turned blind after giving birth in 2012. Her visual impairment was caused by glaucoma. She can distinguish day and night. When talking to people, she seemed to look at them as if she could see. When her vision was still intact, she already started learning computer despite irregularity. She learned computer during her first and third year of junior high school, but did not learn any during senior high school. She had computer at home where she would utilize it for playing games and chatting. She used to have Siemens phone before her visual impairment. She learned computer post-visual impairment at Mitra Netra Foundation in 2009 after could slowly accept her new condition. Currently, she uses computer every day. She uses JAWS screen reader. She writes content on her mother's website which was made by someone. She focuses on internet marketing and only knows how to start new line on HTML. She has been using Smartfren Andromax G2, a local brand of android-based smartphone, for two years and BlackBerry, which was her first talking phone.

Aryani has a diploma degree on communication and currently works as teacher for school subjects and computer in Raudlatul Makfufin foundation for the blind where she uses braille books to teach in some classes also owns an online clothing store. She earns around IDR 5 million in a month. Aryani never met any blind person before she lost her sight. She knew Kartunet community in 2009 not long after started learning computer and so far has online joined its activities. Aryani likes teaching as it is her way to socialize with people, because she rarely socializes with people besides when she is teaching. Besides meeting blind people daily, she rarely has social interaction outside, just monthly gathering with school friends. Before having android smartphone, Aryani has been using BlackBerry which also has screen reader, but as a visually impaired person she only used messenger, facebook and SMS, since not everything was accessible and made it not too functional. She also used to take public minibus and bus, where sometimes she would get lost because she took the wrong one. She does not like to go out alone, so sometimes she asked a friend either blind or not to come along.

She has tried both android-based and iOS-based smartphone, but personally she prefers android smartphone because of iphone's over simplicity especially on *BlackBerry Messenger (BBM*) features it offers. Aryani, a loyal user of *BBM*, discovered that *BBM* on iphone does not have certain features that she always uses. Other reason was because her android smartphone has both touch screen and physical keyboard, which she needs to speed answer customers of her online store – who do not aware of her condition. Additionally, android smartphone is quite affordable and responsive. Smartphone is different from other phones, because it can do almost everything. Android phone's screen reader is Talkback. Aryani uses her android phone to store all the applications she needs and uses android phone more frequently compared to BlackBerry. Some applications are news readers, language learning apps, social media and messengers. Aryani uses phone as her teaching assistant, such as English learning app and Arabic learning app to help her while teaching. She does not have games on her phone, considering the quality of her phone.

Aryani uses *Instagram* as a showcase for her online clothing store, but a friend is the one who uploading all the pictures because the app is not readable by screen reader. She still uses it only for the sake of reaching more potential customers. She also uses *Whatsapp* to communicate with customers through personal and group chat, after *BBM's* popularity decreased. To handle the problem when a buyer sends clothes picture to her, she asked her sister's help to describe the picture and after that she can look for the clothes' data on her own. Aryani who likes to cook a lot of things and eat, has tried to learn making some beverages and seek the opportunity to gain profit out of it by offering her cooking to some friends in the office via *Whatsapp.* She even used to sell frozen yogurt online by shipping the product through *Go-food*[34] but ending up criticized

[34] Go-food is branch service of Go-jek online transportation application

for high delivery cost. As a seller, sometimes she also sells manually where she will need to take money and give change, however distinguishing Indonesian banknotes is fairly a difficult task for her and blind people in general even though it has embossed part. She used to try *Taptapsee* which she considered as useful to assist this activity, yet the app turned out to be limitedly free and made her stop using it. Aryani currently folds her money into different shapes to differentiate the nominal, *"For the small nominal, I will make the banknotes into shapes. For example 20thousands or below that, I'll fold the banknotes, the 20thousands I'll fold it into two and then I'll fold it again, like that".* She also asked her buyer to fold their money before giving it to her.

She is an avid news reader and can open news apps up to four times a day. For her news apps like BaBe is really convenient to use. She also uses *Uber, Go-jek,* and *Grab,* the online transportation apps, to help her mobility. She found them to be useful for blind people and she usually go on her own now. Yet, Aryani still regularly uses conventional motor taxi subscription because the online transportation app sometimes does not even bother looking to the map even though they do not know the area. Online transportation app, however, becomes her solution when her regular motor taxi cannot make it or when she needs to go somewhere. Aryani will walk from home to the motor taxi station when she uses her regular motor taxi without meaningful obstacle. She does not use any phone app to help her walking. She heard about how Google Map can help directing her while walking, but she has not learned how and has not found a comfortable way to walk while holding cane in one hand and phone in another. Still, she employs Google Map to help her while visiting new places by vehicle that she does not know about. She has fallen and tripped over while walking for various reasons such as simply does not know the area or unpredictable situation like cart that stops in the middle of the road. Aryani prefers to shop in small stalls rather than minimarket, because she can just directly ask the seller for the things she wants to buy. While going to the minimarket, Aryani will wait for the nice cashier to ask her need or her kid to help her taking the things she will buy. Aryani used to like cinema a lot, but post-visual impairment she rarely goes to cinema and mainly visits one with volunteer such as the whispering cinema who will narrate the story for her. Aryani's opinion toward android smartphone is generally favorable like incomparable functionality compared to BlackBerry. Comparing to computer, she found android smartphone to have easier uninstallation process and nicer/ more accessible applications. She favors smartphone also for its influence to her mentally, *"it is nice actually, I would think if there were no phone, what could I do, it'd be so awkward"*.

Besides smartphone, she also uses computer for various purposes such as managing social media of her online clothing stores, searching news, looking for study materials, saving study materials and creating resume of all her students. She found computer to be more convenient compared to smartphone especially for writing a blog. Aryani lives with her mother –a beauty salon owner and a spa trainer, husband –teacher in various places including her workplace, 5-year-old child and younger sister. Her deceased father used to work as private employee. Aryani likes cooking in her daily life, although she does it much slower compare to her sighted mother. She cooks various food even the fried one which will cause some obstacles. Cleaning house, preparing her child's lunchbox and food for home are parts of her daily life, although she also has an hourly-servant who will handle the cleaning part sometimes. Aryani picks clothes on her own, which she feels through the materials and the thickness, especially after she started wearing hijab, her clothes have been paired up and she has memorized all the colors once she knew the materials.

During observation, Aryani was one of the most active respondent. She kept moving from one room to another, which were located across each other within 7 meters distance. She walked in normal speed and sometimes bumped into the door because she walked to a slightly wrong direction. She walked to the terrace to reach motor taxi without any obstacles, but bumped into the main door when she came back.

Textural Description of Respondent 8

Respondent 8 is Rafik who was born in 1989 and became blind where everything got foggy when he was 12 years old. He was diagnosed with weak eye nerve and had been using very thick glasses since he was 4 years old for his nearsightedness was 25 at the time. Currently, his

perception can distinguish light and he has eyeballs that do not look like blind person. Rafik first knew computer during 2nd year of junior high school, after he became blind. He uses computer daily. He used to try internet marketing out but due to busy schedule, he did not continue learning about it. Rafik is using JAWS and NVDA screen reader on his computer. He has blog even though it is not regularly updated. He always installs software on his own. Rafik can create website involving activities like coding, CMS setting, making hosting and setting domain, however he has not learned about plugin and server maintenance deeply.

Rafik is currently using Nokia E63 and LG Nexus 4, an android-based smartphone which he has been using since 2013. He bought the phone to follow up technology after trying out a friend's iphone, but opted to android because of its more affordable price. Rafik used to have reader to assist him during exam at school. And his very first phone was Nokia 3315, which did not have screen reader feature and required him to memorize the keypad also listen to the keypad's sound, *"For SMS it was like, when I wanted to write C for example, it would be in the keypad of number 2 and I'd need to press 3 times"*. He also needed someone else to read incoming message. He started to use phone with screen reader during his 2nd year in senior high school, Nokia 6600, a phone which almost all respondents had used, because according to Rafik, there weren't many phones that could be installed with screen reader back then. Rafik also told about his experience browsing on Nokia phone, *"When I was still using nokia, it was really manual, I really had to be super patient to read each pages"*. Rafik had always been studying in public school and has bachelor degree in Islamic Education. During his university year, he normally would take bus, minibus and walk to campus. He would also use the same transportation to reach various places by himself, which although never caused harm to him, definitely not always a smooth journey, *"There was problem like, I just got lost, or I stopped much farther after my real stop"*. He rarely preferred motor taxi due to unaffordable price. He had days where he would face difficulty when he wanted to go to certain place and he did not have choice other than taking multiple minibus or expensive motor taxi to make things simpler, *"it was a total hassle"*. He also often asked friends about route to the place he did not know before going or looked up on internet, but only in the first page.

Currently Rafik is working socially as general secretary and publication in Raudlatul Makfufin foundation for the blind. Other than that, he also works as private tutor teaching computer and braille Quran reading for two children, one blind and one blind-autistic. His monthly income is less than IDR 2 million. His daily life involves interaction with both blind sighted people, where the latter mostly are partnership parties with the foundation he works with. He does not really meets his school friends anymore, other than via Whatsapp group. Rafik does not use any help to recognize people, he just simply asked them right away. Rafik lives with his 53-year-old father, mother and two younger sisters (23 and 20 years old). *"My father is in Ministry of National Development Planning, in Suropati Park. Well, the low level one actually, since his education was only until Aliyah*[35]*... My mom actually used to work. She was just well like, employee for a small tailor business, like that, there were four people working… My sisters are in college now".* Rafik is currently only active as member in Kartunet community, but previously he took part in the redaction as editor. He is involved in some communities other than Kartunet, such as IT Nusantara –Indonesian IT community and ITCFB –Indonesian IT community for blind. He also joins Indonesian Blind Muslim Association.

Rafik has been regularly using *Go-jek, Uber* and *Grab*, the online transportation app, which he uses for various purposes. *"When I left my phone, I went back or when gojek still had promotion the 10thousand one, I used gosend. I was like that… I actually go to many places after gojek came… When I have activities where I need to go here and there in a day, what really helpful is, the existence of these online motortaxi. So I am no longer worried that how to say, there will be no one who will pick me up and drop me to the destination"*. Online transportation app's existence has reduced his dependency on his family, *"Even though I actually can ask them*

[35] Islamic school equals senior high school level in Indonesia

to take me with motorcycle, but if I can go by myself, either with gojek or anything, I will prefer using that". He also uses the app to buy food or shop sometimes.

"After I knew the concept of touch screen that was amazing", Rafik considers android smartphone as much better compared to other cell phones. It is helpful, multitask, has more functions, better internet access, better connection and responsiveness. *"With android, it becomes much simpler".* It is only the battery that drains really fast. He cannot leave without his smartphone, but he has never used smartphone during the journey, because he feels that it is unsafe to open smartphone while sitting on the back of motorcycle. Rafik also thinks android phone to be advantageous from the perspective of mobility, *"it is simpler to be carried when I am mobile"* and convenience to use anywhere. However, laptop has better monitor with better internet access and display which is not simplified like phone. For Rafik, a simplified display means deleted parts of the website and it makes searching experience becomes less optimal and rather difficult. It is in line with Rafik's later statement that said he accessed information, browsing and social media more from laptop than phone. He also works from computer, such as sending email, making publications, managing foundation website and accessing social media. Not to mention, Microsoft Office (mainly Excel, Word and Power Point) to make data. He also likes to play game from computer.

It does not mean that phone has only functional online transportation app, Rafik also uses applications like audio recorder, money reader, ecommerce app, messenger, mobile banking, game and social media. Rafik uses *Smart Voice Recorder* which he uses while attending seminar and discussion, so that he can listen to them again in mp3 format. *"It can be used to record audio within some meters range and the clarity of the audio is also better".* He also knows the existence of good quality portable recorder, but thinks that a good app installed in an all-in-one device is much better and simpler. Mobile banking is also one of the app he uses, which needed a trick to be accessible for him to use, *"Mobile banking, to be considered accessible, actually at first it was not, it was not accessible. Since many of the features are not readable by screen reader, but I fixed it. Starting from OS Jelly Bean, there is a screen reader feature or talkback where it can rename all the unreadable labels"*. He fixed all the labels with his sisters' help to read the labels out, so that he can rename them. Another app that he uses quite often is *Android Money Reader*, *"money reader is practical, since my android is quite sensitive to read the money, so yeah it is quite sensitive".* Before using this app, he was using different money reader app but ended up to be not satisfying because it was slow and not responsive.

Rafik has social media accounts on facebook, twitter and path, but he no longer opens his twitter because the app he always used became error. His facebook is also not really active anymore. *"I often talk with friends through Path, usually we will talk about IT or IM sometimes, we just knew via online at first".* He usually accesses social media app when he is on the road. He uses Whatsapp, BBM and Line as messenger, but said the first two to be the most active ones. Communication is one activity he regularly does with phone. A week before the interview, his ATM card could not be retrieved from the machine and he called the bank right away. Rafik also uses ecommerce app, *Tokopedia* to sell and buy stuffs, which he considers to be accessible. He does not use other popular Indonesian ecommerce, *OLX*, on phone because of its inaccessible android app. Other helpful app that he uses is *Back Camera Selfie*, which helps him to direct while taking picture. He used to try *Taptapsee*, but never really used it because it does not help him on crucial matter, *"Taptapsee, I don't use it that often anymore, since it is, well it is just for a help when I am curious with the situation around me".* He uses Google Map regularly, when he is looking for a road. He also likes to try various applications on *PlayStore* and voluntarily reviews and writes tutorial for new app made by member of IT Nusantara community also gives his perspective as blind user of the app. He plays a game called *Blind Legend*, an adventure game without video and fully relies on audio.

Rafik has not found any navigating app that can help him move around indoor place. This makes him to rely on friend's assistance while moving around inside mall. He also likes watching movie, but needs other people to explain the story to him. He has been living in his current home since he was young and makes neighbors know him quite well. He sometimes goes out on his

own to nearby places such as kiosk without cane, but he will definitely need cane when walking to some hundred meters away place. Cane is like an ID for Rafik, who always carries it wherever he goes. It is mainly also related to his eyeballs that look like sighted people, which may cause problem because people will think he is not blind and intentionally causes trouble. Rafik also uses *transjakarta* with friends, not because of its difficult area, but mainly because he does not regularly have mobility around central region and happened to always go there when he is with friends. Rafik rarely goes to minimarket alone and while he does, he usually asks the cashier for help right away. Rafik likes to travel to different city as refreshment, but he never does it without sighted people's assistance. He happened to have close relationship with leader of a travel agent owner, who also runs a community that travels with blind people, it makes him able traveling to some places. While he was about to start teaching, Rafik found a chair that he sat on and directly invited his blind students to also sit when in fact there was no other chair nearby, I had to tell them when they kept moving around looking for chairs. Rafik bumped into a table that is put in front of the office and he also bumped into some other furniture while looking for stuffs. He wanted to go out from a room and walked slowly while touching thin air, but needed to be altered when he was about to step on a blind kid's head who lied down on the floor. Rafik ate in the foundation in the kitchen, which had been prepared by the helper. He could turn on a fan on his own after looking for the buttons for a while.

He usually stays fully at home on Wednesday or Thursday, where he does not have schedule outside. The other day, he usually will stay in the foundation. He will just stay doing various activities on computer while he is at home, watch TV or play with family cat. Rafik does not have critical problem on choosing clothes. He can pick his own clothes, which he has separated between casual and formal wear. His preference on plain standard color also helps him not to encounter weirdly unmatched colors or motives.

Textural Description of Respondent 9

Respondent 9 is Indar, a 30-year-old who has low vision and has ability to see for about one meter distance. Indar used to be blind when he was 2 years old because of very high fever, according to his parents. He got a surgery when he was 5 years old and has been able to 'see' better by then. He cannot see face clearly, but he can see colors and pictures on the websites, although he prefers not to. When I came to meet him, he did not recognize any human presence before I spoke. Indar came to Jakarta in 2005 to continue study in special junior high school, which is not available in his hometown. That was also his first time using computer, where he took a 6 months course but did not finish it because he felt left behind and the teacher did not really pay attention to him. He does not open computer every day, only some times in a week where he will make report for foundation in Excel, read news and also chat on *Zello*. Indar uses NVDA and JAWS on his computer. Indar does not have blog or understand any programming language. He used to learn how to install a computer software before, but has forgotten how to do it since he never really done it anymore, he stated that he could create folder and save files there.

Currently, Indar is using Samsung J2 – an android smartphone and Nokie E63. This Samsung J2 is not his first android, he used Samsung Galaxy V before. He has been using Samsung J2 for a month. He was convinced to use android phone when he could not find any new Symbian phone, *"since I have this android, it becomes my friend… if I follow my feeling, I will just want to use my phone the whole day"*. He prefers forgetting money while going out to leaving his phone, because without phone he feels like he has no friend. His favorite activities on phone are reading news and listening to radio. He has two radio streaming apps called *Rdio* and *RRI*, where he can access various local radio stations. He likes them because he can access various radios from around Indonesia, including his hometown to get updated news with good clarity, unlike when he used conventional radio where various blockages can interfere. He uses news apps like *Kurio* and *Kompas*.

He first used phone without screen reader where he had to memorize people's phone number and could only make a call and send SMS. During his childhood when he was still blind,

he often hit trees when he walked or ran. Before using android phone, he used three other phones with screen reader, Nokia 6600, N73 and E63, on different times. He also read news on those phones, but admitted that he was not that interested to keep reading since they did not have a lot of menus. He usually went out by using minibus. When he was going to university, he forgot his cane and had difficulty to cross the road until an acquaintance recognized him and offered a help. Indar stated that he could walk without cane in familiar area (the area nearby his house) as long as he did not need to cross the road. Cane also helps him avoid problem because sometimes people do not realize that he is blind. Until now, Indar still uses cane regularly.

Indar has always been living with Raudlatul Makfufin foundation in its dormitory since he came to Jakarta. He lives with eight other, where he is the oldest. Many others are of the age of school students and one of them is in college. He is currently helping the foundation as coordinator of household affair, where he will manage the daily expense of the foundation related to food, grocery and household subjects. He does not have formal job and only occasionally travels to other cities to teach blind people as a social work, where he will get transportation reimbursement. He is also a masseur, although not a professional. It is either people coming to him or he will be fetched to their home. Indar's main income is monthly stipend from his family, IDR 1 million. Indar always studied in special school from elementary to senior high. He is currently postponing his study, bachelor degree in Social Welfare at one private university in Jakarta, due to financial matter. Indar's families are all in his hometown, Bengkulu. His father (63) and mother (59) are both farmers. He has two older and younger siblings, who were educated until senior high school. Indar occasionally joins Kartunet events, he is not actively involved as committee there. After postponing his study, Indar no longer goes out regularly and only visits Mitra Netra on Friday. When he goes out, he will employ *Go-jek, Uber,* or *Grab* the online transportation app, which make things more comfortable compared to the time when he still had to take minibus. He also uses Google Map to direct him while on the road, either while he is taking transportation or walking, although it is not always accurate and sometimes makes him take a longer route to reach a destination. *"At that time I went to, I was with friend, so we just knew about that place, so we used google maps, we were confused we kept turning and turning. But in the end we found it".*

Other than radio and news apps, he also uses messenger, music player, online transportation apps and many others. He only uses Whatsapp as his messenger, other than occasional SMS. He likes to use voice note feature on Whatsapp more than typing because it is simpler than typing, especially when he is on the road riding motor taxi. Indar listens to music as one of entertainment activities, he also watches TV with *Mivo* but does not really do it often because it spends his internet quota. *"I don't need TV to watch TV now. I can just use it. I just use android".* He has all his activities in the foundation such as reciting Quran or teaching blind kids. He regularly interacts only with blind people. He also uses digital Quran to recite Quran, where he can look for the chapter he wants easily, the problem is only it uses a lot of internet quota. Indar does not use assistive apps like Taptapsee or money reader, because he can still see for a bit and can distinguish money by seeing the color. He also rarely plays games, but has one called *Cerdas Cermat*, which he never played anymore because of the slow update. Indar also no longer opens his facebook, even though he has one, because it makes the screen reader slow and the phone becomes laggy. Although still has remaining vision, Indar did not see the phone when there was incoming call and just randomly pressed the phone monitor until the ring tone stopped.

He uses android more than his other phone, however his Nokia E63 is however, still quite functional for taking notes because he considers typing on physical keypad is more comfortable especially when he is in rush or when he needs to type a lot, but he is also using android phone to type sometimes. Laptop is also more comfortable to type, but phone can be carried wherever he goes. Indar favors android phone and admitted it supported his activities. He was afraid not to be able using touch screen but it came out as fine, he feels convenient using the phone. He even said that he rarely used computer and just did everything on phone. *"Android helps in many aspects. It is more accessible. it is very, veeeeery helpful"*.

Indar still uses public transportation for a very far destination, such as when he met his friends. He needed to take motor taxi, *transjakarta* and train, which he took on his own, *"there was no problem, it was nice. That was the only time I tried taking the train, I liked it a lot"*. He also used bus when he left to other city with his blind friends, assisted by the bus driver during the visit. Indar always washes his own clothes both with hands and machine, but lately he often sends his dirty clothes to laundry because the machine is broken. He also picks his own clothes by seeing the color. When I came, he was seen walking on his own in normal speed on the lobby which length is about 7 meters without touching the wall or having any obstacles. He also could take the right amount of money under the dim light after looking at it. He needed to try for couple of times until he could put his feet into the sandals. His food is usually prepared by the helper in the foundation. He rarely goes to cinema and when he does, he will go with someone else to explain the story.

Composite Textural Description

Respondents use smartphones either iOS-based or Android-based one to certain level. Smartphone simplifies their mobility, facilitates their access to environment, helps their productivity and elevates their lives. Using smartphones gives them access to various applications with different purposes that previously were not available in the older phone generation. Respondents express the utility of smartphone positively although some finds touch screen to be a bit of barrier. Five respondents use more than one phones, where one being smartphone and the other normal cellular phone. One uses both iOS and Android smartphones but prefers iOS more. Other phones are used for mainly faster typing, safety purpose in public place or inarticulacy of using smartphone. Out of nine respondents, English screen reader is used by seven respondents for its better clarity, but Indonesian screen readers are readily set for certain purpose. One is using Indonesian screen reader even though facing similar challenge and one other still tries to operate his phone without turning off screen reader. Despite the different digital skills, every respondent utilizes online transportation applications to travel within the city, where eight of them uses it independently while one other asks someone's help to access it. Some respondents also utilize the application to help them reaching other goal besides accessing the environment.

Respondent 7 used to have online transportation application *Go-jek* shipping her food product:

"I happened to also learn how to make yogurt and it tasted good (...) so I tried to sell it online, it was sold quite well, mostly it was through delivery, like there is gojek… but to reach the customers, that part (delivery) was expensive"

Respondent 2, for example, also uses the same application to help them shopping without going out:

"I'll just order from Go-jek"

Communication application is one other main usage of smartphones among respondents, such as Whatsapp, Line Messenger and BlackBerry Messenger. They have them to communicate with co-workers, clients, friends and acquaintances. Some features used frequently by some respondents are group chats and voice note, which is simpler to use while on the road compare to typing the message. Entertainment and information are also two of the main usages of smartphone, such as radio, television and video streaming applications, game applications, social media applications, news applications, audio description and music player.

Respondent 4 uses social media like *Facebook* and *Twitter* for work:

"Facebook, Twitter, those are mainly because I manage Pertuni's social media accounts"

Respondent 9 uses radio streaming application *Rdio* and *RRI* to get information from his hometown:

"I usually listen to radio from my hometown, like from Bengkulu, so I will be updated with the latest information… in r-dio they have all the radios, like for example in Jakarta, there are 280 registered radios. And I can just keep changing channels, for example if I want to listen

to radio from Kalimantan, I just need to click, 'Kalimantan'… the advantage of internet radio, so there is no blockage or such, like when we listen to manual radio where it will be unclear"

While, respondent 6 uses *Youtube* to help her major of study in theology by listening to various theological speech available:

"Youtube is, well my background is theology right? So in theology it is like, there are a lot of studies where we need to learn from video about teaching"

Online transportation and communication applications are the only similarities all respondents have on utilizing smartphone. Some respondents use some more applications while some others do not, because of insufficient phone capacity, unawareness of the applications or preference. Respondent 2 and 8 use assistive application such as money reader and talking camera quite frequently and feel that the application has been helpful.

Respondent 8, *"I also installed android money reader, so it is to read money… Money reader is very helpful, now I use it almost every day"*

Respondent 2, *"there is one which is for taking picture… it will tell whether our position is right"*.

Other than applications above, respondent 2 also uses assistive applications like walking guide, scanner, book reader and writing scanner.

The usage of navigating application is not generally implemented by all the respondents because of reasons such as inability to use or insufficient quality of phone to download one. The users are respondent 1, 2, 6, 7, 8 and 9 where navigating application is not only helpful to find direction of the road, but also find out less jammed road, prevent possibility of scamming taxi driver and direct while walking.

Some respondents such as respondent 2, 4 and 8 are also using mobile banking application, which helps them to do various financial activity independently where they used to do with the help of other people. Respondent 1 although has the knowledge of mobile banking application's existence, still uses internet banking and depends on someone's help to read the pin, and respondent 3 uses SMS banking from his normal cellular phone because of limited ability to operate his smartphone.

Respondents 1, 2, 5 and 8 are users of ecommerce applications, where they use it for their own purpose such as regularly selling things, drop shipping or occasional shopping and selling. Usage of ecommerce application also helps respondent 1 to be able selling product without leaving home and invite the buyer to come instead. Respondent 5 utilizes the application to help him doing for-fun drop shipping business as an activity to earn some more cash besides his parents' monthly stipend as a university student.

Email application is also utilized by respondent 1, 2 and 4 while on the road to access or send important work. While browser application is employed by respondent 1, 2, 4, 6, 7, 8 and 9 mostly to occasionally read articles on the road or looking for trivial things while relaxing at home. Although they usually access various things such as news via the applications they have downloaded. Respondent 3 accesses browser through his cellular phone and respondent 5 prefers to access browser via computer.

Respondent 1, 6 and 8 use audio recorder for educational purpose such as recording university lectures and seminars or discussions. Respondent 6 uses audio recorder to record all the lectures in her class and re-listens to them at home to take notes of important points. Respondent 8 uses audio recorder that can clearly record some meters away voice when he wants to record seminar and discussion topics he likes and replays them whenever he wants. Respondent 1 and 6 also employ storing application to automatically uploaded recorded materials to computer.

Respondent 4, 6, 7 and 9 use various learning applications such as dictionary, language learning application, Bible and Quran to support their activities. Respondent 7 uses language learning applications to support her while teaching and also for her personal purpose. Respondent 9 –who is a Quran memorizer- uses digital Quran to help him looking for desired chapter and verses easily. Respondent 7 uses Bible in her phone to also 'see' the verses shown on slide during a praying session in the church and Bible history as reference to her study major in university.

All respondents feel that smartphone has been very helpful, facilitating their work and offers a completely different experience compared to their previous phones. Smartphone makes some things become more accessible compared to computer. Smartphone makes them able to do almost everything, prevents awkwardness and loneliness.

All respondents used to only be able using call feature, sending message without ability of reading incoming message without sighted person's help, were required to memorize phone numbers and also counted how many times they had pressed the keypad when typing message. They were also often hesitating and even afraid to go out on their own except (for some respondents) to certain places they already knew and that did not need transit or unable to leave without someone else's assistance. Respondents who have low vision or who became blind after the screen reader has been invented also feel that smartphone has helped to access more varied subjects. Although their previous phones also had screen reader, they had slow internet connections and was unable to access many accessible things.

However, smartphone has not let them to be free from being dependent to other people or able to avoid various obstacles during their mobility. Respondents need other people's help while using certain applications. Smartphone also is not as effective to assist them on doing some activities. Inaccessibility, inaccuracy, unavailability of applications or user's inability are some of the reasons.

Respondent 7 uses one social media application, *Instagram*, for her online clothing store, however due to its inaccessibility, she asked for her friend's help to upload the pictures. She also asks her sister's help to identify the picture of clothes whenever a buyer sends picture of one. Respondent 1 asks someone to take pictures. Respondent 3 asks someone to book from online transportation application, look for food and order it, install messenger and activate phone's screen reader. Respondent 2 uses messenger and camera to ask someone's help to pick clothes for her on special day. Respondent 8 asked his sister's help to read the unreadable label of mobile banking application when he just started using it, so that he can use it independently later on after renaming the labels so that it becomes accessible to the screen reader.

All respondents still need other people's help to conduct daily life and avoid obstacle. Respondent 4 who has low vision has the less dependence on other people. She needs one while watching movie in the cinema or picking up clothes to make sure about the quality. She manages to walk on her own and avoid obstacle without the help of smartphone. Other respondents need other people to assist them while going to public places, such as mall, cinema and taking public transportation especially the big one like bus. Respondent 1, 2, 3, 5, 7 and 8 also told shopping experiences in the minimarket where they usually will shop with someone or ask someone/ the cashier directly to pick the stuffs they need. Respondent 7 prefers to buy things from kiosk where she can directly ask the seller to take stuffs she needs, because sometimes cashier can be not so kind.

Respondent 2 has tried guiding application while walking, but does not really use it in Jakarta. She considers the application to have some degrees of accuracy on the road of Jakarta but quite helpful abroad. Respondent 9 has used navigating application to guide while walking with his blind friends and could reach the destination after being directed to dead end, and longer route than it supposed to be. Only respondent 4 who uses no cane and does not need assistance while walking. Respondent 2 never carries cane when she is with someone, it is shown while she was about to get into the car and walking from the gate to sofa where she was assisted by others. Respondent 5 does not carry cane but needs assistance while walking all around the familiar area. Respondent 8 and 9 use cane not to be dependent on someone and not to be mistaken as sighted. Respondent 9 needed someone's guidance to put his feet into sandals. Respondent 9 needed someone to warn him while he walks inside the room without cane when he almost stepped on a blind kid's head. Respondent 6 only does not carry cane when she goes to church every Sunday because she will not move a lot and there will be her mother around, she also kept touching the wall to move around. Respondent 1 was assisted walking from home to car and from car to the destination building. Respondent 7 had fallen to the gutter for couple of times or hit some objects on the road while walking. Respondent 3, 5, 6, 7, 8 and 9 ate the food prepared by others and

readily available on the plate. Respondent 3 and 5 needed help to look for spoon and open the food package. Respondent 6 needed help to take food that fell after unsuccessfully trying to find it

APPENDIX D THEMES BY RESPONDENTS

Phenomenological data analysis proceeds through the methodology of reduction, the analysis of specific statements and *themes*, and a search for all possible meanings. (Creswell, 1998)

Table D.1. Themes by respondent

Respondent 1	Respondent 2	Respondent 3
GENERAL INFORMATION		
Visual Impairment - I became blind since 6 grade of elementary. - I lost vision completely during the first grade second quarter of junior high - Just black - Since the end of 2014 it's gone blank	Visual Impairment - blind since birth - I still can see light	Visual Impairment - I lost my sight completely on January 2001 - there wasn't anymore remain of vision (after surgery) - Before I still could see light, like corner of prayer rug has slightly brighter color - Now it's painful if I try to see
Phone - It was that 2013 (first smartphone) - For iphone, all of them will certainly be accessible - The 4S, its RAM was only 500 MB. (…) This one is 2GB. Like 6S (Iphone 5SE) - it has old look of 5S, but the inside is just like 6S - The camera is also 12 MP, not 8	Phone - Iphone 6 I have it from 2 years back. - I really used and owned it (smartphone) was 2012 - I think iphone (use more often than computer) -- I also have android, but I rarely use it. (Samsung Galaxy A3)	Phone - About 2012 (First time using iphone) - Iphone 3GS. But I was just learning and my son got sick, so I sold it. I hadn't learnt that much. I just owned it for about two months, even I didn't know how to open it - Last Ramadan (owning second iphone) – June 2016 - I use it but rarely -4S if I'm not mistaken - I also bought iphone that because I wanted to learn, I wanted to know what kind of thing touch screen was. - E63 and E5
Digital Skill -Creating website kind of. - PHP, I can only do practical stuffs and modify. - SQL should be understood, it's the database -JAWS Screen reader -Making website and optimizing it through SEO	Digital Skill - not really (creating website) - For posting, I still can do it. - I can make, a bit, but to customize in advanced, no. (blog) - I have actually, but I never post anything - I have been adapted to use JAWS	Digital Skill - my computer skill was the worst of all. Since then and until now. - Download from where? (About downloading audio book)
Access to Computer - I was still in 5th grade and computer was not even around - During my JHS and SHS time, every day after school I used to always go there (to learn computer)	Access to Computer - every day for sure. - during the 5th grade (First time)	Access to Computer Pre-Visual Impairment: - I knew computer in 90, at that time it was DOS, I think - when we were using computer we would play game

- I work online, so mainly for that		- I have tried internet in internet café Post-Visual Impairment: - I haven't had the chance to own one. I can use someone else's but I'm afraid it'll be broken. - it's not like I can operate one, because if something wrong happens here, we'll got blamed - I never touched that computer given by the community because someone did not like me getting it
Professional -Making website - optimized it through SEO - To drive traffic - From that traffic we can put ads - I can put ads with Google Adsense. - not that much, so-so - I've ever got about 14 (million)	Professional - I am still applying here and there, maybe just some freelance works. - someone's making a contract, so I'll help. (…) like partnership agreement - sometimes I'll be asked by the ministry of communication and information to be trainer - the main payment for the trainers is around 2 million - but since it's a ministry, they have a lot of (…)like transportation coverage and stuff. - Teaching Word, teaching Excel, and all (to the blind)	Professional - Phone Operator or GA Operator since August 2004 - it's about the regional standard, 3,1. - His work was mainly to receive call from two phone devices which connected to many line numbers
INFLUENCE		
Travel - Well, just take gojek, you'll be there (going to unknown place) - We should also check the distance on google maps - He was assisted to the back of the car by his brother - when I'd take angkot, I'd be accompanied to the main road - I would certainly go to cinema with friends. - I can just ask someone to do it (Buying grocery) - I'll always go with sighted one, normally	Travel - I can take the lift (at home) by myself - Andira left with Uber car which she ordered by herself from her own phone - I have used Google Map but I like Waze more - When the Uber driver asked which turn to take, Andira told him to wait while she checked on her Waze and after that she answered him	Travel - Gojek, well any online transportation apps (going to office) - I carry cane. Look there my cane is near the door - I left by motortaxi from here to meet them somewhere and then we left together to donate blood -There's no problem to walk from operator room outside, it's already in my head - Sometimes it happens though, I walked too much on the left or sometimes too much on the right. So, that's the difficulty, additionally when there is a shooting sesión -When I go out, I will ask people to assist me, accompany me.

		- sometimes i'll need someone to assist me to motor taxi - I have also walked by myself to motor taxi, but there is security right there, so normally he'll assist me -Irawan bumped into chair that was left on the corridor and security came to help
<u>Productivity</u> - Pages, this one is to manage fan pages - Upload on OLX, to put ads - I'll just call buyer here (ecommerce) - It increased my outreach (writing facebook status) - Camera for taking picture of course and to put on blog	<u>Productivity</u> - Work is to read, like, say, checking email, or to read the result, to send, sometimes I do it all from iphone. - I use this, the m-banking one, so I don't need token	<u>Productivity</u>
<u>Information</u> - I also use iphone to call. It's actually the same - I got news from other friends on facebook - I need someone to tell the story (of the movie)	<u>Information</u> - Voice Vision, this one is to read a scan result	<u>Information</u> - iphone is for chatting, to learn - Calling someone
<u>Entertainment</u> - Tune in radio to stream radio - Watch vlogs of people playing Pokemon - I've tried, like Harry Potter, it has audio description -Dark Room games - He listened to music	<u>Entertainment</u> - There are like monopoly, uno - I have played brain duel actually - If I just want to listen I'll open soundcloud from phone	<u>Entertainment</u>
<u>Environment Identification</u> - He acknowledged a place when asked about direction - I don't do selfie, I can just ask someone to take my picture - His brother found his shoes for him - He asked me to confirm the parking car	<u>Environment Identification</u> - I have memorized home - i-move is too read our surrounding - she sometimes used imove while on the road to see the places around - Scan, scan writings, to read books, and also to see colors (…) I use them (Application) - recognizer to read money - there is one which is for taking picture (…) it will tell whether our position is right	<u>Environment Identification</u> -Asking color of the card on his wallet -I read money with someone's help, the emboss does not work - Irawan asked me nominal of the banknote he was holding
EFFECTIVENESS		
<u>User's Knowledge</u> - I'm too lazy to type there (phone). (…) it's annoying, I can't be patient	<u>User's Knowledge</u> - Because I'll be confused if I use Indonesian screen reader	<u>User's Knowledge</u> - I was almost dying just to reply (Whatsapp) - Normally I would recognize that here there is keypad for menu, and here is this and after that is this, but this one

		isn't like that. So I was like, where should I go, where should I look for it, where is it. - About applications, I was really grateful that finally I could understand what that was - I was even confused how to enter the contact number - then input birthdays, I was even more confused, oh okay here's to input birthdays - there was an incoming call from my wife, but when I wanted to answer I just turned off the voice over in the end - If there is no one, I'll be doomed, how should I turn it on (Voice Over) -Dimas installed my whatsapp - when you use uber, you can still be deceived when the driver's cunning, he'll get you lost first.
<u>Significance of Usage</u> - I use this (Whatsapp) to advertise products, for work and other things Taptapsee is just for fun teasing people, I guess.	<u>Significance of Usage</u> - Assistive apps are useful - when I am alone, I'll just take the picture of the clothes and I'll ask whether it's pretty. Or I'll video call someone and point the camera directly to the wardrobe. So it's much easier.	<u>Significance of Usage</u> - I used to have it in 3GS. I just tried taptapsee out of curiosity -The transportation apps are helpful, I can even go home just with my wife.
<u>Usability of Applications</u> - He ordered car from uber using his own phone - Audio will automatically be uploaded to dropbox - Some things are more accessible through iphone - Instagram is not active since it's not accessible. - Telegram but not active, it is not accessible - MTVplay, it's error all time - I use whatsapp without any problem	<u>Usability of Applications</u> - when I am mobile, I'll browse from phone - when I want to lie down I'll use phone - like writing contract and so on, those are impossible from phone - I use OLX to buy. - Iphone cannot save file - I can use it to transfer and all. internet banking is bothersome, I have to wait for someone to read it first (mobile banking) - I have Blindsquare, it is quite right abroad, here it might be still inaccurate sometimes - I've tried like the one that reads the barcode. It is actually worth it. Abroad it's really useful but here I don't know - There are some unreadable labels, but I can give new label to it. (mobile banking)	<u>Usability of Applications</u> -I haven't installed gojek on my phone. It was installed before, but no one ever used it -I don't use my phone to order motor taxi - if we carefully count the fare, grabcar is more expensive - gocar told me they didn't take any order over 70km

	- I also have Instagram but rarely use it, perhaps people will just tag me, it's not so accessible -Tokopedia, Lazada, Bukalapak. Quite accessible, at least I can still use them, I can still outsmart them all, probably 90% accessible.	
TRANSFORMATION		
<u>Accessibility</u> Pre-Smartphone: - I used this 3310 type, it didn't sound - I had to memorize when there was message - I could type message but I couldn't read - I used to memorize people's numbers - Transportation's fee would take half of my salary	<u>Accessibility</u> Pre-Smartphone: - Rarely (taking public transportation) - it happened once when I took the college bus, I almost fell kind of. - it still didn't have voice feature yet (…) nokia 3310 (…) I memorized. - It had a not really good screen reader, and then it also, how to tell, like it didn't have good and continuous improvement, and besides that the phone kept restarting on its own, frequently (blackberry Apollo) - before there weren't too many applications -when we just wanted to check email, we could not even do it from phone - all the money transfer apps sort of, they were not even existed during nokia time	<u>Accessibility</u> Pre-Smartphone: - I used to have motor taxi's subcription (to reach office) - the first time I rented a house (close to office) - I changed motortaxi for several times until I could no longer take it since the motor taxi was really moody and expensive. when I called driver, he told me he could not come - I memorized my phone, there wasn't any screen reader - there was a transportation as office's facility, it will pick and drop employees, sometimes I also used it - conventional taxi sometimes they purposefully prolong the route
Post-Smartphone: - Yeah, like this, to upload on OLX, to put ads somewhere. Everything. - Meet the buyer, no I don't do, I'll just call him here - I ride all of it. I ride grab often and gojek too. I've taken gocar too. I will just pick which one has promotion. -Pages, this one is to manage fan pages - I open facebook to check the notification	Post-Smartphone: - I feel more convenient to transfer and do many things via phone - it's more convenient to open from apps (ecommerce) - I tend to prefer iphone. It's more convenient, like it's more accessible, it has more apps, and then the navigation is also easier, and to type is also easier. - We can estimate the time now - I'll just order from gojek (shopping)	Post-Smartphone: - Gojek is helpful - Before I still could check email through phone, right now I can't
<u>Independence</u> Pre-Smartphone: - Taking a cab sometimes can be difficult too, when they intentionally get us lost, the price will also keep increasing - I wasn't brave enough to just go here and there	<u>Independence</u> Pre-Smartphone: - usually I'd just go with someone (shopping) - not really alone, someone would drop me. (to school) - when I was still in college I took transjakarta (…) with someone	<u>Independence</u> Pre-Smartphone: - (even though my house was close) still there will be someone who accompanied me (walking to office)

	- Maybe if not my mom accompanied me, I'd go with friends by, perhaps taxi	
Post-Smartphone: - If there is someone asking, fine (going to cinema). - We can complain directly and the company will return our money (…) That's why it's safer, for those (blind) friends especially it's safer. (online transportation app) - usually when I go out I'll always go with someone, I never go just by myself. Maybe just to, well I am courageous enough to go to Mitra (taking bus and public transportation)	Post-Smartphone: - Andira left with Uber car which she ordered by herself from her own phone - When the Uber driver asked which turn to take, Andira told him to wait while she checked on her Waze and after that she answered him. - From lobby to the car, she had to be assisted because the car's door located a bit far, unlike what she predicted	Post-Smartphone: - I asked for my friend to book an order (online transportation app) -Irawan asked me to read out the available restaurants and menus and order the food for dinner - there is security right there, so normally he'll assist me (to walk)
OTHERS		
Motivation of Usage - Taking that one's better (uber) - I have be my eyes but never used it - What a nuisance to use that kind of thing, it's difficult (walking guide app) - He used internet banking yet needed help to read the token, because he can ask others.	Motivation of Usage - when I want to buy something and the seller is active on BBM - When the menus on phone are set in Indonesian, it'll be weird	Motivation of Usage - He did not take his phones when going out to toilet. -Chatting, I learn whatsapp
Physical and Material Access - (Camera) For taking picture of course (…) I also will put them in the blog.	Physical and Material Access - The chatting one I suppose, whatsapp and other chat apps. There must be some groups which will be active.	Physical and Material Access - I am afraid when I use iphone, let's say I put the simcard on iphone and when I am in angkot checking credit balance or I want to transfer money, something will happen. You know that the more sophisticated something is, it becomes more riskier
Usage - I always actívate my own google map (on the journey) - I use whatsapp every day	Usage -Whatsapp is active every day - That can read money, whenever I need I'll use it	Usage - he is using his Nokia phones more frequent, I only saw him showing his iphone once

Respondent 4	Respondent 5	Respondent 6
GENERAL INFORMATION		
Visual Impairment	Visual Impairment	Visual Impairment - First time it was 2005

-Maybe my vision is about 25% - I still can read, read in the sense like how sighted people do it, but maybe there is influence from the loupe that I have, I mean magnifying glass, I use that -I have been like this since I was 7 year old - before I could read books longer, now I got tired easily - I could see that there was a small restaurant but I didn't know what it sold - I see you, but your face is blurry - I still can see pictures on websites -I don't feel good when I'm looked at like that - Dhani could read comic book with the help of magnifying	- I still can see a bit, Dhani sees more - Maybe 10% - I can see light, shape, color - I can see you, but I cannot distinguish face. I won't know whose face is that - I'm like this since I was born. It's quite stable. So, it's quite comfortable, thank god. -I cannot read. Except the size bigger than 20 - he directly concluded that I was still there since he said he saw the color of my clothes	- I became blind because brain tumor damaged the eye nerve - I still can see light, perhaps it is like tinges or dots of lights -Recently, people's shadow, shapes, pillar from far away, color, design and motives, they are not too visible anymore
<u>Phone</u> -Iphone 4S - Before I used Samsung Galaxy Chat - if I didn't change my phone, I would be left behind and not well-informed	<u>Phone</u> -Samsung J1 - I have been using it for a year - I used Samsung V, Galaxy V, for several months - At first I got android from my friend. Smartfren, andromaxi. I got it in the end of 2014 - for rooting (on android), let's say, I can do that	<u>Phone</u> - smartphone was in 2014 - iphone 4s
<u>Digital Skill</u> -JAWS -I just learned HTML last week. HTML, PHP, CSS, and Wordpress I haven't mastered those, too. I mean I am still in the introductory level - I can do Microsoft Office - I learned Sound Editing, radio streaming, last week - I learned blogging as content writer -I have many blogs, but it's no longer updated	<u>Digital Skill</u> - I am using both JAWS and NVDA - I can make website, yes (…) Using CMS or drupal - I can (make blog), I have a blog - HTML, CMS, PHP, MySQL. I'm still in the basic level - If the damage is still about the software I can (Computer and Smartphone)	<u>Digital Skill</u> Pre-Visual Impairment: - what I liked back then in computer was drawing. I never typed a thing (…) drawing in Paint or such - when I was, I think 5th grade, my friend moved, she moved to Texas I think, so we started to send email to each other - MSN and all. Chatting and other things, so those are what I did Post-Visual Impairment: - I have NVDA too, but JAWS is more convenient - I don't do and I don't have blog - I rarely update status, I rarely do that (social media) - I don't use HTML. Maybe I use HTML only by taking the ready data

		-I just download software
Access to Computer - I first knew it when I was in junior high, but at that time I still looked at it with my eyes - I started to love learning computer, internet, blogging and all, it was after I learned about screen reader - about 2008, 2009, I started to actively using computer -During junior high, I used computer to browse on internet	Access to Computer - during the 4th grade I took computer course - Of course, (I use computer) every day	Access to Computer Pre-Visual Impairment: -3rd grade, it's my first time operating computer - I learned at school (…) how to make writings, for this and that -(I used computer) Quite regularly - when I was in junior high, I started to slowly leave computer (…) since I got my own phone in junior high, I started to keep sending SMS Post-Visual Impairment: -I work with computer and phone in the office - Computer is like, well laptop and all, it is just to do my assignments or when I look for something, browsing or so.
Professional - I get around 2 million rupiah - when there is new project, I'll get more. -For three days, Tuesday, Wednesday, Thursday, usually I will be in the Center of Accessible General Election office, for the disabled - Since the other two days are free, sometimes I use it to finish Pertuni's work, usually I'll just work from home. Last time I helped Pertuni producing a public service ads project	Professional -I still get money from my parents, 30 rupiah a day - University student	Professional - I am in the division of information - (I work with) Computer and phone - I will offer bank customers the programs we have - I got about 3.5 every month - I started working in 2011
INFLUENCE		
Travel - Going to places with stairs? Well I suppose yes, then. There are many buildings like that. I have also hiked mountain, just once -I regularly take angkot, train, bus to reach office and then I'll get off in, it's like a small street, and I'll walk from there - Dhani walked by herself and crossed the road. She took the angkot that stayed there and got in on her own without problem - Dhani walked under confusion for a bit and tripped when she walked on the	Travel - I usually use motor taxi to go back from campus - I often go somewhere by myself (…) with uber, grab, all of those things - I don't use GPS to get around. What for? -I can memorize nearby area -I'll go to new places with uber - Since I still can see, so it is just fine (to memorize the route) - Ary walked slowly without any difficulty from the main gate to the right side of the yard - He went to buy snacks which located about 100 meter from the foundation along with his blind	Travel -I go to work by motorcycle (…) I subscribe to a motor taxi - since gojek and grab have come around, I'm so lazy (to take minibus) - I can just walk (on the stairs) - Every day I carry it (cane), but to the church, rarely (because I have memorized the place) also I will not go anywhere mostly - I haven't tried to download it (imove) by myself since I rarely go out you know

stoney and less finely paved road of the station because of small construction, however she didn't fall - She took the stairs at her home without obstacle - I want to go somewhere, oh I guess it will difficult to take train, so I can just take motor taxi right away, maybe gojek, grab, I don't have to ask my father to take me there	friends without carrying any cane or feeling the wall - Dad's taking me (to campus) - Hang out, well it depends, we don't hang out that often, and if we do maybe just two or three of us - To watch movie usually we'd just go in in two or a group of three - I am like, as long as there is sighted person around, it's better that I ask. Even though I'm alone, whenever I am, I'll look for people around, 'Excuse me, Miss', just that, it's easy - if I wanna go to minimarket then usually if I am on my journey somewhere, I'll go with the gojek or grab driver, they'll be fine to assist me. When I'm home, I'll ask my siblings to do so, as long as they're around. -Ary held my shoulder and he made me assisted him to reach the studio	- if I happened to not carry lunchbox, I'll go down to the third floor - Precilia went to the church from her house by Uber car -Her yard and house are separated by short stairs, which has about 6 steps. Precilia could go down on the stairs without any difficulty, she seemed to recognize the stairs quite well. -Precilia walked a bit slower compared to other sighted people, as seen in comparison to her grandmother who happened to be there - She could walk by herself to enter the church although she kept touching the wall -Using map
<u>Productivity</u> - Facebook, Twitter, those are mainly because I manage Pertuni's social media accounts - I also manage from there, things like hootsuite - for office work also, there is a whatsapp group where everything will be discussed there. - I use mobile banking	<u>Productivity</u> - It was Line, but it depends to the person. I usually use OLX (for dropship)	<u>Productivity</u> -Youtube is, well my background is theology right? So in theology it is like, there are a lot of studies where we need to learn from video about teaching - to help my study, I use many applications, and one of the applications is like dropbox -(i-jakarta) it is like library where we can just register and borrow book online (…) I use it sometimes when I need
<u>Information</u> - probably just joining the groupchat of Kartunet in WA, when they have event, they'll share it there - I use whatsapp, also make a call - BBM I still use - I use applications like the news app, Detik, Kompas - for the communication purpose, personally to me, I mostly use whatsapp, sometimes SMS too	<u>Information</u> -I just call my girlfriend	<u>Information</u> - for facebook maybe it's just, I just get some group info or such thing, and also fanpage. For twitter, it is like news updates -(Browser) it is more for study and for information. I like to look for biography, this person was like this and then now she became this. - also applications like alkipedia (…) it is more like the history of bible's writing - I will call the motor taxi driver

-I joined whispering cinema. I don't watch by myself, I'm not that confident		
Entertainment -Music - there is a game, Brain Duel	Entertainment -I play games. (…) Just RS game actually (…) like game for the blinds. Cards	Entertainment - I have the app of Brain Duel and it is like improving my knowledge
Environment Identification -I read like sighted people with magnifying glass - I'll see the title, the author, and oh, the cover's cute (When buying book in the bookstore) - Picking clothes? Just normal :D Sometimes I just ask the color 2 mom. Just to make sure u know, I'm worried that it won't match, the color is dull etc.	Environment Identification - Ary sat on chair which located a bit on the back where he must pass many people who had been sitting before him, he was guided by an employee from the foundation - Ary asked me to help him opening the lunch package	Environment Identification - I've never used it (money reader app) - I can use such, like just the small stove, the one with small gas, you know, but to use the big gas stove I can't since I am also not allowed to so
EFFECTIVENESS		
User's Knowledge - Actually I want to use map but I'm probably a bumpkin. I don't know how to use, how to even turn it on? Things like that. So I never actually used it	User's Knowledge	User's Knowledge
Significance of Usage - I also have apps like bukalapak, but I haven't used it - I have wattpad actually but I never opened it. Many people seem to always get new stories there, but when I look up they are not that diverse - Phone is to check facebook, twitter and social media. Social media and then reading news, detik.com or kompas, dictionary too, English, stuff like that, and also music - I just need to communicate, finish my works, I can search for books, I can read ebooks. So far those are all my main needs, so I just keep using this phone for those purposes - when I go back late and it is already past the dusk, at that time my sight will be decreased, so rather than crossing the roads, looking for angkots, those are awful, I better take uber - I can be more independent. Like that, independent as in I	Significance of Usage - All of them are really helpful, y'know. (online transportation) If you think rationally, how anyone can even use their (public transportation) services, when the drivers are reckless, the transportation is also, the vehicles are all rotten like that -For social media and mainly communication, and all the transport apps -I use things like that, gojek, grab, uber, whatsapp, line, BBM	Significance of Usage - there are a lot of teachings I can get. And that (youtube) can be reference too -(Taptapsee) when I was using that app I was thinking, whether it will be useful for me, if it is not that useful then I will rarely use it

can get information far easier, in the mobility aspect is also becoming easier, easier in the, well many of them		
Usability of Applications - When I bought book online, from facebook, friend - If you use iphone, the download will be directly saved there - I have tried magnifying app out but I got a headache instead - I found the national library application, it turned out that I have to register manually first by going there - phone is more practical - that one was terribly slow, God. The screen reader, I was so annoyed (Samsung Galaxy Chat) - For me from the perspective of a user, I think iphone is enough -This Qibla app I don't use screen reader for this, I see with my eyes - I have Line but I rarely open it, it is full of ads, while BBM is full of people selling stuffs.	Usability of Applications - that's just tiring my eyes out (magnifyer) - For me it depends on the situation, if I am with friends I'll prefer to send VN. If I am in my room, just lying down, relaxing, at that time I'll type (whatsapp) - I pity my (phone's) battery (to access apps on the road) - Android covers (my need), but iphone is better when it encounters strange apps, even it can edit video. - there are (editing video apps on android) but not accessible - Whatsapp call is like, "Hello, hello, do ya hear me?", "What? What? Oh all right I hear you ", it's really slow	Usability of Applications - (With Dropbox) when I record on iphone, it will directly be saved to the computer - Precilia listens to the verse of the bible through her phone which were discussed by the pastor and was shown on the slide - if I use uber (to work) I'm afraid it won't reach on time. Since it needs to be, they need to know which road does not have traffic jam and then also how to make shortcut - The driver asked for the route and Precilia looked on her phone about possible routes without traffic jam and told the result she found to the driver. - She ordered Uber car by herself through her iphone -Now it (iphone 4S) is slower - maybe about using iphone 4s, the first is its easy accessibility, faster.
TRANSFORMATION		
Accessibility Pre-Smartphone: - I also thought that touch screen would be difficult - it was my first time going out of town by myself and I was not that confident with my low vision to take bus. - I was copying all my textbooks in much bigger size, A3 - When I looked for food, I'd look from nearby places - I took bus, I took angkot, all by myself. During the day, I still could see, even now I still can, but then, the problem is perhaps mm I didn't see the number of the vehicle. So usually I'd memorize the color. - my difficulty was to stop the angkot that's just passing, when they weren't parking	Accessibility Pre-Smartphone: - My first phone was nokia 2116. The keypads were 9. It doesn't have screen reader, I could still memorize the menu	Accessibility Pre-Smartphone: - it (old phone) could be used for facebook, twitter and such things, but it stopped there - It (Nokia 2600) could not use talks - I brought the laptop school, I typed all the notes, all the assignments, I typed them in the laptop and I printed them. - to browse, with phone like that it was really heavy. Even though I already had package, it was still really heavy and slow.

- The navigation of BB was a bit difficult		
Post-Smartphone: - Since I like reading, I am happy that I can get e-book now, I can download app to read news and sort of things - Facebook, Twitter. That is mainly because I manage Pertuni's social media accounts. I also manage from there, things like hootsuite. And then for office work also, there is a whatsapp group where everything will be discussed there. - I download in PDF form. If you use iphone, the download will be directly saved there. - Let's say I couldn't read the sentence clearly, I want to read per word, per letter, to make them spell it, it is really easy to do - using iphone is much simpler, just that. You just use it and this way is the short cut, and the setting can be changed right away -With smartphone many things become easier, I guess -All my previous phones were accessible, but the accessibility levels were totally different, you know	Post-Smartphone: -Android is accessible and covers my need - But iphone is better when it encounters strange apps, even it can edit video. - if I am with friends I'll prefer to send VN. If I am in my room, just lying down, relaxing, at that time I'll type. - For those things (dropship business), I'll always type.	Post-Smartphone: -before we could also do it, like before for example we could use twitter or facebook or whatever other social media in standard mode, we could access them, but for this kind of smartphone, like this iphone, it has wider range, I felt like it gives me easier access to a wider range, so it is bigger and faster I should say - Everyday when I record on iphone, it will directly be saved to the computer.
<u>Independence</u> Pre-Smartphone: - before, when I wanted to shop online, since the money needs to be transferred, sometimes I needed for someone's help and it discouraged me - Before it was like that, it would be difficult to take train, so I'd ask someone at home to take me - I'd go out with friend (when out of town) - When I first moved to the rented studio, my mom had told me at first. "Dear, when you want to eat later, there is this restaurant here, there is this restaurant there".	<u>Independence</u> Pre-Smartphone: -I'd cross the road with someone - I was escorted to school and I was picked up after. I had taken angkot too, I could but rarely - I just started taking those kind of buses, I started doing it in the college, I can do it by meself. Before it was only angkot. - I went from campus to train station with the motor taxi in campus and then I took a, took train to Sudirman, from Sudirman I took metro bus - when I was in junior high, I started to learn about talks. I asked for my school friend to install it for me on my mom's phone.	<u>Independence</u> Pre-Smartphone: - I went everywhere with my mom, it was mostly with my mom - after I reached the 1st grade (senior high), I'd be accompanied by mom in the morning and then I'd go back on my own (…) By angkot, one (…) From the front gate of residence, there were many pedicabs, so I'd take the pedicab -During national exam, there was someone reading it for me, but I still held the braille version to speed up. The person would read and then we gave the answer.
Post-Smartphone: - since I already have mobile banking and I have understood	Post-Smartphone:	Post-Smartphone:

how to do it, I'm sure how to do it now, the transfer method, I start to shop online frequently (…) it's simpler and practical, I can do it by myself - about downloading m-banking app, I want to transfer by myself, I don't cause a hassle to people	- Now I never do that (cross the road) anymore. Gojek will appear right in front of me - going home should be free, so I mean whenever me wants to go back, at which hour, I try my best not to bother dad (by using online transportation) - Ary asked me to help him opening the lunch package - Ary held my shoulder and he made me assisted him to reach the studio	- I have been to minimarket, but usually I'll go with my mom - I have attended some concerts, but they were all also with my friends. So, I have never been to any concert on my own -in the campus I never typed anything, I just focus on the explanation, focus on the explanation and record, like that. And then after I arrive at home, on Saturday, I will listen to the audio again and I will take note on any important materials. - the driver also asked the route and Precilia looked on her phone about possible routes without traffic jam and told the result she found to the driver.
OTHERS		
Motivation of Usage - No I didn't download taptapsee, that is like a trial I think. Just, you just get 10 photos for free, I guess. (…) that's why I don't use taptapsee - Well with English accent it is fine actually, I mean it is still better than the other way round. Sometimes when there is a certain chat where it isn't read clearly with English, I will change it to Indonesian. (Screen reader) - I don't use those things (money reader) -but public transportation is cheaper than uber, it reduces the transport fee	Motivation of Usage - I have deleted brain duel. (…) There is no update. - I am not really interested in using such things (assistive apps) since my phone's RAM is small	Motivation of Usage - it is much better to use grab and gojek (than public transport) - This alkipedia is more like the history of its (bible) writing
Physical and Material Access - since I still can see, so sometimes when I see the phone, it is really small.	Physical and Material Access - for mobile banking the bank didn't want me at that time. They said things like, the token is not accessible and many other excuses, alibi, I also didn't want to say a lot that time. Actually I could have one if I was accompanied, but I was too annoyed	Physical and Material Access - Youtube is, well my background is theology right? So there are a lot of teachings I can get. And that can be reference too - to help my study, I use many applications, and one of the applications is like dropbox
Usage -I use my phone everyday - Computer and phone, maybe now I use phone more	Usage -I use whatsapp the most - Sure, I use phone often	Usage - I access from phone more (social media)

-I use whatsapp the most		- My daily is like this, I go home, take a bath, open social media for a while. -I like to look for biography, someone's biography

Respondent 7	Respondent 8	Respondent 9
GENERAL INFORMATION		
Visual Impairment - actually I became blind since 2006 - It was glaucoma - I had low vision until right after I gave birth in 2012 perhaps, not long after that it starts to slowly become a total - it is just light and dark -it is still bright, now	Visual Impairment -I became totally blank when I was 12 years old - since I was 4 years old, I have been diagnosed with weak eye nerve - when there is lamp, the light is still visible - my friends said that my eyeballs do not look like blind person	Visual Impairment - I have low vision - I still can see about more than one meter - I cannot even see face that clearly -I know your t-shirt's color - Before I was actually blind since I was 2 years old -When I was 5, I got surgery so I can see -my parents said that I suffered from high fever - I still can see the pictures on website but I don't
Phone - I'm using smartfren andromax, android - And BlackBerry, just that - This andromax is quite new, I started using it 2 years ago - Andromax G2	Phone - Nokia E63 - The android is LG, Nexus 4 - I think 2013, I first used Nexus 4 -My reason of buying android was because I have to follow the technology	Phone -Nokia E63 and Android J2 Samsung - Galaxy V was my first android -This J2, I have been using it only for a month - I wanted to look for Symbian phone, but it was really hard to find one, it was not that many in the market.
Digital Skill Pre-Visual Impairment: - I was just using computer for chatting, playing games Post-Visual Impairment: - I am using just JAWS - I have website which was made for my mom, I just filled up the content - I don't know how to code - my focus is always the marketing (internet) - I just know a bit about HTML. Maybe just all those brackets and br (giggling)	Digital Skill -I am using both. JAWS and NVDA too - I can create website, but for like maintenance in the servers, I have not mastered that yet - I can code too - buying hosting, making the hosting, setting domain, I can do that - Setting CMS, I can do that - things like maintenance plugins and all, I still haven't learned that deep -I haven't learned about PHP that much - My personal blog is not managed well, it is not updated - I can install and download software	Digital Skill -NVDA and JAWS - I don't blog - I learned about installing software before. But after I started college I rarely did that kind of things, that's why I forget most of it now - I don't really understand programming language - I can make folders, I can save the files there
Access to Computer Pre-Visual Impairment:	Access to Computer	Access to Computer

- since I was in junior high - but it was not that long, at that time the school was still swinging. The first year we were learning, in the second year we weren't, and during the third year it was there again. Even in the senior high, there wasn't any - at that time it was only at home Post-Visual Impairment: -I open computer every day -I first knew in 2009, in Mitra Netra	- I just didn't do anything on Internet Marketing. I was just trying it out back then -I did not have chance to learn computer before I was blind -(I first knew computer) in the 2nd grade of junior high from Mitra Netra - For using computer, it's almost every day	-I started using computer since I came to Jakarta - I took 6 months course. But I didn't finish -when I started taking the course, they had not managed the hour like now. And I felt like, my teacher at that time did not really pay any attention on me. So I stopped - I don't open computer every day
<u>Professional</u> - just teaching here and also I am a housewife and then I have online store - around 5 (million) perhaps - School subjects, but actually I teach computer	<u>Professional</u> - I am here in secretary division, as a general secretary, since March 2012 and also publication for the foundation actually - I am teaching as private tutor, like computer and reading braille Koran -My students, one is blind and autistic, and the other is blind - it is not even 2 million	<u>Professional</u> - I am not working actually, but thankfully, how to say, sometimes I will get a teaching job outside, like to other cities (…) it is just social work actually but there are some transportation money - if there is someone asking for massage, I can accept that - I am a committee where I will help other friends to buy groceries for daily life and also manage the expenditure that is what I do Income: - I just get some to buy groceries, for daily life here, from my parents - it is perhaps one million
INFLUENCE		
<u>Travel</u> - when I am somewhere, wherever it is, I'll order gojek, order from other apps - I will go out on my own actually - when I am at home, I will walk first to reach motor taxi. I don't use my phone to help walking -GPS -going to minimarket, actually it is still hard for me. While going to the small stores, you just need to mention what you need, in the minimarket you need to take your own thing, right? And that is not yet accessible - Aryani walked around the foundation's area without any	<u>Travel</u> - Even though now I took motor taxi, I always carry my cane, it's like my ID -I need cane, sometimes when I cross the road, I am afraid that people will misunderstand. They might think that I am not blind and that will be a problem - Map is a must - I often go to kiosk near my house, since most of the area I knew it well and people in that area already knew me quite well, sometimes I don't use cane, but if it is like some hundred meters from home, then I should use it - I have been to minimarket alone, but it is rare - While Rafik was going back to the teacher's room by touching	<u>Travel</u> - I carry my cane when I go out - I can be considered as, the person with low vision who depends on cane -I rarely go out just for refreshing actually. I don't like the traffic jam - I can also do it on my own, now (going out) -At that time I took the train to Bekasi. First from here I took the motor taxi to Lebak Bulus, and then I took transjakarta, the transjakarta with Lebak Bulus-Harmoni route and then from Kota, I took the train. There was no problem, it was nice. That

serious obstacle, as seen when she kept moving between three rooms which two doors are facing across each other within a distance of 7 meters and the other door is in the middle, the office - She bumped lightly into the door and then quickly avoided it and met me. - sometimes it is also because I just don't know the area. And sometimes things like that happened, like hitting something, it happened when there is a cart just stopping in the middle of the road, that kind of thing is not predictable	the wall, he bumped into the table which was put on the lobby in the middle of the room - Inside the mall, yes, mostly I will be assisted, after we meet in front the main entrance - There should be sighted person when I travel. - I take transjakarta but I never take it alone. I have never taken it by myself, my area of mobility has not reached the central part, so whenever I take transjakarta, it is mostly with friends. - I have been staying there (house) since I was young - he walked slowly to the right because he wanted to approach the door yet he was almost stepping on a blind child's head who was lying down on the floor. I told him.	was the only time I tried taking the train, I liked it a lot - If it is still around here, I could. But if I need to cross the road, I need to have my cane - I indeed take them (online transportation), most of the time, when I go out - For bus, it is probably only for far away destination -Google Map is directing me, while walking at that time. - He walked to his room from the lobby, which was located about 7 meters by passing the corridor and he did not have any obstacle or touch the wall, he walked like a sighted person - I will just go when there are events, like some friends organized it. I never been to cinema on my own - I went to Bandung, just for refreshment, with friends from here, but there were people assisting
<u>Productivity</u> -Learning English, Arabic - rather than eating alone, it's better if others eat it too. That's why sometimes before I come here, I will send to the whatsapp group, "Tomorrow I'll come and I want to cook this, anyone wants to order?" -Since BB cannot have whatsapp also, so there are more customers that are not using BB now, so customers will ask through whatsapp. So it is more, it is just more facilitating, since we also can make groups and all	<u>Productivity</u> - So it's like there are friends who made apps often. And then he will give it to the community, we will try it out and then we will make the tutorial and just review in general. I'll review the advantages and drawbacks of the app from blind perspective - I am using BSM mobile banking	<u>Productivity</u> -I also type on android - When I recite Koran, I like to use that Digital Quran app
<u>Information</u> - I am indeed using it for the messenger, social media, and then also to download -Motor taxi will contact via whatsapp	<u>Information</u> - I often talk with friends through Path, usually we will talk about IT or IM sometimes, we just knew via online at first -I do (open) with application of facebook for android - Whatsapp and BBM actually, and also Line, I also use Line - Perhaps only whatsapp, like the group of high school friends on whatsapp	<u>Information</u> - I probably use only whatsapp - I still use SMS - the one that I never leave out is like the news application

	- I don't meet a lot of friends whose hobbies are watching movies in the cinema. So if there is someone who asked me or let's say we just happened to go together to cinema, I'll be respectful. (…)The story will be told.	
Entertainment -I don't play games	Entertainment - For games I have blind legend (…) it is like an adventure game. There is a blind person, her mom is kidnapped by a robber	Entertainment - I listen to music - I also can watch TV now
Environment Identification - blinds still cannot distinguish banknotes, it is still fairly difficult for us - I like cooking but if my movement is considered to be slower than sighted people, it is quite obvious - there are a lot of obstacles especially when I fry fish (…) there are a lot of obstacles especially when I fry fish - I have fallen and tripped over, -She offered me a can of banana chips which was on the lobby's table and she wanted to take it yet she could not find it after trying to continuously touch the table and she stopped after I said I would take it later.	Environment Identification - I also installed android money reader, so it is to read money - there is taptapsee which can describe object we took - He switched on the fan without serious obstacle. He just kept touching the buttons to find the right one -Back camera selfie is an application also for the blinds, so when we take picture, we will point the camera to ourselves, right? So it will help us to direct it - It's better if I can just ask the cashier (in the minimarket)	Environment Identification - He took the money from the lower part of the wardrobe and he picked the money by looking at each banknote for a little while under dim light and he gave me the right amount - When someone called him on the phone, Indar did not look at the screen and he answered it right away by pressing the screen couple of times randomly until he successfully pressed the icon - He needed to try for couple of times and helped by the foundation's helper until he could put his feet into the sandals
EFFECTIVENESS		
User's Knowledge - it's not that I don't want touchscreen, but sometimes customers just don't understand our situation. I even never told my customers that I am blind - There is nothing such on phone (to help directing while walking), actually there is map, but I haven't learned how to use the map, so it's like that. I haven't discovered a comfortable way to use it. Because if my right hand will hold the cane and my left hand holds the phone, it will be..	User's Knowledge -Mobile banking, to be considered accessible, actually at first it was not, it was not accessible. Since many of the features are not readable by screen reader, but I fixed it - I haven't found any (indoor navigating app)	User's Knowledge - I searched on playstore and I found it (radio) -I actually feel like it is harder to write on android when I am on the road. When I am on motor taxi, I cannot focus. At those time, I often use voice note on Whatsapp -this E63 is only to take notes in my daily life. (…) It is easier like that (…) it is more comfortable to write with keypad. But if I am not in rush, I can just use android - when I write a lot, nokia is better.
Significance of Usage -I use gojek when my motor taxi cannot make it - there are many applications which purposes are to learn,	Significance of Usage - I often use, well for transportation, let's say I order online motor taxi or when I search for road, I will use phone	Significance of Usage - I usually listen to radio from my hometown, like from Bengkulu, so I will be

learn English, learn Arabic, and then also to read news -Taptapsee was actually useful because using that I can distinguish banknotes - Gojek, uber, grab and all that, honestly, they are really helpful to blind people - also the GPS. Since sometimes there are new places we will visit where we don't even know anything about - I don't do anything anymore in Instagram, just for my online store. -I use phone to assist my teaching activity	- I don't open it (facebook) as often as before - (After my card was pulled into the ATM) I contacted the center office, and they blocked my card right away - I rarely browsed actually -Taptapsee, I don't use it that often anymore, since it is, well it is just for a help when I am curious with the situation around me - starting from OS Jelly Bean, there is a screen reader feature or talkback where it can rename all the unreadable labels - Smartphone is really helpful -My phone, it must not, it should not, It may not be left anywhere	updated with the latest information - I rarely play games, I probably have tried only this game, the intelligent race -I use android for everything -All the applications really support my activity -Google Map is really convenient. it is accessible too, so for example when we are on the road, he will say, "you have to turn left after some steps', for example (…) Well sometimes it is right (…) Sometimes it gets error too
<u>Usability of Applications</u> - I happened to also learn how to make yogurt and it tasted good (…) so I tried to sell it online, it was sold quite well, mostly it was through delivery, like there is gojek - but to reach the customers, that part (delivery via Go-jek) was expensive -This andromax has QWERTY, the below section still has keyboard - Instagram is pictures, it is not accessible - I know what my phone is. This is not a phone with that much quality. For games and such, I have never played games on phone -Phone is good -It is quite fast and the price is affordable too	<u>Usability of Applications</u> - I have all of them, gojek, uber, grab, which one has the promotions, use it - maybe just play social media or open whatsapp, when I am on the road -When I left my phone, I went back or when gojek still had promotion the 10thousand one, I used gosend. I was like that - Smart audio recorder, it is like a recorder, but it can be used to record audio within some meters range and the clarity of the audio is also better. Usually when I attend seminar or when there are some good discussion events where I am invited, I like to record them and then I collect them all, the mp3 audio. And then I can replay it later on laptop - Yes, money reader is practical, since my android is quite sensitive to read the money, so yeah it is quite sensitive - I asked my siblings to read all the unreadable label on mobile banking app for me - since I use motorcycle more, I felt like it is not safe to use phone - the advantage of android is surely its mobility - laptop's advantage or computer, the monitor is optimal. The strength to access internet pages is better, and	<u>Usability of Applications</u> - Grab, like that, uber, it is actually just according to our likeness, right? I can just choose, whichever is cheap. - I was with friend, so we just knew about that place, so we used google maps, we were confused we kept turning and turning. But in the end we found it. - I watch TV quite often too, but when you use it to watch TV, it will spend more of your quota -Digital Quran, I can just keep changing depend on what I want. If I want this chapter, I can just click right away. But that is also, it is using quite a lot of quota - all the blind friends usually experienced the same thing, when I asked, they said that using facebook on android is really heavy, the screen reader becomes quite slow - That is the advantage of internet radio, so there is no blockage or such, like when we listen to manual radio where it will be unclear once we just go far a little bit. This one is not like that at all

	sometimes the display on mobile is not the same like the display on laptop, sometimes they delete some parts. So when I looked for it, it's really difficult and it made the search not optimal	
TRANSFORMATION		
Accessibility Pre-Smartphone: -for BlackBerry, the blind people just used it for BBM feature, actually. BBM and facebook, and SMS, phone, well those normal things. Since BB's screen reader was originally from the company, it was not crack, we could just install it right away, just download, but it was not like everything was accessible anyway, right? So it was still not that flexible - I got lost before. Even I took the wrong angkot, but then I knew it when I got off - BB doesn't have too many functions	Accessibility Pre-Smartphone: - in junior high, at that time nokia 3315 (…) I memorized and it was by listening to the keypad's sound - for SMS it was like, when I wanted to write C for example, it would be in the keypad of number 2 and I'd need to press 3 times - Actually for nokia, there were many of them but the series were limited. So not all nokia phone can be installed with screen reader, that's the problem - I mostly took angkot before gojek - There was motor taxi subscription but I rarely used it, my pocket is full of hole -Before it ever happened, a day where, "I have to go here but there is no transportation" and it was a total hassle (…) I didn't have other choice, other than angkot - the annoying one is like the one where I should take one angkot to this destination and then I need to change to another angkot, I'd rather take motor taxi if it's like that - When I look up in the internet, I will just look up from the first page (direction) - when I was still using nokia, it was really manual, I really had to be super patient to read each pages	Accessibility Pre-Smartphone: - phone that I used in the beginning, the one that could only make a call and send SMS - When I still didn't have phone with talk, I memorized people's phone number - I did read news on nokia, but I could not read like in android, I would just open the internet when I wanted too. I was not that interested, since the menus were not that much also
Post-Smartphone: - we can do almost everything -News is important and it (the app) is not too heavy, so it's convenient - in smartphone I can just uninstall app easily. that's the convenience, it is comfortable too. I don't need to feel like opening it, like the big laptop.	Post-Smartphone: - it is simpler to be carried when I am mobile - it is more convenient to use wherever I am - there are some recorders which are indeed portable, there are devices like that and the sound clarity is good too. But when everything is inserted on	Post-Smartphone: - in r-dio they have all the radios, like for example in Jakarta, there are 280 registered radios. And I can just keep changing channels, for example if I want to listen to radio from Kalimantan, I just need to click, 'Kalimantan' or 'Sulawesi'

-Since there is gojek now, so it is not as hard as before. - andromax android, it has a lot of functions. And also besides the messenger applications, there are many other applications that can improve knowledge, things like that. It's incomparable actually (compared to BlackBerry) - it is nice actually, I would think if there were no phone, what could I do, it'd be so awkward	android, it will be much better and much simpler -with cellphone, android more multitasking, it has more functions, and then also from the internet access it is much better, much better according to its connection also from the responsiveness (…) with android, it becomes much simpler -After I knew the concept of touch screen, that was amazing (…) I thought that we will always use QWERTY	-since I have this android, it becomes my friend - Voice note is better, I just need to press toot, that's all, it's easy and simple -Android helps in many aspects. It is more accessible. it is very, veeeeery helpful, that android -advantage is basically on android, basically everything is there, it is more than any other cellphone - After I have android, I actually do not really use computer anymore. So I just do it on android. I really don't open computer anymore - I can type more comfortably, it is more convenient - I felt that it is comfortable, it turned out that I can use it finely - I don't need TV to watch TV now. I can just use it. I just use android - Now it is quite comfortable, right, you can directly go somewhere with a transportation, before I would just take angkot
<u>Independence</u> Pre-Smartphone: - I took angkot before gojek. but I don't like to go on my own. Sometimes when I go somewhere, I'll ask my friend to come. My friend, I mean a blind friend also - Before I often took the bus, with a friend. I don't like to go alone	<u>Independence</u> Pre-Smartphone: - in the exam my questions were read by a junior -When there was incoming message, I'd look for a live reader. -I took bus and angkot by myself. There was problem like, I just got lost, or I stopped much farther after my real stop - from home I'd take bus to Lebak Bulus and then from Lebak Bulus I'd take angkot to reach campus, after that I would walk to campus alone -Before there was map, I usually asked friends. (direction)	<u>Independence</u> Pre-Smartphone: - People sometimes will not realize that I am blind. So for example when someone bumps into me, that person just does not want to care (…) I went to campus and I didn't carry my cane (…) I was really suffering, but thankfully at that time, there was someone from campus who knew me (…) Before he came, I was just standing there waiting for someone helping me crossing the road. At that time when I forgot my cane, I took angkot.
Post-Smartphone: - It was actually useful because using that I can distinguish banknotes. That's the function actually since to this moment blinds still cannot	Post-Smartphone: - even though I actually can ask them to take me with motorcycle, but if I can go by myself, either with gojek or anything, I will prefer using that	Post-Smartphone: - Like last time, I went to Bekasi, by train, I was alone (..) I took motor taxi (application). And so at that time I took the train to Bekasi.

distinguish banknotes (Object identifier application) - Someone uploaded picture to Instagram for me - managing social media of my online store, since there are a lot of fans - going to minimarket, actually it is still hard for me. that is not yet accessible, well sometimes when the cashier is nice -I use gojek too	-When I have activities where I need to go here and there in a day, what really helpful is, the existence of these online motor taxi. So I am no longer worried that how to say, there will be no one who will pick me up and drop me to the destination - I actually go to many places after gojek came.	- If it is still around here, I could. But if I need to cross the road, I need to have my cane - I went to Bandung, but there were people assisting -Google Map, it is directing me, it is accessible too, so for example when we are on the road, he will say, "you have to turn left after some steps', for example.
OTHERS		
Motivation of Usage - Taptapsee is a paid app, so after you take pictures several times, it was free, but slowly it changed to be a paid app. So, I don't use anymore - iphone was nice actually, but for me it is too simple (…) The BBM features that I often use were not there	Motivation of Usage - I tried out Play Store applications	Motivation of Usage - recently I like to listen to this, radio from application - I like to use voice more, that's my personal opinion (Whatsapp) -I don't use taptapsee or be my eyes, or such things, since I still can see a bit, maybe. For the totally blind one, maybe those things will be really helpful
Physical and Material Access -iphone was nice actually, but for me it is too simple. I have been using BBM for quite long, I opened the BBM there, it was too simple. I mean, it didn't look like the real BBM at all. - or blogging, computer is still more convenient	Physical and Material Access - for transportation, let's say I order online motortaxi or when I search for road, I will use phone, with android. - the advantage of android is surely its mobility, it is the obvious one, its own advantage, it is simpler to be carried when I am mobile, and then also it is more convenient to use wherever I am.	Physical and Material Access - it is convenient. Well at least it is wider, compared to my previous phone - to write, then laptop is more comfortable, but for the to be carried wherever I want, android is more comfortable. - since I still can see a bit, maybe. For the totally blind one, maybe those things will be really helpful. (Assistive application)
Usage - when I want to, I'll read, I can open the news apps for 3-4 times (a day)	Usage - I use my phone for communication daily, yes -Money reader is very helpful, now I use it almost everyday	Usage - the most, just whatsapp - I have facebook (…) I rarely use it now - I use android more frequently -I don't play that often, because they don't make that application to newer version

T.C
YÜKSEKÖĞRETİM KURULU
ULUSAL TEZ MERKEZİ

TEZ VERİ GİRİŞİ VE YAYIMLAMA İZİN FORMU

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Tezin Özgün Adı	INFLUENCE OF SMARTPHONE USAGE TO MOBILITY OF VISUALLY IMPAIRED: STUDY IN JAKARTA
Tezin Tercümesi	GÖRME ENGELLİLERİN HAREKETİNE AKILLI TELEFON KULLANIMIN ETKİSİ: CAKARTA, ENDONEZYA ARAŞTIRMASI
Konu	İletişim Bilimleri = Communication Sciences ; Sosyoloji = Sociology
Üniversite	Kadir Has Üniversitesi
Enstitü / Hastane	Sosyal Bilimler Enstitüsü
Anabilim Dalı	Yeni Medya Anabilim Dalı
Bilim Dalı	
Tez Türü	Yüksek Lisans
Yılı	2017
Sayfa	111
Tez Danışmanları	YRD. DOÇ. DR. ÇİĞDEM BOZDAĞ BUCAK 33367924726
Dizin Terimleri	
Önerilen Dizin Terimleri	görme engelliler hareketi, akıllı telefon, dijital yeteneği, yardımcı teknoloji
Kısıtlama	Yok

Yukarıda bilgileri kayıtlı olan tezimin, bilimsel araştırma hizmetine sunulması amacı ile Yükseköğretim Kurulu Ulusal Tez Merkezi Veri Tabanında arşivlenmesine ve internet üzerinden tam metin erişime açılmasına izin veriyorum.

27.06.2017

İmza: Sabilul Maarifah Karmidi