How to stay relevant: A qualitative study on exploring ICT professionals' identity and their sensemaking on the need for continuous development of digital skills

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Master Thesis

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2022

Abstract

Objective. The rapid expansion of the Information and Communications Technology (ICT) industry in Indonesia demands a significant number of highly skilled ICT professionals who can keep up with the latest technological developments. This study aims to investigate how ICT professionals maintain their professional identity in the face of a new technology environment and how they make meaning of the process as they acquire new skills to stay up with the new technology. In addition, the effectiveness of the Digital Talent Scholarship (DTS) in boosting the abilities of ICT professionals will be explored. This research fills a gap in the literature about the identity of ICT professionals and how they make sense of the ongoing development of digital skills.

Methodology. This study was a qualitative study that developed through a semi-structure interview with open-ended questions. The participants of this study are 20 ICT professionals who complete the Digital Talent Scholarship program in 2021, have worked in the ICT role and selected through purposive sampling. The data were then analysed using a combination of thematic coding derived from the theoretical background and open coding based on the data themselves. ATLAS.ti was used for coding and analysis, and the intercoder reliability score was also calculated to confirm the validity of the coding.

Results. This study found that ICT professionals could articulate a strong sense of what it means to be a member of their profession. These strong professional identities assist ICT professionals in adapting to technological change. They actively upskill and reskill in response to their awareness of digital skills' constant progress. As a result, DTS has emerged as an alternative training offered by the Indonesian government to accelerating human capital development in ICT skills.

Implications. This study highlights the need to take into account the efforts made by all relevant parties—namely, those working in the field of ICT, the government, and private sector companies—towards the enhancement of human capital in the ICT sector.

Keywords: *professional identity, sensemaking, upskilling, reskilling, ICT profession*

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List of Abbreviation

Abbreviation	Definition
ACS Foundation	Australian Computer Society
AWS	Amazon Web Services
CCNA	Cisco Certified Network Associate
CET	Continuing Education and Training
CTVET	Continuous Technical and Vocational Education and Training
DTS	Digital Talent Scholarship
GDP	Gross Domestic Product
GTAI	Germany Trade and Invest
ICT	Information and Communication Technology
ILO	International Labour Organization
IT	Information Technology
MCI	Ministry of Communication and Informatics
MOOCs	Massive Online Open Courses
PROa	Pro Academy
TVET	Technical Vocational Education and Training
UI/UX	User Interface/User Experience
USD	US Dollar

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1 Introduction

Information and Communication Technology (ICT) professionals are an essential driving factor for advancing the Indonesian economy today. According to AlphaBeta (2021, p.6), in 2019, there were approximately 1.5 million of ICT professionals in both technology and nontechnology sectors, contributing USD 62.1 billion of Indonesia's Gross Domestic Product (GDP), equivalent to approximately 6% of the GDP. They also estimate that by 2030, digitally skilled professionals will contribute approximately USD 303.4 billion to Indonesia's GDP, equivalent to 16% of the total forecasted GDP that year. Additionally, there are currently 2,300 technology startups in Indonesia, including a dozen of startups that valued at USD 1 billion (International Labour Organization [ILO], 2022). Because the ICT sector in Indonesia has experienced rapid growth and is a key contributor to the economy, the demand for ICT specialists has been high and will continue to rise. The growing demand applies to both quantity and quality, considering the skills requirements will increase as technology develops further. ICT professionals must keep their skills up to date following technological development, including when shifting to new roles. The rising demand of ICT professional and the need to keep their skill updated demonstrates that ICT professionals are crucial to the development and maintenance of rapidly evolving technologies. Consequently, it is essential to emphasize the individual factors to comprehend how individuals maintain their identity when exposed to a new technology environment and the sensemaking process individuals undergo when they recognize new technologies.

Many studies have used the professional identity approach to explore how individuals define themselves in their current or anticipated professional role. For example, Smets et al. (2017) stated that technological advancement significantly impacts career prospects for various professions and occupations. Furthermore, Lifshitz-Assaf (2017) stated that when a new technology is adopted, professionals must reconfigure their professional role, which is essential to their identity. This professional role identity is vital because it maintains a profession’s integrity against external changes (Goodrick & Reay, 2010), including technological advancement. Reay et al. (2017) defined professional role identity as professionals' perceptions of who they are and what they do. Previous research on the formation of professional identity has focused on well-established fields such as education, medicine, and law (e.g., Fitzgerald, 2020; Sarraf-Yazdi et al., 2021; Castro et al., 2022). However, because ICT is a relatively new field, it has been less widely explored from the perspective of identity (S. S. Smith et al., 2015).

In addition, the ICT identity landscape is relatively uncharted in communication literature and thus remains inadequately understood (Gal et al., 2009; Nach & Lejeune, 2009; Schellhammer, 2010; Stein et al., 2013; Tripsas, 2009). ICT is a rapidly progressing field; thus, ICT professionals need to keep their skills up to date (DaSilva et al., 2013). Thus, research on a professional role identity in ICT is essential but remains limited.

Furthermore, it is important to understand the meaning of ICT professional identity and how ICT professional perceive the need for continuous development of digital skills. Owing to constantly developing technology, ICT professionals must frequently upgrade their ICT skills (Wang et al., 2008). Therefore, sensemaking may help in reducing the uncertainty that arises when faced with change or something previously unknown (Weick, 1995). Sensemaking is a process of giving meaning to something, especially new developments and experiences. Moreover, sensemaking is a continuous process (Weick, 1995); thus, it is applicable to developing digital skills. Therefore, professionals use sensemaking to better understand the required digital skills, which aid them in taking the right actions. Previous studies have used a sensemaking approach to explore how individuals interpret and react to new technologies (e.g., Barley, 1996; Boudreau & Robey, 2005; Orlikowski, 1996). A recent study examined employees' sensemaking of digital transformation in the tour-operating industry (Van Der Schaft et al., 2022). Osmundsen and Bygstad (2021) examined the continuous development of digital infrastructure. Korica and Molloy (2010b) explored how medical professionals make sense of the relationship between new technology and their professional identities. However, previous studies have focused on general workers; to the best of the researcher's knowledge, none have specifically examined the ICT profession. Therefore, the present study explores the context of sensemaking by examining how ICT professionals continuously develop and learn new skills as technological advancements affect their work.

To remain employed in a world with constant technological progress, professionals must acquire more recent and relevant skills. Zahidi (2020) emphasized the importance of reskilling and upskilling for individuals who intend to retain their position at the workplace. Similarly, Okwu et al. (2022) popularized the concept of human resource skill adjustment, which includes upskilling and reskilling. Furthermore, Li (2022) suggested that upskilling and reskilling of the workforce is a worldwide concern; therefore, corporate leaders, educators, and governments cooperatively build facilities and programs to develop a workforce that is equipped for the future. Previous studies have explored education and learning programs that provide training, skilling, reskilling, and upskilling to a future-ready workforce. For example,

the Australian Government has established Massive Online Open Courses (MOOCs) to bridge the skill gap (Santandreu Calonge et al., 2019). Similarly, in the UK and Norway, the government provides funding and resources for universities and research institutes to train, upskill, and reskill the future workforce (Lloyd & Payne, 2019). The Chinese government has ensured that the workforce is equipped with the skills and knowledge needed in high-technology fields (Woetzel et al., 2021), and the Malaysian government has established the Technical Vocational Education and Training (TVET) program to produce a highly skilled workforce (Gowrie Vinayan et al., 2020). The Indonesian Government has initiated the Digital Talent Scholarship (DTS) program to train, retrain, reskill, and upskill the Indonesian workforce to help them acquire the skills required for future employment. Therefore, the present study intends to examine the DTS program within the Indonesian context.

DTS is a training scholarship program focusing on technical skills that are currently in demand for ICT professionals. The program aims to bridge the gap between the skills that workers have and those required in the labor market and offer a solution to cope with the development of the Industrial Revolution 4.0. This program was organized by the Ministry of Communication and Informatics (MCI) of the Republic of Indonesia, which comprises seven academies. In essence, all Indonesians can participate in this program by choosing an academy that suits their characteristics and interests. One of these academies is Professional Academy (ProA), which is dedicated to professionals who intend to acquire ICT skills. In the ProA, participants can select courses consistent with their preferences, such as User Interface / User Experience (UI/UX) design, Data Analyst, Data Engineer, Data Scientist, and Cisco Certified Network Associate (CCNA) Network Engineer. The DTS was established in 2018, and the government continues to execute its agenda to generate a workforce with the appropriate knowledge, capabilities, and way of thinking required to survive the globalized economy (Digital Talent Scholarship 2022, 2021). Therefore, this study examines one of the programs of the MCI—the DTS—which focuses on accelerating human capital development in ICT skills.

The present study's main objective is to understand how ICT professionals identify their identities and make sense of the continuous development of digital skills following technological advancement. In addition, this study also explored the ways in which the DTS program supports digital skill development among ICT professionals. The study addresses the following questions:

1. How do ICT professionals define and understand their sense of professional identity in terms of constant technological change?
2. How do ICT workers make sense of the need for continuous development of digital skills for their professional identity?
3. In what ways does the DTS program support the continuous development of digital skills for their professional identity?

In addition, from an academic standpoint, this study contributes to the literature on ICT professional identity by investigating the development of ICT professional identity amid technological change. Research on ICT professional identity work is sparse, even more so when technological change is factored into the analysis. This study expands the realm of understanding how ICT professionals interpret the need for continuous development of digital skills that influence how they think about and act toward the situation. This study contributes to the current literature on reskilling and upskilling since it focuses on supporting the DTS Program for the skills development of ICT professionals. In terms of practical implications, this study could provide recommendations that may be relevant to the government and companies seeking to invest in the digital skills development of ICT professionals. This study's qualitative methodology sheds new light on the perspectives of individuals in constructing their professional identities in response to ongoing technological change, how they make sense of the continuous development of digital skills, and to what extent the DTS program supports their skills development.

The next section provides a theoretical background to explain the concepts of industrial revolution, professional identity, making sense of the continuous development of digital skills, and reskilling and upskilling. The methodology section provides information on research design, study participants, study procedure, the use of semi structured in-depth interviews, and data processing and analysis. The subsequent sections present the findings and the answer to the research question. The discussion section also includes the implications of findings, study limitations, and suggestions for further research.

2 Theoretical Framework

This chapter presents the theoretical framework for the research. It defines the concepts of professional identity, digital skills, and reskilling and upskilling and describes the current trends in those areas. This study is structured as follows. The first section starts with a historical timeline of industrial revolutions, which drives technological change. The second section discusses how technological advances during the fourth industrial revolution have impacted how ICT professionals perceive themselves as workers (who they are). The third section explains how technological change requires ICT professionals to adapt the way they are working (what workers do) to be able to improve their performance. The fourth section discusses two approaches to improving an ICT professional knowledge and skills: upskilling and reskilling. Finally, the remaining sections discuss the study's relevance in the Indonesian context.

2.1 Industrial Revolution

The industrial revolution was a massive change in the agricultural, manufacturing, mining, transportation, and technological sectors and impacted the world's social, economic, and cultural conditions. Since its inception, technological leaps and bounds have always characterized an industrial revolution (Ghislieri et al., 2018). The advent of steam power and waterpower towards the end of the 18th century signalled the beginning of the first industrial revolution, which led to the transition from human to machine labour for production. The second industrial revolution began in 1860 and is known as the technological revolution because electricity played a crucial role in various technological discoveries. The third industrial revolution began in the 1970s through partial automation using programmable computer memory, which enabled companies to automate their entire production processes without human assistance. Finally, the current period is the fourth industrial revolution, also known as Industry 4.0. The fourth industrial revolution has taken advantage of the availability of digital technologies developed in the third industrial revolution, which closed the gap between the digital and physical and increased the pace of technological change (Ross & Maynard, 2021). Industrial Revolution 4.0 is a technological revolution that blurs the lines between the physical, digital, and biological domains(Schwab, 2016). Industrial Revolution 4.0 has three features that distinguish this revolution from the previous one: speed, scope, and system impact. This revolution is accelerating at an exponential rate, impacting virtually all industries and bringing about changes with the potential to affect.

Technological changes also require employees to adapt to changes and continue to be able to improve performance because employees play a strategic role in the fourth industrial revolution. They will determine the overall product strategy, monitor its implementation, and intervene in the cyber-physical production system (Gorecky, 2014 as cited in Pfeiffer, 2015). Hence highly skilled employees will be critical to transitioning successfully to industry 4.0 (Ra et al., 2019). However, the existing literature on the fourth industrial revolution focuses mainly on technology and innovations, application fields, disruption, new opportunities, and challenges (Lasi et al., 2014; Vogel-Heuser & Hess, 2016; Liao et al., 2017). However, the vast literature seems to ignore an employee's role as a critical pillar of technological change in the fourth industrial revolution (Cetindamar et al., 2022). The previous study of social challenges in the context of industry 4.0 has mostly been regarded from a management perspective rather than a workers' perspective (Muller, 2021). Considering all of this, the impact of Industry 4.0 on an employee's role is crucial, particularly in assessing their identity as a professional and making sense of the continuous development of digital skills through reskilling and upskilling. These will be explored in the following theoretical background.

2.2 ICT Professional Identity

Identity studies provide insight into the factors that influence an individual's orientation toward a particular career. Many studies define professional identity based on the behavior and activities of a profession carried out by professionals (e.g., Billett, 2010; Clarkson & Thomson, 2017; Dikmen et al., 2016). They found that the stronger the behaviors and activities, the greater the professional identity, which leads to greater job satisfaction. Researchers also define professional identity by what professionals know, including knowledge, formal education, certification (Dikmen et al., 2016), and professional experience (Yazdanik et al., 2012). Furthermore, the characteristics most often mentioned in defining professional identity are beliefs and attitudes, values, and motives (e.g., Trede et al., 2012; Johnson et al., 2012; Sutherland & Markauskaite, 2012). As an illustration, Forenza and Eckert (2017) found that workers identify social justice and empathy as value-based concepts in defining the profession of social work. Thus, action and behaviour, knowledge and skills, including experience and image of the profession, as well as beliefs, attitudes, values, and motives, construct a professional identity for the profession.

Professional identity can also be formed by the environment. Researchers assert that professional identity is formed through the socialization process, where a person is influenced by the expectations and meanings associated with the profession (Adams et al., 2006; Slay &

Smith, 2010) and developed in interactional relationships and a professional context, such as the workplace or established communities (Goldie, 2012). In addition, group identity is also considered a defining characteristic of professional identity. It refers to professions recognized by society and associations where each member can develop a professional identity within that group (Fitzgerald, 2020). The stronger the unity with the group, the stronger their self-recognition as professionals (Thompson et al., 2017). Aside from this, professional groups also can create professional ideals and values among their members (Yazdannik et at., 2012). The above points show that professional identity contains context and group identity attributes.

There is still a lack of general definitions for exploring professional identity. This is because prior research has heavily centered around well-established professions such as teachers and healthcare professions (e.g., Goodson & Cole, 1994; Fagermoen, 1997; Clouder, 2005). This has led to a lack of a common definition that does not apply to professionals in other industries. More specifically, the research on professional identity has yet to consider studying the ICT professional identity. In contrast, professional identity can be used to understand the ICT industry and issues regarding its ability to attract a qualified and experienced workforce (Tsakissiris, 2015). In fact, ICT professionals also meet the requirements to become a research population due to the rapid development of the ICT industry (Scholarios et al., 2008; Marzec et al., 2009). Therefore, understanding professional identity is important to explain "why people think about their environments the way they do and why people do what they do in those environments" (Ashforth et al., 2008, p. 334). From such a point of view, focusing on the ICT workers' stated ideas (beliefs) and their experience in work might provide invaluable insights into the professional identity of ICT professionals.

Globally, the ICT industry has struggled to be seen as a profession. There is a long-standing debate within the industry about what role the ICT profession has shapes (Denning, 2001). The first debate is about the diverse nature of ICT. As an illustration, according to the ACS Foundation (2016), there are four career disciplines in the ICT industry: content and design application, technology services, business services, and product development. Meanwhile, each discipline has differences in the ICT products created, the services offered, and the roles. The second relates to the debate over qualification and certification. Adams (2013) argues that there is a common perception among ICT workers that applicants do not need formal tertiary qualifications, as many of them develop computer-related skills independently. Furthermore, the ACS Foundation (2016) states that various education pathways exist for an individual to enter the industry or embark on an ICT career. The

education pathways include on-the-job training, VET programs, undergraduate, honours, and postgraduate university programs, private training institutions, and industry group certifications. The diverse nature of ICT and the various education and certification requirements add complexity to constructing the ICT profession.

However, despite the ICT professionals being challenged, everyone has become dependent on ICT professionals. Users expect ICT professionals to help them with designing, locating, retrieving, using, configuring, programming, maintaining, and understanding computers, networks, applications, and digital objects. Moreover, ICT professionals are characterized as knowledge workers who perform their roles in a highly dynamic and technical work environment (Jemielniak & Marks, 2012). They have a comprehension to adopt the evolving technology quickly and apply the right solutions to issues. In addition, they have sufficient expertise to operate the technology reliably and troubleshoot problems properly (Denning, 2001). The character of knowledge workers and sufficient expertise show that ICT roles have a symbolic intellectual status and possess a professional identity (Marks & Scholarios, 2007). Thus, the combination of the ICT profession's unique characteristics, its positive image, and its impact on society shows that a profession must be formed. In summary, this study argues on the importance of the ICT profession identity in understanding individuals' experiences toward the evolving technology, including their decision-making and behavior in reshaping their skills.

2.3 Digital Skills

The digital nature of work requires employees to have the new skills and knowledge to perform their tasks digitally. The new skills and knowledge are called digital skills, which are acknowledged as new skill sets that are becoming more extensive and considered the capital for securing jobs worldwide (Pirzada and Khan, 2013). Digital skill is a long-debated topic, and to date, there has yet to be a general acceptance of the definition because human nature and technology are constantly changing (van Deursen & van Dijk, 2009; Eynon, 2020). However, digital skills can be assumed by individuals possessing the necessary competencies to use new technologies to save money, study, find jobs, and so on, regardless of their socioeconomic background (Davies & Eynon, 2018; Eynon et al., 2018). Digital skills could be categorized as a range of skills, from basic digital literacy skills for the general workforce to specific digital skills for ICT professionals (Motyl et al., 2017). Furthermore, Van Laar et al. (2017) mention a theoretical framework called 21st-century digital skills to identify various conceptualizations that describe the skills needed in a digital environment. They list seven core

skills: technical skills, information digital skills, communication digital skills, collaboration digital skills, critical thinking digital skills, creativity digital skills, and problem-solving digital skills. Technical skills encompass the knowledge of technical features and the ability to use a variety of digital technologies (van Laar et al., 2022), such as computers, the internet, digital platforms, machine learning, and other forms of artificial intelligence, as well as big data technologies (Erumban, 2018), which are generally known as ICT skills.

ICT plays an essential role in 21st-century digital skills. The demand for technology and engineering skills, including ICT skills, has been growing since the early 2000s and is expected to continue (Peri et al., 2015; Deming, 2018). ICT itself is defined as the devices, applications, network components, and systems that allow communication and networking in any digital environment. And ICT consists of several components, which are internet access, cloud computing, software, hardware, transactions, communications technology, and data (Rouse, 2019). In addition, ICT skills consist of the ability to discuss ICT technology according to problem-solving situations and critical thinking as described (van Laar et al., 2017). On the other hand, human capital is critical in ensuring an efficient and effective transition and transformation from the industrial to the digital era (Hunt, 2014). Therefore, employees need to equip themselves with various ICT skills, including database design, communication technologies, production and design technologies, and social networking technologies (Hanson-Baldauf & Hughes-Hassell, 2009).

The adoption of digital skills is necessary for all companies, regardless of their size. Therefore, improving employees' digital skills according to digital trends is crucial for the company's success (Ismail, 2018). It means employees must have skills in interpreting, understanding, and adopting different technologies. By having the necessary skills, knowledge, and competencies, employees can create competitiveness and innovation for a company. Since employees are a source of sustainable competitive advantage, they have the competence and capacity to complete solutions (Vaggelas & Leotta, 2019) and positively influence company performance (Crook et al., 2011). However, the complex nature of new skills might create discomfort and make individuals cautious and even afraid of the actualization of digital technologies (Frewer et al., 2011). Moreover, developing digital skills is very challenging because the employee attitude toward the introduction and implementation of digital skills may differ according to the positions in the organizational hierarchy (Muzam, 2022). Since each employee copes with digital skills differently, it is crucial to understand how they make sense of the nature of digital skills to adapt to continuous digital skill development.

Sense-making is the process of giving meaning to experiences and situations in which people are involved. Seligman (2006) defines sense-making as the cyclical process of taking action, extracting information from that action, and incorporating information from that action into mental frameworks. Sense-making could be categorized into awareness and action-related themes, which happen, interact, and modify simultaneously (Saghafian, 2020). The awareness-related theme is what the individual should know, and the action-related theme is what the individual should do. When faced with new digital skills, individuals must navigate through a high level of technological complexity and knowledge due to a lack of familiarity with those digital skills. To counter the effects of ignorance on new digital skills, individuals often seek to bring them into the realm of 'what is known' by engaging in certain cognitive strategies. The strategy can 'fill in the blanks' with information that is already available in a process known as sense-making. Therefore, a personal understanding of the sense-making of digital skills plays a vital role during technological change (Cornelissen, 2012; Lockett et al., 2014). Hence, studying sense-making by professionals enables an exploration of how individuals in their profession affect sense-making beyond the organizational level.

Technological changes in the world of work also make ICT a dynamic occupation. The changes affect the skill demands of workers. New roles that did not exist previously in the ICT industry frequently appear. Further, technological change is changing how workers think about work and requiring them to tackle new tasks and work practices (Parker & Grote, 2020), where people and digital technology work together. This requires workers to be flexible and able to readjust and reskill to support and create new technologies and to constantly re-invent themselves if they wish to remain in the industry (Adams, 2013; Billett, 2010). At the same time, technological change also changes the way people work (what workers do) and challenges workers' views of themselves as workers (who they are) (Wallin et al., 2022). In other words, technological change challenges their professional identity (Nach, 2015; Walsham, 1998). With the changes in the world of work, workers must continually assess whether their professional identity fits with the changing context of their work.

It becomes relevant to ascribe the meaning of employees in their professional identity and how they perceive the continuous digital skills development in the actualization of digital technologies. How professionals understand and respond to digital skills is critical for practitioners and scholars (Hinings et al., 2018). However, there is less understanding of how employees interpret digital skills and digital skills development. Previous studies mainly examined sense-making at the organizational level (Weick, 1995). In addition, the existing

literature investigates how to deal with the need for digital skills, considering the awareness of digital skills and the perception of the existence of a digital strategy at the management level (Prezioso et al., 2020). Previous literature has neglected the role of employees and their digital skills in actualizing digital technologies (Cetindamar et al., 2022). Whereas, employees' skills are expected to play a crucial role in their employability and adaptability to the changing demands of their working lives (Evans & Kersh, 2017). Therefore, studying sense-making by employees in their professions enables an exploration of how actors' embeddedness in their contexts affects sense-making beyond individual and organizational levels (Goto, 2021). In summary, this study explores how ICT professionals make sense of the continuous development of digital skills through their awareness of the situation and action to cope with the demand by reskilling and upskilling their capabilities.

2.4 Reskilling and Upskilling

There are two ways to improve the professional life of an employee: upskilling and reskilling. Both approaches strive to improve skills, but they do so in various ways. Upskilling is the process of providing an individual with more advanced skills. In contrast, reskilling refers to the acquisition of new skills and the transition to a new position in a different field (Monear, 2020; Sawant et al., 2022). In addition, prior research indicates that employees should be devoted to reskilling and upskilling in order to advance their careers (Li, 2022). Similarly, a recent study discovered that skill enhancement methods boost employee performance (Owoeye et al., 2020). Both findings show that professionals should invest in skill development to be competitive for jobs in the field of technological progress. In conclusion, reskilling and upskilling can contribute to a growth in human capital.

Industry 4.0's technological evolution is distinct from earlier industrial revolutions, which emphasized human capital as an intellectual resource for innovation. For this reason, professionals must acknowledge that they live in a world of constant change, in which they must acquire the new abilities necessary to do their work (Domenech et al., 2017). Here, digital skills are seen as a necessary skill for industrial 4.0 (Sung, 2018) and are related to utilizing digital technology to do activities (Rahmat et al., 2021). Consequently, constant development of digital skills and technical knowledge is unquestionably necessary for professionals to remain relevant (Bejakovi & Mrnjavac, 2020; Bonekamp & Sure, 2015; Li, 2022). Overall, it can be stated that professionals must reskill and upgrade their digital abilities in order to adapt to the rapid evolution of workplace technologies.

In addition to the acknowledgement and willingness of professionals to reskill and upgrade, the design of education and training policies presents a problem. On the one hand, through public training programs, governmental policy can help reduce unemployment (Mankiw, 2003). The Ministry of Manpower of Singapore, for instance, developed two Continuing Education and Training (CET) campuses to address the disruptive effects of technological innovation on employment (Fuei, 2017). In contrast, continuous technical and vocational education and training (CTVET) programs are underdeveloped and primarily target unemployed and low-skilled individuals (Ntolou et al., 2022). In addition, businesses claim that investing in reskilling and upskilling is a commercial imperative; therefore, they must take the initiative rather than the government (Illanes et al., 2018). The company desired to integrate the training with its purpose and core values (Illanes et al., 2018). Educators, corporate leaders, and governments must nevertheless provide facilities and initiatives to assure the ongoing growth of digital skills (Li, 2022). There are a few approaches that demonstrate a transformation of education and skill-development systems in relation to global workforce training and skilling activities. China, for instance, transformed its workforce into lifelong learners through reskilling, upskilling, and vocational training; the German education system integrated vocational schools with industry needs; and the Nordic countries' increased funding for research and development, including increased resources for universities and research institutes to train, upskill, and reskill the future workforce (Li, 2022). In conclusion, education and training policies are needed to help people find jobs and learn new skills, especially in Indonesia, so that it can deal with the disruptive effects of technological innovation.

2.5 The Present Study

Professional identity is concerned with how individuals define themselves and their roles within society. These definitions impact the functions they select and are permitted to perform, the groups they identify with and associate with, and the status they can command within society (Fraser-Arnott, 2018). Professional identity is highly fluid and changes over time based on personal experience and external feedback from others in the profession (Gibson et al., 2010). Emerging technologies are also transforming professional activities and interactions in ways that challenge professional identity (Lamb & Davidson, 2005). These challenges force professionals to engage in individual sensemaking processes, and the development of a new sense of the profession plays a role in the success of the role (Fraser-Arnott, 2018). Since professional identity views professionals as the active agent (Covaleski et al., 2003; Hoff & McCaffrey, 1996; Lamont & Molnar, 2002; Martin et al., 2009), the way that

professionals make sense of the relationship between emerging technologies and professional identity is a valuable focus of study. The professional identity experiences of ICT professionals are explored in this study. This population was selected because ICT is a relatively new profession and has been less widely explored through the lens of identity (S. S. Smith et al., 2015). Yet, the demand for ICT practitioners remains strong (Deloitte Access Economics, 2019) and is expected to continue to grow (Kaarakainen, 2019) throughout the world, including in Indonesia.

The ICT sector in Indonesia has experienced rapid growth in recent years, primarily driven by technological advancement and improvements in internet connectivity. The ICT sector has become an essential contributor to the economy. Thus, there is an increasing demand for ICT specialists across all sectors of the economy, which is reflected in the contribution of the ICT sector to GDP in general. The demand for ICT professionals will continue to increase in the upcoming years. With ICT now underpinning most social and economic activity, professionalizing the sector has the potential to enhance the quality of output, increase the status of ICT as an occupation, and improve perceptions of ICT. However, foreign companies report that it is challenging to find ICT professionals in Indonesia, especially programmers and software engineers (Germany Trade and Invest [GTAI], 2019). Therefore, to overcome those issues, the Indonesian government established the DTS, a technical digital training program to accelerate the development of national digital talent. With the importance of the ICT profession in Indonesia, it is important to reveal how workers self-identify as professionals, the impact of technological change on them as individuals and the quality of their work. Accordingly, this study is designed to examine what is known about professional identity and what it means for ICT professionals in the Indonesian context, including how the program can support the acquisition of knowledge and skills demanded by the industry.

3 Methodology

3.1 Research Design

This study aimed to understand how ICT professionals identify their identities, how they make sense of the continuous development of digital skills, and in what ways the Digital Talent Scholarship program supports their digital skills development. Therefore, qualitative research was chosen because it helps to interpret and better understand the complex reality of a situation that someone experiences. Qualitative research also provides detailed descriptions of how people experience and perceive a specific situation (Rahman, 2016), which can help measure their professional identity construction and the sensemaking process. Since the aim was to describe participants' experiences; thus, this study used a descriptive approach. The descriptive approach provides straightforward descriptions of experiences and perceptions (Sandelowski, 2010), particularly in areas where little is known about the topic under investigation. Accordingly, a qualitative descriptive design may be deemed most appropriate as it recognizes the different experiences participants have and presents the findings in a way that directly reflects the terminology used in the initial research question (Bradshaw et al., 2017). Since the ICT profession has not yet been well established in the literature, thus, leaving a study based on the concept of identity is necessary. Therefore, this design is relevant to ICT professionals' research, which concerns how identity is constructed and adapted among ICT professionals over emerging technologies.

Moreover, this study obtained the data through semi-structured interviews. This method is useful for gaining insights into the experience (Rowley, 2012). It facilitates an in-depth investigation of the professional identity of ICT professionals, makes sense of the continuous development of digital skills, and explores the support of the Digital Talent Scholarship program for the continuous development of digital skills. It also enabled participants to respond with their own words and express an opinion without being influenced by the researcher (Zull, 2016; Foddy, 1993). In summary, this study used a qualitative descriptive design with a semi-structured interview method.

3.2 Participants

All participants were selected using a purposive sampling method. Purposive sampling is favourable method in qualitative research because it increases the "likelihood that the full array of multiple realities will be uncovered" (Lincoln and Guba, 1985, p. 40) and helps the

researcher understand the problem and the research question (Creswell, 2009). The total participants in this study were 20 people, consisting of 13 males and seven females. They are ICT professionals who finished the Digital Talent Scholarship program, particularly those who participated in the ProA. ProA is one of the eight academies of the Digital Talent Scholarship, which aims to improve the capability of skilled workers in the field of ICT in accordance with industry needs. It consists of various courses, such as AWS Cloud Foundations, AWS Cloud Architect, Data Scientist, Data Analyst, Data Engineer, Google Cloud Fundamental, 3D Asset for Composition Design, Internet of Things, UI/UX Design, and Alibaba Cloud Associate (Digital Talent Scholarship 2022, 2021). All of the participants joined in the Digital Talent Scholarship program in 2021. Furthermore, the work tenures of the participants ranged from 1 to over ten years, which were grouped into three categories, namely 1 to 5 years, 6 to 10 years, and more than ten years. In addition, the participants were working in various roles within ICT work. Table 1 summarizes the participants and their characteristics.

Table 1

Overview of the demographic characteristic of the study

Baseline Characteristic	Total	%
Gender		
Female	7	35
Male	13	65
Age		
20-25	5	25
26-30	10	50
31-35	3	15
>35	2	10
Work Tenure		
1 - 5 years	5	25
6 - 10 years	11	55
> 10 years	4	20
Occupation		
Project Manager	1	5
Develop & Operations Engineer	4	20
IT Support Engineer	4	20
Data Science & Data Engineer	5	25

3.3 Data Procedure and Collection

3.3.1 Data Procedure

Before data collection began, the participants were informed about the consent form (See Appendix A for Consent Form). It explained that participation in the research was purely voluntary, and the participants were allowed to withdraw from the study at any time. The consent also included an agreement to be audiotaped, a description of the data collection process, and the benefits of participation in the research. The benefit to the participants included gaining insight into their personal experiences and potentially encountering an improved awareness of ICT professional identity. Further, their participation in this study helps the government in improving the quality of the Digital Talent Scholarship program so that it can deliver a better contribution to the development of human capital in Indonesia. Likewise, participants were made aware of confidentiality and removed identifying information, for instance, name of the company or the name of the client. The study's findings were presented using the participants' number, gender, and occupation. Further, data collected and analyzed for this study were kept on a personal laptop by the researcher and were not stored in an online cloud.

3.3.2 Data Collection

This research was conducted to better understand the experience of professional identity formation among ICT professionals. Their perspective was elicited in individual interviews with introductory questions and follow-up questions as needed to clarify responses. Individual interviews allowed each member to be heard and his/her experiences to become part of the data set as opposed to quantitative or survey data that generalize participant experiences (Doody et al., 2013; Liamputtong, 2011; Redmond & Curtis, 2009). The individual interview started with a social conversation to relax the participants and gain their trust in the researcher (Moustakas, 1994). The researcher then asked the participants to reflect on the phenomenon of interest and describe it in their own terms. This allowed the participants an environment in which they were comfortable and able to convey a personal experience of the phenomenon honestly and fully (Moustakas, 1994). The researcher brought to the interviews a set of open-ended and follow-up questions as a guide. The researcher performed an online interview via Microsoft Teams

due to geographic location, where the researcher was located in the Netherlands, and the participants were in Indonesia. The interviews ranged from 50 minutes to one hour and 45 minutes. After 20 interviews, the participants began to give repetitive answers; thus, the researcher realized that the data was sufficient and not required to conduct further interviews.

Before conducting interviews, the researcher organized a pre-test with three participants. The pre-test aimed to improve the interview questions and help adjust the order of the interview questions. When conducting the first pre-test, the researcher asked questions according to the list of questions and responded to the participant answer. After the first interview, the researcher played back the recording and compared it with the research questions. Then, the researcher realized that some questions were unrelated to the research questions, and there were questions that should have been asked but were not included in the list of questions. Then, during the second pre-test, participant tested using a modified list of questions. After conducting the interview, the researcher repeated the same process, namely playing back the recording to evaluate the interview process. Then the researcher realized that the flow of questions needed to be changed to make the interview process more fluid. After being adjusted, the researcher again conducted pre-testing, and after the third participant interview, the researcher saw that the interview questions were sufficient to be used in the following interview.

The interview questions were divided into three main topics: professional identity, making sense of the continuous development of digital skills, and the support of the DTS program. Professional identity includes questions such as: How do you describe to other people what you do? What values do you need to have to become an ICT professional? What do you think about technological change? Do you join a professional group? To what extent do knowledge and skills support your identity? These questions provide insights into the understanding of the ICT professional identity. Next, to get insights into the sensemaking process of the continuous development of digital skills, each participant was asked: What is your opinion about the need for the continuous development of digital skills? What activities did you participate in to improve your digital skills? Furthermore, the participants were asked questions about the support of the Digital Talent Scholarship for their digital skills, including: Can you describe the experience of joining the Digital Talent Scholarship Program? What is your motivation for joining the program? How do you think this program is helping you? (See Appendix B for the Interview Guide).

3.4 Data Analysis

The data were analysed using ATLAS.ti to support the process of qualitative data analysis. Before the researcher moved all transcripts to ATLAS.ti for analysis, the researcher created a project and inserted the ten main codes in the ATLAS.ti software. The codes were based on the identified themes in the theoretical background, which consisted of attributes of professional identity, making sense of the continuous development of digital skills, and the support of the DTS program. For the first theme, namely professional identity construction, the researcher created the main codes: 'PI-action and behavior', 'PI-context', 'PI-group identity', 'PI-knowledge and skills', 'PI-value and belief', where PI is a short form of professional identity. The researcher generated 'SM-action' and 'SM-behavior' as the main codes for the second theme, where SM is a short form of sense-making. Similarly, the researcher made 'the DTS-reskill', 'the DTS-upskill', and 'the DTS-evaluation' codes for the main codes of the third theme, where DTS is a short form of Digital Talent Scholarship. After the main codes were inserted, the transcripts were added, and the researcher assigned codes to important quotations. For instance, quotations such as *"empathy are important, where we position ourselves from the user's perspective. So, we see the problem from the user or customer side"* was coded under 'PI-value and belief'. While analysing the main codes, the researcher started to assign sub-codes according to the participants' answers. For example, the subcodes 'join' were assigned under the main codes 'PI-group identity' when the participants indicated their participation in a professional group.

In total, the researcher generated 37 codes, which consist of ten main codes from the theoretical background and 27 subcodes from the data. Once all the subcodes were identified, the coding scheme was finalized. In the last step in the coding process, the transcripts were analysed again in order to discover the relationship between different subcodes and main codes and to try to understand the underlying logic of the data. Moreover, to ensure the coding quality, the researcher conducted an inter-coder reliability test. To test the inter-coder reliability, another person redid part of the coding and compared it with the researcher's codes to check for differences. Here, the second coder was coding 10% of the total transcript. Accordingly, the Krippendorff coefficient was calculated to ensure sufficient inter-coder reliability and indicated 0.806, which is considered strong. Finally, the information gathered from each participant was compared, and the findings will be discussed in the next section.

Table 2

Coding definition

Themes, Codes and Sub-Codes	N	Definitions
Professional Identity (PI)		
PI - Action & Behaviour		
Action	20	Participants describe what they do as a professional (e.g., the task)
Autonomy	13	Participants articulate their capacity, freedom, and/or responsibility to make choices in their role
Behaviour	20	Participants describe the manner of the work (e.g., doing, talking, performing)
PI - Context		
Impact technological change	19	Participants describe the impact of technological change on their working situation
Perceive of technological change	16	The way participants interpret the technological change
Perceive the pace of technological change	15	Participants perceive the rapid pace of technological change
PI - Group Identity		
Join	12	Indication of participation in a professional group
Not join	8	Indication did not participate in a professional group
Social network sites	12	Social media platforms used for group
PI - Knowledge & Skills		
Certification	9	Participants indicate the possession of professionals' skills certification
Experience	16	Participants emphasize the importance of experience to support professionalism
Hard skill	14	Participants describe the technical skills needed in their role
Knowledge	2	Participants describe the importance of knowledge for their role
Soft skills	17	Participants describe the soft skills needed in their role
PI - Value & Belief		
Values	20	Participants explicitly/implicitly describe their value as professional
Belief	19	Participants describe the confident feeling as professional

Themes, Codes and Sub-Codes	N	Definitions
Sense Making (SM)		
SM - Action		
Bootcamp	13	Participants join Boot Camp to develop digital skills
Conference	5	Participants join a conference to develop digital skills
Discussion/sharing knowledge	17	Participants actively share their knowledge or conduct a discussion to develop digital skills
Self-taught	18	Participants develop their digital skills without the guidance of masters or institutions (e.g., hands-on, social media, reading documentation)
Support from company	16	Participants develop their digital skills using facilitation from the company (e.g., e-learning platform, company training, financial aid)
Online course	16	Participants join an online course to develop digital skills
SM - Awareness		
Toward future digital skills	13	Indicate participants' awareness of the needed skills in the future
Demand digital skills on workplace	15	Indicate participants awareness of the current demand for digital skills in the workplace
Attitude toward continuous development of digital skills	18	The way participants interpret their perception of the demand for digital skills development
The DTS		
DTS - Reskill	8	Participants able to reskill after finishing the DTS program
DTS - Upskill	12	Participants able to upskill after finishing the DTS program
DTS - Evaluation		
Constraints	7	Participants describe the weakness of the program
Support	18	Participants describe the benefit of the program

4 Results

This chapter covers the findings from semi-structured interviews conducted with 20 ICT professionals. The following sections examine three topics: professional identity, making meaning of the continual evolution of digital abilities, and upskilling and reskilling. The identification attributes for ICT professionals are summarized in Section 4.1. Section 4.2 explains how participants make sense of the necessity of ongoing digital skill development. Section 4.3 describes the DTS's support for the upskilling and reskilling of ICT professionals.

4.1 Attributes of ICT professionals' identity

This section examines the initial subject, professional identity. It reveals how ICT professionals define and comprehend their professional identity in the context of ongoing technological development. Five attributes of professional identity were investigated. It includes action and behavior, belief and value, profession-specific knowledge and skills, group identity, and the context of technological change. This section is further divided into sub-sections to reflect the characteristics of professional identity that participants share.

4.1.1 Actions and Behavior

The results of the interviews indicate that all participants (n = 20) adequately described the tasks and responsibilities associated with their roles. Participants were able to clarify and identify their roles during the interview. One participant stated, "A UI/UX designer's responsibility is to design the aesthetic of an application or website" (Participant 9, Female, UI/UX Designer). Another participant maintained a company's hardware and software (Participant 6, Male, IT Engineer). Another participant maintained and repaired communication networks (Participant 13, Male, Core Network Engineer). Finally, one participant prepared a project strategy, objective, budget, and list of required resources (Participant 15, Male, Project Manager). Moreover, one participant described their position using the following metaphor:

> It's easiest to use an analogy. For example, when people work in a restaurant, data science is the chef. The data engineer prepares all the preparations for the chef, starting with picking up the ingredients from their location, bringing them to the chef's table, and cleaning them too. So the chef is ready to start cooking with our prepared ingredients (Participant 19, Male, Data Engineer).

This metaphor suggests that the data engineer's responsibility is to collect and handle raw data for the data scientist to understand. In the end, it was shown that the participants could recognize their tasks, which supports the idea that task and role recognition help people form their identities.

Despite the fact that participants had various occupations and performed diverse duties, the findings showed similarities in their activities. For example, participant 1 (Male, Data Scientist) displayed similar behaviours to participant 10 (Female, Web Developer). They use algorithm languages and codes to perform their duties. Similarly, participant 11 (Male, ICT Infrastructure Supervisor) and participant 3 (Male, UI/UX Designer) identified a similarity. Both of them described design as one of their activities, even though the output is different. ICT infrastructure supervisor was responsible for designing ICT infrastructure, while UI/UX designers focused on designing the user experience when interacting with a digital product. Similar activities describe the identity relationship between one person and others who work in the same environment or perform similar tasks. Thus, it describes identification as an ICT professional. Accordingly, the stronger the identification with the behaviors and activities, the greater the professional identity.

4.1.2 Value and Belief

The results of the interviews revealed that all of the participants (n = 20) overtly and implicitly considered a growth mindset as the value that influences their behavior. When discussing the growth mindset, participants defined it as the willingness to learn, acquire new abilities, and improve existing ones. For example, one person demonstrated and explained:

> We must be willing to learn; this is the most essential characteristic. However, many individuals fail to become ICT professionals due to a lack of willingness to learn. Indeed, learning IT was difficult; there was a great deal to learn, and the process itself was difficult. Thus, both those new to ICT roles and those with prior expertise must continuously learn and be willing to fail during the learning process (Male Participant 2, Software Architect & Business Analyst).

This quote shows that being an ICT professional is a continuous learning process; hence, professionals must have a desire to learn. Despite being explicitly stated, participants demonstrated an internalization of the growth mindset value by stating that technological progress demands constant skill development. The majority of respondents have seen the demand as an opportunity for growth. This attitude demonstrated the internalization of the

value of the growth mindset. In conclusion, it indicated that a growth mindset was a core value among participants, driving their decisions and becoming an integral part of their personalities.

Participants mentioned other values that guided their behaviour and activities during the session. Several participants (n = 8) emphasize the importance of open-mindedness, for example, when they present the design or solution to clients. They added that they must be receptive to new information and ideas, as well as constructive criticism and performance recommendations. Several participants (n = 7) acknowledged that creativity assists them in providing innovative solutions to the clients. In addition, a number of respondents (n = 8) highlighted the value of responsibility through their dedication to accomplishing assignments. Other participants (n = 8) highlighted the need to be open and transparent about whether or not they can fulfil a client's request, demonstrating the importance of the integrity value. Similarly, empathy is necessary, which participants illustrated by positioning themselves as clients to help them understand the client's perspectives and problems. Other participants (n = 7) valued resilience, especially when dealing with rapid technological development. In conclusion, the values influence participants' behaviour and enable them to provide quality work to their clients. Participants mentioned seven values, and an overview of the values is displayed in Table 3.

In addition to being able to describe the values that influenced their activities, the participants also showed strong beliefs as professionals. According to the participants, work tenure and performance affect their confidence as professionals. Participants described that positive performance at work could improve their self-esteem. They illustrated positive performance by completing work, receiving appreciation from clients or management, and solving a problem or issue that had never been encountered before. In addition, participants also felt fulfilled in their workplace when they could share their knowledge with others and implement their knowledge and skills to bring benefits to society. For example, one participant said, "I feel valuable because my knowledge and skills are better than my colleagues. I noticed that they often consult with me" (Participant 7, Male, Develop Engineer). This quote shows that the participant is recognized for his expertise by his colleague. In addition, it demonstrated his positive performance at the workplace. Moreover, during the interview, participants (n = 11) also emphasized work tenures and experience as factors that influenced their self-assurance. They described that the more experience they have, the more confident they will be in their job. In summary, the self-confidence participants experienced depicts a belief, which resulting bolsters participants' identity as professionals.

Table 3

Values of ICT Professionals

Values	Number of participants	Sample comments
Empathy	5	"A sense of empathy too, that's important. Empathy is where we position ourselves from the user's perspective to see the problem from the user/customer side."
Growth mindset	20	"I think ICT professionals should always upgrade their knowledge. Because the IT world is always changing, even though we feel that we have a lot of knowledge, there is always more up-to-date knowledge out there."
Integrity	5	"Integrity, because you can't lie about data."
Creativity	7	"The UI/UX itself might be more about creativity and empathy."
Open-mindedness	8	"We should have an open mind, don't limit yourself to criticism, suggestions, and feedback."
Resilience	7	"The most important thing is you have to be willing to learn. […] So, the first is learning a lot and the second is resilience."
Responsible	8	"One more thing, being responsible. Because not everyone understands design, so at least we can be responsible for the trust they give us. [...]."

4.1.3 Knowledge and Skills

The results of the interviews revealed that all participants agreed on the importance of knowledge and skills for enhancing their performance on the job, which bolsters their professionalism. The results of the interviews indicated that knowledge can be divided into two categories. The first category relates to theoretical knowledge, as demonstrated by one participant, who stated:

> As an IT architect, the most important thing is knowledge. For example, a client wants to integrate with various systems; we must know whether these systems can communicate with what procedure and what issues need to be encountered to enable the systems to work. This is what I mean by knowledge (Male Participant 2, Software Architect & Business Analyst).

This quote demonstrated that knowledge is necessary for developing a solution for the client. With knowledge, individuals may accurately diagnose the problem and explain it to the client. Participants also added that this type of knowledge was obtained through formal education. Meanwhile, other participants manifested knowledge as professional knowledge,

which developed over time and was obtained from daily engagement with particular tasks. This was illustrated by one participant, who stated, "If we want to distinguish ourselves from other candidates, we need additional experience" (Participant 8, Female, UI/UX Designer). In addition, participants emphasized that the portfolio, which consists of their job results and competences acquired through their experience, is beneficial to their careers.

The findings also demonstrated the importance of a skillset that includes both hard and soft skills. During the interviews, all participants acknowledged the significance of hard skills in their respective professions. Here, they included numerous hard skills associated with their responsibilities, such as the ability to operate Figma for UI/UX Designers, Kubernetes for Deployment Engineers, and machine learning tools for Data Scientists. In addition, each participant identified numerous soft skills that were essential in the workplace. The majority of them highlighted interpersonal communication skills when conducting negotiations, performing public speaking, and presenting ideas. For example, one participant (Participant 7, Male, Develop Engineer) highlighted the significance of communication skills when it comes to persuading the client to accept his proposed solution. Other participants also mentioned thinking skills such as analytical thinking, critical thinking, problem-solving abilities, and teamwork skills. As an example, one participant stated, "The role of IT architects is to solve problems, either by developing new software or by reusing current software. Therefore, analytical skills are required to assess situations from a high-level perspective" (Participant 2, Male, Software Architect and Business Analyst). This quote demonstrates that soft skills, such as analytical thinking, are advantageous for addressing complex challenges and providing a logical resolution. In summary, the participant showed their commitment to their profession as they applied their knowledge and skills to real-world problems.

The interviews found that participants improved their knowledge and abilities through their participation in higher education and training. Sixteen participants graduated from colleges with IT-related degrees, and four were from non-IT backgrounds. Even though the majority of participants' educational credentials fit with their roles, they nonetheless participated in training to improve their knowledge and skills. According to them, the formal education curriculum was not entirely suitable for the current labour market. Participants also mentioned that the school curriculum barely covered the fundamentals. Concurrently, people from non-IT majors participate in training to gain knowledge and skills. For example, one participant stated:

> I received training prior to entering the data. I initially enrolled in a data science bootcamp offered by one of the institutions. Then I completed the Digital Talent Scholarship and another Bootcamp in Data Engineering, this time focusing on the back end. Consequently, I received a great deal of training for a career change before obtaining employment (Participant 5, Female, Officer of Information Management).

According to the quote, participant 5 was required to complete training in order to acquire qualifications equivalent to those of IT graduates because she did not have education or work experience in IT fields. She also noted the great value of certifications from the program for entry into ICT positions, which was echoed by other participants. This remark demonstrates that competencies and technical skills can be achieved through a variety of educational routes. It gives a chance to those who wish to pursue a career in ICT but have no prior IT education or work experience.

4.1.4 Group Identity

The findings of the interviews showed that professional communities facilitated professional identity development. The majority of participants (n = 12) indicated that professional communities enable them to exchange experiences, knowledge, practices, and events and facilitate connections with other professionals, which shapes their identities. For example, one participant said, "I joined a community [...] whose primary purpose was to find knowledge about the Figma application. I frequently read there to determine community trends. In addition, I obtained a great deal of intriguing knowledge there" (Participant 18, Male, UI Designer). This quote demonstrates that the professional community encourages the acquisition of information and the development of work-related skills. Additionally, several participants disclosed that professional communities helped them improve their careers. For example, one participant stated, "I also obtain a great deal of employment-related information through professional communities" (Participant 5, Female, Information Management Officer). This quote suggests that the professional community facilitates professional development. Furthermore, participants report that they joined social media group communities such as Telegram, WhatsApp, Discord, and Facebook. In summary, emerging technologies enables the connection among professionals through digital platforms, which supported the sense of belonging to the profession.

In addition, the interviews revealed that some participants (n = 8) had not joined a professional community. For example, one participant said, "No, I tend not to find and do not

seek (the professional community). If I want to find some knowledge or information, I prefer to do it by myself, case by case" (Participant 2, Male, Software Architect and Business Analyst). This quote illustrates that participant 2 did not look for any professional community to gain knowledge and information, while he preferred to approach learning materials from authentic learning resources to learn a specific subject. Another participant preferred to gain knowledge from social media (Participant 17, Female, UI UX Designer), and join events (Participant 16, Male, IT Engineer). In addition, another participant (Participant 13, Male, Technical Support Core Network Engineer) reported that he was unable to find a professional community that corresponded to his role. In summary, even though community groups offered more than knowledge sharing and enhanced the internalization of value and belief as an ICT professional, some participants did not join professional groups because they preferred to learn independently and did not find a relevant group.

4.1.5 Context

Professional identities are fundamentally affected by the realities that surround them. Accordingly, the researcher investigated how the participants interpret and manifest their professional identities in connection to technological change. During the interviews, all participants expressed their concern over the rapid pace of technological development in the era of the fourth industrial revolution. For example, one participant said:

> Since 2020, the development of technologies that we never anticipated and technologies that we believed were still in the future has been accelerated. Including application changes, they are accelerating. In comparison to the transition from version 1.0 to version 2.0, it appears to be extremely rapid. The Industry 4.0 trend is growing rapidly (Participant 15, Male, Project Manager).

The quote demonstrates that the development and implementation of new technologies have accelerated dramatically during the past few decades. In addition, participants described the emerging technologies as "changing so fast", "make activities easier", and "quickly evolve". Participants stated that evolving technology forced businesses to alter their business models in order to remain competitive. In turn, the change transformed the workplace and the work itself, resulting in more adaptive working circumstances, extensive information sharing, and a flatter decision-making structure. This demonstrates that technology is viewed as a social change that affects professional identity.

The researcher then examined the influence of developing technologies on the identities of ICT professionals. The results of the interviews demonstrate that technological advancement influences the actions and behaviours of ICT professionals. The influences include altering the various roles and responsibilities and altering the utilization of applications and tools. During the interviews, participants said that technological advances "change work tasks" (Participant 4, Female, Data Analyst) and "create new roles" (Participant 20, Male, Data Scientist). For example, one participant said:

> There is a change in my work pattern. For instance, when I need to keep track of network alarms, I had to be on standby to monitor the network using our PC. But now, we have bot technology that makes it automatic; I only need to set it up to alarm me when the problem occurred. So, I no longer need to constantly check the computer (Participant 13, Male, Core Network Technical Support Engineer).

The quote demonstrates that technological advancement is altering several tasks. In addition, workplace automation replaced routine and low-skilled tasks, allowing him to do a more complex and highly skilled job. Participants were further liberated from tedious tasks, allowing them to engage in more demanding and rewarding labour. Another finding is that participants reported that technological changes had altered their work nature. According to them, technological advancement offered a flexible work design that allowed them to work regardless of time or location. In summary, technological advancement improves the work tasks and behaviours of participants.

The next finding indicates that technological advancement enables people to exercise their autonomy. For example, one participant stated, "I can choose any algorithm I wish to complete my clients' tasks" (Participant 20, Male, Data Scientist). The quote shows that the advancement of technology facilitates ownership over the use of applications and the decision-making process regarding the project's implementation methods. Another finding demonstrates that participants were aware of the demand for new skill sets due to technological change. Further, they stated their willingness to enhance their skills in order to adapt to the changing demands of the workplace. How participants make sense of the continuous development of digital skills is further discussed in the next section.

Subsequently, participants said that technological advancement allowed them to pursue their professional interests. For example, one participant said:

> At that time I had a friend who worked as a web programmer, and he asked me to test his application, to check if there were any errors or bugs. When I was testing, unconsciously I gave input in terms of design and application flow. It turned out that it relates to my current role. Whereas, at that time when I had just graduated, I still didn't know where to focus. Finally my friend gave information about the UI/UX design field and advised me to deepen the field. He also advised me to try learning first from free websites to make designs. After I watched it, it turned out that I was interested and wanted to continue learning about this role (Participant 9, Female, UI/UX Designer).

This quote demonstrates that she did not recognize her interest in an ICT role at first, especially given that a UI/UX designer is a rare position in Indonesia. However, the evolution of technology supports the expanding demand for UI/UX designers. Therefore, it affords her the opportunity to pursue a career that aligns with her interests. Furthermore, several participants stated that technological advancements allowed them to gain confidence, appreciation, and expand their professional networks. In summary, those opportunities supported participants' professional identity development.

4.2 Making sense of the need for continuous development of digital skills

The previous section of the report examined how technological advancement affects the identities of ICT professionals. ICT professionals strive to maintain a positive identity in the face of technological change by continuously enhancing their skills. In this section, the research presents findings about the second topic, namely sensemaking. It exemplifies how ICT professionals interpret the need for continuous digital skill development for their professional identities. This topic is analysed in terms of two themes: the awareness-related theme and the action-related theme. The former theme provides the situation's perception and rationale, whereas the later theme explains the situation's response.

Regarding the first theme, the researcher investigated how respondents perceived the need for continuous digital skill development. The majority of respondents (n = 18) viewed the demand as an opportunity. According to them, consistently acquiring digital skills allows employees to advance in their professions, enhance the content of their work, and expand their abilities and competencies. For example, one participant said:

> I perceive the requirement for skill development as an opportunity because if our skills continue to advance, our job outcomes will improve and our careers will advance even

> further. […] There are now numerous websites where we may sell our design work, and this is an opportunity for us to earn more revenue (Participant 17, Female, UI/UX Designer).

This quote demonstrates that acquiring new skills can widen the skill set and enhance the nature of work tasks. Finally, it allows people to advance in their careers, which leads to an increase in income. Two participants, however, viewed the demand as a thread. They stated that acquiring new abilities could be exhausting at times due to the rapid evolution of new technologies. However, they saw the thread as a reason to improve continuously because they want to keep working as ICT professionals.

During the interview, the researcher investigated the awareness of the skills required to keep up with technological advancements. Participants were well-informed about the future skills required for their profession, which are primarily hard skills. For example, one participant said:

> In the future, we will use AR (Augmented Reality). So we directly interact with the application with our hands. So even though it will be a challenge for UI designers in the AR world, where the technology is not established, the design process is still unimaginable. However, it will be implemented in the future because our trend is in that direction. Especially with the emerging metaverse, it is also a challenge for a UI designer (Participant 18, Male, UI Designer).

This quote demonstrates that the participants were aware of the future skills required for their profession. It was also described by other participants, who said that, in the future, Software Architects will be required to operate low-code software, and Develop Engineer need to be able to use Infrastructure as Code (IaC) technology.

In addition, with reference to the second theme, the researcher investigated the dynamics through which understanding the continuous development of digital skills leads to personal action. The findings show that all participants actively improved their skills to acquire greater professional competence. According to Table 4, the three most prevalent actions to improve their skills are being self-taught (n = 16), taking an online course (n = 16), and sharing knowledge (n = 16). Participants are self-taught to learn about knowledge and skills related to their job because of the flexibility that brings benefits to those trying to manage their job and upskill demands. Self-taught activities include reading books and articles, browsing social media for references, and engaging in hands-on or experiential learning. Similarly, participants

mentioned sharing knowledge to develop their skills by actively sharing their expertise, knowledge, and best practices in professional communities and workplace interactions. Another participant stated that online courses contributed to their skill development. For instance, one participant stated, "It is preferable to enrol in an online course such as Udemy or Coursera; because there are various interesting courses, and the application is easy to use and interactive" (Participant 14, Male, Pre-Sales Engineer). This quote demonstrates that online courses give great value in terms of benefits to employees, including technology that functions efficiently and useful applications that provide learners with feedback.

Bootcamp is one of the most common actions taken by the participants (n = 11) to improve their knowledge and skills. To eliminate bias, this number represents the total number of participants who joined a bootcamp training, excluding the DTS program. One participant reported attended many bootcamps (Participant 20, Male, Data Scientist). According to him, bootcamp could facilitated in the acquisition of a new skill because it offers structured training and direct interaction with the trainer. In addition, participants reported that the company supported their skill development by giving them company training (n = 10) and an e-learning platform (n = 10). On the other hand, some participants said that their employer did not provide a training platform; rather, their company supported them and gave working hour compensation when they took training. In addition, other participants enhanced their knowledge and abilities by obtaining a professional certification (n = 9) and attending a conference (n = 5).

Table 4

Overview of the actions taken by participants to develop digital skills

Actions	Number of participant
Bootcamp	11
Self-Taught	16
Online Course	16
In-Company Training	10
Conference	5
Sharing Knowledge	16
Certification	9
Request to Fund Training Courses Relevant To Work	1

4.3 The DTS program

The previous section of results investigated the participants' recognition of the accelerated rate of technological advancement. In order to maintain their skills, the participants

engage in the learning process. This section of the study discusses the third topic, upskilling and reskilling. It examines how the DTS program supports participants' digital skill development through upskilling and reskilling.

Table 4 illustrates that bootcamp is the most common action taken by participants to improve their digital skills. Throughout the interview, all participants mentioned DTS as one of the programs. The researcher therefore explored how the program contributed to the professional development of digital skills. All participants indicated that the DTS enabled them to acquire new skills and enhance their professional performance. Participants mentioned the courses that they took: Data Analyst, UI/UX Design, Data Engineering, OpenStack Administrator, Red Hat OpenShift, and CCNA Network Engineer. According to them, the DTS's course materials aligned with labour market demands and were taught by experienced professionals. In addition, one participant said, "I think the course is effective. Because we can directly practice using live coding, and the form of training that goes directly to the use case. So we can directly understand the implementation of the knowledge" (Participant 4, Female, Data Analyst). This quotation implies that DTS provided relevant resources that assisted participants in operating more efficiently and systematically.

Another participant mentioned the benefits of DTS certification. Participants stated that certification is vital since it indicates one's expertise, despite it is relatively expensive to get. Therefore, they were delighted when DTS gave qualifying participants the opportunity to earn professional certification for free. For instance, one participant stated:

> The most exciting component of DTS is that participants will receive funds for AWS certification if they are selected. Certification is expensive (if self-pay), therefore it would be intriguing if I could be selected to participate in certification without paying (Participant 19, Male, Data Engineer).

This quote reveals that the DTS not only rewarded participants a certificate for participating in the program but also gave them the opportunity to join a certification that may bring further value. Similarly, another participant said that there was a demand in the workplace for certified professionals to manage clients' projects (Participant 15, Male, Project Manager). In addition, other participants indicated that they lacked the required college degree and ICT sector experience at the beginning. Therefore, the certificate from the program enabled them to obtain the necessary skills for in-demand jobs and assisted them in transitioning into ICT employment.

In general, the DTS program enabled participants to reskill and upskill, which enhanced their professionalism and allowed them to change careers.

During the interview, participants also brought up the program's shortcomings. For instance, one participant stated, "Actually, this program is fairly comprehensive, but there is still no material that covers how to present the results of my data to clients" (Participant 2, Male, Data Scientist). This quote demonstrates that the program did not include soft skills. The participant believed that teaching soft skills was crucial. Other participants underlined the significance of a follow-up program as a bridge to employment. According to them, many participants desire to switch jobs; therefore, it would be beneficial if the government, in its capacity as the organizer, helped them find employment. In addition, one participant stated, "I took a data engineer course, but it was too basic" (Participant 19, Male, Data Engineer). This quote demonstrates that some courses teach only fundamental skill levels, while some participants require more advanced skills. Participants anticipated that the DTS would provide them with a course on soft skills, a follow-up program, and more courses on advanced abilities.

5 Discussion & Conclusion

5.1 Discussion

The purpose of this study is to understand how Indonesian ICT professionals view their identities in relation to ongoing technological change, how they making sense to the continuous development of digital skills, and to what degree the DTS supports their digital skill development. The objective of this chapter is to highlight the answers to three research questions, the implications of those responses, the limitations of this research, new directions for research, and finally, some recommendations. In the first section of this chapter, all research questions are answered and analyzed based on a review of the scientific literature. In the second section, both theoretical and practical implications are examined. The third section discusses limitations and future recommendations. The final section describes the conclusions.

5.1.1 Attributes of ICT professionals' identity

The following is a summary of the results reported in the previous chapter about professional identity. Five significant characteristics associated with the concept of professional identity among ICT professionals have been identified. These characteristics include the activities and behaviors of ICT professionals, a system of beliefs and values that guide conduct, and knowledge and skills gained from empirical science and experience. In addition, the characteristic also include professional communities that facilitated the establishment of relationships between professionals, which affected their sense of belonging to the ICT profession. The last characteristic is the contextual factor, wherein this study find that professional identity fundamentally affected by the technological change. Each attribute of professional identity is described in greater depth below, with reference to the relevant literature.

Regarding the first attribute, actions and behavior, the findings indicate that participants were aware of the roles and functions they performed or were expected to perform in a social setting as members of the ICT profession. When participants demonstrate that an action is consistent with societal norms, their professional identity is strengthened (Fitzgerald, 2020). As part of their duties, they developed, acquired, managed, and maintained computer hardware and software and provided telecommunications services. These findings agree with Heldal et al. (2019), who find that roles and task performance define professional identity. Other findings indicate that participants viewed and experienced a process similar to other ICT professional

roles. Consistent with prior research, the similarity improves the association between oneself and others, thereby creating a shared professional identity (Dahl & Clancy, 2015). Overall, it was shown that the participants did various technology-related tasks that differed from those of other professions. As a result, they formed a shared identity as ICT professionals.

Moreover, concerning the second characteristic, the findings reveal that the participants' values and beliefs affected their performance at work. Participants emphasized the significance of having a growth mindset as the value of ICT professionals. In this case, participants displayed a growth mindset by responding that being an ICT professional required them to constantly learn and embrace failure. This behavior is consistent with the previous literature on continuous learning (Lischka et al., 2015) and positive attitude (Lin et al., 2022), which have contributed to professional growth and development. Subsequently, this study found that participants' self-respect about their job responsibilities and tasks was a crucial component of professional confidence. Their sense of achievement upon completing a particular task and their contributions to the workplace strengthened their sense of pride in their work. In addition, participants were more likely to feel confident when they actively and enthusiastically shared their knowledge to assist coworkers. Consequently, the self-assurance displayed is essential for developing their professional identity (Vabo et al., 2021). In conclusion, participants demonstrated the second attribute of professional identity, values and beliefs, by adopting a growth mindset as their values and beliefs to encourage professional identity development.

In terms of the third characteristic, participants reported that possessing particular knowledge related to their profession enabled them to produce successful tasks, explain things clearly, and troubleshoot efficiently. The findings are consistent with those of O'Meara (2008), who said that integrating concepts and applying abstract knowledge to real-world issues is essential for forming a solid professional identity. In addition, the study demonstrates that possessing and utilizing a particular set of skills in ICT employment helps to enhance professional identity. Participants emphasized that ICT professionals must possess a specific combination of abilities, both technical and non-technical. This result is consistent with a recent report by Ternikov (2022) concerning the technical skills required of ICT specialists. In addition, Ternikov (2022) emphasizes the need for non-technical talents such as communication skills, leadership, teamwork, and time management. In line with the literature, this study reveals that participants deemed the non-technical talents they employed in the workplace beneficial. These abilities included communication, critical thinking, and leadership

abilities. In conclusion, mastering and applying a specific skill set in their daily work could foster professional identification and confidence.

Notably, the participants agreed that work experience might increase their abilities and professionalism. This result is consistent with findings from earlier studies (Flores & Day, 2006; Trodd, 2012), indicating that professional experience impacts professional identity. Participants also mentioned that completed work could serve as personal portfolios. According to previous research, Antonek et al. (1997) assert that portfolios are an adequate tool for constructing a professional identity. Overall, the results are congruent with those of Minott (2010), who argues that work-related knowledge gained from daily challenges might enhance professional practice. Comparing the findings to the studies mentioned earlier; thus, it can be concluded that professional identity could be reshaped through time by experience, knowledge, and practice.

In terms of the fourth characteristic, the findings indicate that individuals joined a professional network to enhance their knowledge and abilities, exchange work-related themes, and seek information. They actively discussed particular topics and circumstances inside the communities, creating an informal setting for professional development. The result is consistent with the findings of Flum and Kaplan (2006), who found that identity development requires an incentive to obtain information and to participate. In addition, they assert that identity creation is built on curiosity, which translates to an active pursuit of knowledge. Most participants joined a group on the digital platform, specifically Telegram, WhatsApp, and Discord. In agreement with the present findings, a previous study indicates that social networking sites contribute to forming professional identities (Istenic Starcic et al., 2017). IT professionals' information-seeking behavior is evidenced by their participation in professional communities to enhance their knowledge and abilities (Lee, 1999). In conclusion, the professional community aided participants in perceiving themselves as members of their profession, with this membership becoming a part of their self-identity that gave them an advantage when representing their profession to the broader public.

In relation to the fifth feature, the findings indicate that technological development is viewed as a social setting that influences professional identity. Participants reported that the quick technological change influenced their behavior, allowing them to conduct more challenging and rewarding work. The findings contradict the notion that technological improvements render meaningful employment useless and ineffective (Korica et al., 2010; Shepard, 1977). Possible causes include the different occupations of research participants,

which influence perceptions of how technological progress affects the way individuals work. Participants also reported that technological development strengthened their autonomy, connected to a flexible work design, ownership over application use, and the decision-making process in determining the project's implementation processes. According to a recent study, the autonomy increases a person's sense of professionalism (Sawatsky et al., 2020). Furthermore, another finding states that the participants viewed the technological transition as a positive challenge. They could pursue occupations associated with their professional interests, develop confidence and appreciation, and expand their professional networks due to technological advances. Employees who are receptive to change have a harmonious work-identity alignment, strengthening their professional identity (Vahasantanen & Hamalainen, 2019). Finally, technological change strengthens the identity of ICT professionals by increasing their competitiveness and creative capacity.

5.1.2 Making Sense of Continuous Development of Digital Skill

Identity construction is an ongoing process that constantly changes as individuals grow. When people face changes, the changes may influence their professional identity. At the same time, emerging technologies are transforming professional activities and interactions in ways that challenge their professional identity. As a result, people frequently create ways to cope with such changes to prevent viewing themselves differently. Thus, it is important to understand the sensemaking mechanism adopted by professionals during the change. Sensemaking can help create a sense of what is happening and guide professionals to what should be done. The main findings reveal that all of the participants were properly aware of the importance of updating and developing their skill sets. Participants stressed that ICT skills had become an essential element of their roles. Since technological advances required them to be highly equipped with digital skills and good technical knowledge to perform tasks, they recognized the importance of developing skills continually. This finding agrees with the recent study by Kira & Balkin (2014), which mentions that learning new digital skills is considered as an effort to maintain a positive identity and a situation where their identity aligns with their work.

In addition, the participants also signaled a positive attitude toward the demand for continuous digital skills development. Participants portrayed the willingness to update and develop skills that provided them with the opportunity to enhance their career trajectory, improve the quality of their tasks, and broaden their skills and competencies. Solberg et al. (2020) support the findings with regards to the professionals' willingness to learn and openness

to change to digital-related changes. By broadening skills and competencies, professionals craft opportunities that support their professional development (Wallin et al., 2022). Another finding confirms participants' awareness of the future technical and non-technical skills in order to aid them in solving problems and creating new products and services. Participants recognized the skills to use specific tools and programs related to digital technologies, such as artificial intelligence, big data, the metaverse, and the Internet of Things. They also realized the demand for the ability to think creatively with outstanding communication skills. These findings are corroborated by the studies by Gehrke (2015) and Markus et al. (2015), who claim that technological advancement requires professionals to have the abilities to use IT technology, interact with modern interfaces, and have non-technical skills as well. In general, the participants representing their roles recognized the future trend of digital skills. They also felt urged to develop their skills continuously despite their educational backgrounds.

Within the sensemaking mechanism, participants engaged in actions that reflected their common understanding and beliefs. The main findings reveal that all participants actively improved their skills in response to their awareness of the continuous development of digital skills. The findings also indicate that participants took part in technology boot camps to respond to the continuous development of digital technologies, as this is one of the most popular learning format designs nowadays (HolonIQ, 2022). Overall, the participants enjoyed the boot camps, as they felt the learning design was innovative and stimulating, allowing them to acquire and develop key technical and non-technical skills. As a result, they felt more prepared in their respective workplaces. The findings are fairly consistent with other studies which argue that boot camp is a workforce-aligned training program designed for those looking to move into high-skill technology careers (Bentz et al., 2019; Patelli et al., 2020). Other findings show that participants engaged in self-taught methods to meet the demands for the continual development of digital skills. The self-taught activities included joining online courses where they could manage their schedule and pace, browsing social media (e.g., Instagram and Facebook), and reading articles (e.g., Medium). This finding reflects those of Morris and König (2020), who highlight that self-development learning can afford a person to learn new knowledge, skills, and competencies on a continual and lifelong basis. Abele and Wiese (2008) and Bolhuis and Voeten (2001) further emphasize that self-development is important for professionals to manage rapidly and constantly changing work conditions, including developing digital skills.

5.1.3 The DTS program

The participants recognize the accelerated pace of technological change which made their skills sets quickly turn obsolete. Therefore, they engage in an unceasing learning path in order to stay relevant and updated. Consequently, professionals are also looking for lower cost, updated, and convenient professional development program, to adapt to newly established job roles. At the same time, the Indonesian Government has launched a Digital Talent Scholarship (DTS) Program to add another kind of boot camps in Indonesia. DTS provides an opportunity for professionals to improve their ICT technical skills with updated contents. The main findings revealed that participants had generally positive perceptions about the DTS for advancing or starting careers. Participants uttered the DTS support on the improvement of their professional knowledge by helping them reskill and upskill on their field of expertise as the DTS provided a comprehensive course. The courses taken by the participants were comprised of computer science, software development, UI/UX Design, OpenStack Administrator, Red Hat OpenShift, and CCNA Network Engineer. This finding is in agreement with pervious study by Katz (2009) who notes that acquiring a specialized training, expertise, and new knowledge in relation to professions would aid professionals retool their career for the purpose of meeting the needs of a growing labor market. Participants also conveyed that the DTS benefitted them from the chance to gain certifications as a useful resource to demonstrate their professional expertise. In fact, certification has become one of qualification alternatives since it is increasingly more regarded for the entry into ICT industry (Denning & Frailey, 2011) and provides a tangible benefit as it establishes a base level of knowledge about the profession (Phillips, 2004).

Nevertheless, the current study also infers where the DTS program fell short. Participants described that the DTS program was not providing materials related to soft skills, follow-up programs and more advanced level courses. As mentioned before, the participants considered soft skills important. However, the findings are unable to identify the existence of soft skill-related course in the DTS program. According to a survey conducted by Noll and Wilkins (2002), information system knowledge relating to the entire organization and overall business knowledge is important. The report also emphasizes that the so-called ‘soft skills’ such as teamwork and collaboration, planning and leading projects, presentation delivery, and writing skills will be critical for success in the information system profession. Emanuel et al., (2021) further assert the importance of soft skills in connection with the transformation of workplaces due to technological change. In summary, the Indonesian government needs to prepare workers to have the skills needed in the world of work, both technical and non-technical

skills and ensure that workers in Indonesia have the requirements needed by employers. In addition, the government also needs to warrant that the workforce can implement lifelong learning by providing sustainable training programs.

5.2 Implications

5.2.1 Theoretical Implications

In the introduction of this study, three research gaps were identified that the current study can fill. First, it contributes to the body of knowledge about the concept of professional identity by drawing on the ICT profession. Very little research has been done in this area (S. S. Smith et al., 2015). The literature review did not identify a single study that was designed to describe the attributes of the ICT profession. At the same time, the demand for ICT professionals is growing, and they are heavily impacted by technological change. This study is the first to define the characteristics of ICT professional identity in the context of technological change.

Second, it contributes to the body of knowledge about the concept of sensemaking during technological change, which demands continuous development of digital skills. New technological changes have not been emphasized in previous work on sensemaking (Namvar et al., 2018), particularly in the ICT profession. During the literature review, the previous study examined sensemaking at the organizational level, particularly at the management level. Saghafian et al. (2020) investigated how managers approach sensemaking to deal with complex organizational phenomena during technological change. This study explores how ICT professionals make sense of the need for continuous development of their digital skills. The use of the sensemaking concept in this study offers an idea for how to demonstrate ICT professionals' role in interpreting and acting on the development of digital skills.

Third, this study contributes to the current literature on programs that provide reskilling and upskilling. Previous study examined initiatives from regulators to support the workforces in various countries. However, no research to date has explored the DTS, one of the MCI's program that focuses on accelerating human capital development with ICT skills. This study provides insight into how the DTS addresses upskilling and reskilling practitioners in an Indonesian context.

5.2.2 Practical Implications

This study led to the following practical suggestions. First, the findings show that professional community via social networking sites prompts participants to construct their identities by allowing them to grow and receive new professional opportunities. Boughton (2013) argues that a profession is usually exemplified by an association. The Indonesian government has set a target of at least 9 million digital talents by 2030 (Kominfo, 2022); thus, a recommendation would be that ICT professionals develop an association to accommodate and foster professional practice. The association could aid in representing and supporting ethical practices among ICT professionals, as well as maintaining professional integrity, values, and recognition. Eventually, professionals would be able to actualize themselves better and improve the quality of their practice.

Second, the findings reveal that technological change causes demand for new skills encompassing non-technical and technical skills. The government, as the organizer of the Digital Talent Scholarship, should make sure to incorporate non-technical skills training into the curriculum of the Digital Talent Scholarship. For instance, it could offer a training program based on serious games, which are effective in stimulating learning in different settings. Additionally, instead of only providing one stage of training, the government could offer a range of stages of training, such as basic to advanced courses. This would enable participants to continue the training to a higher level; thus, the government could ensure the continuous development of digital skills. At the same time, the government could provide a follow-up program, such as a mentor program or networking events to accommodate the training participants in their career pursuits.

Lastly, the findings show a lack of support from companies regarding digital skills development. Technological advancement requires ICT professionals to be able to unlearn old technologies and practices and learn new ones. Accordingly, a practical implication of the study is that employers need to promote the development of digital skills among ICT professionals. Employers must recognize that developing opportunities for employees is essential to maximizing the potential of technology. Employers should also encourage continuous learning by providing an e-learning platform and training.

5.3 Limitations and Future Recommendations

There are several limitations to this study. First, the full scope of ICT work was not included in the study since representation depended on the participants' willingness to

participate. According to the ACS Foundation (2016), ICT work is divided into four areas: content and design (application), technology services, business services, and product development. Using those grouping, the majority of participants would be categorized as content and design (application) since they are working as UI/UX designers. As there are different roles within each group; future research should ensure equal representation from each group to broaden the understanding of each group. Second, the genders of the participants were not equally represented; the majority of the participants were male (n = 13). Although willingness to participate depends on the participants; future research should consider balanced gender representations. The aim is to avoid bias by capturing perceptions and experiences of interpreting identity and technological change from both men and women.

Previous research has indicated that ICT work is a dynamic and unstable environment that requires flexibility and the ability to readjust and reskill due to its rapidly changing nature (Adams, 2013). At the same time, professional identity is fluid and changes over time based on personal experiences and external feedback (Fraser-Arnott, 2018). Similarly, Wallin et al. (2022) noted emerging technologies as a social context that changes ways of working and professionals' views of themselves. Technology can be perceived as threat or an opportunity to the professional identity (Mishra et al.,2012), in other words, technological change challenges their professional identities (Nach, 2015; Walsham, 1998; Wallin et al., 2022). Considering the ever-changing ICT professional environment and the continuous stream of new technologies being considered, developed, and redefined by professionals, examining identity from the perspective of professionals themselves will remain continually relevant. Additionally, previous research has demonstrated the under representation of women in the IT workplace (Trauth et al., 2003). They found that personal characteristics, such as educational background, IT identity, and gender identity as well as influences experienced by women have impacted their decision to enter and remain in the IT field. At the same time, the society shape information technology as men's work and place women outside the domain (Berger & Luckmann, 1966; Trauth et al., 2003). Meanwhile, even though the number of women participants in this study was small (n = 7), during the interviews, they noted that they were attracted to the ICT workplace's flexible nature. Therefore, future researchers are recommended to undertake studies related to the participation of women in the ICT profession, particularly to explore the attraction of the flexible working situation for them.

5.4 Conclusion

This qualitative study examined the professional identity, sensemaking, and upskilling and reskilling of 20 ICT professionals. This study was the first of its kind to explore how individuals keep their identity when exposed to a new technology environment, as well as the sensemaking process individuals undergo while recognizing new technologies. Findings from this study indicate that ICT professionals possess a strong professional identity, which allow them to better cope with technological change. Additionally, ICT professionals recognize continuous development of digital skills as an impact of technological change. They acknowledge the importance of updating and developing their skills and perceive it as positive challenge. As a result, they actively upskill and reskill in response to their understanding of the ongoing evolution of digital skills. Accordingly, DTS emerges as one option for bootcamp training provided by the Indonesian government to help ICT professionals upskill and reskill.

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Appendix A
Informed Consent Form

Consent Form for

How to stay relevant: A qualitative study on exploring ICT Professionals' Identity and their sensemaking on the continuous development of digital skills
YOU WILL BE GIVEN A COPY OF THIS INFORMED CONSENT FORM

Please tick the appropriate boxes

Yes No

Taking part in the study

I have read and understood the study information dated [DD/MM/YYYY], or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.

I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and can withdraw from the study at any time, without having to give a reason.

I understand that taking part in the study involves being interviewed by one researcher from Communication Science, BMS Faculty, University of Twente. The interview will last approximately 60 minutes. I allow the researcher to take written notes during the interview. I also may allow the audio-video recording of the interview. It is clear to me that in case I do not want the interview to be taped I am at any point in time fully entitled to withdraw from participation.

Use of the information in the study

I understand that information I provide will be used for my master's thesis titled "How to stay relevant: A qualitative study on exploring ICT Professionals' Identity and their sensemaking on the continuous development of digital skills." I also understand that the transcript of the interview will be analyzed by Reaza Rahmatika as the research

investigator and access to the interview transcript will be limited to academic colleagues and the supervisors of the study.

I understand that personal information collected about me that can identify me, such as my name, will not be shared with the study team.

I agree to be audio/video recorded.

Future use and reuse of the information by others

I give permission for the information that I provide to be archived in audio recording and anonymized transcripts so it can be used for future research and learning.

Signatures

_____ _____

_____

Name of participant [printed]

and legal representative If applicable) Signature

Date

I have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.

_____ _____

_____

Researcher name [printed] Signature Date

Study contact details for further information:

Reaza Rahmatika (reazarahmatika@student.utwente.nl)

Contact Information for Questions about Your Rights as a Research Participant (or put this in your information sheet)

If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Secretary of the Ethics Committee/domain Humanities & Social Sciences of the Faculty of Behavioural, Management and Social Sciences at the University of Twente by ethicscommittee-hss@utwente.nl

Appendix B
Semi-structured Interview Form

Introduction

Hi, it's nice to see you today. I hope this sort of experience will be pleasant and interesting for both of us. For your information, the aim of the research is to explore who are you as ICT professional, and what is your experience in making sense of your professional identity during the technological change. I am aware that you are an ICT professional, and I want to find out a little bit more about how you see the demand for digital skills and how the Digital Talent Scholarship Program function in supporting the digital skills development. The whole purpose of using this interview will be not only for the master thesis research but also for describing how ICT professionals make sense of their situations. This interview was also used to help the government on improving the Digital Talent Scholarship program so that can contribute the most to the development of human capital in Indonesia. I am not expecting the interview to last very long, probably only about 60 minutes or so. I know that when we spoke earlier you agreed to take part in the interview, but I just want to check if that is still okay with you. And I need to read out the consent form regarding this interview before we get started. Do you have any questions before we start?

I. How do ICT workers define and understand their sense of professional identity by the ongoing of technological change?

General Question

1. Can you tell me something about yourself, how was your career story?

The Attribute of Professional Identity

Actions and Behaviour

2. How do you describe to other people what you do? Please pretend you are describing your career to someone you just met.
3. How does your typical day look like?

Values and Belief

4. If we step back a little, why do you want to be an ICT professional?

5. What character do you wish to develop in yourself professionally?

Context

6. What do you think of the technological change that is happening now?
7. How has the change impacted how you see yourself as a professional?
8. In your view, how important is the ICT profession today?

Group Identity

9. Do you join ICT professionals community?
10. How do you feel about the community?
11. To what extent does your professional relationship support your professional development?

Knowledge and Skills

12. Could you describe the education pathways you took to become an ICT professional?
13. What has helped you the most in developing yourself as an ICT professional?
14. In your opinion, to what extent do knowledge and skills can help one's professionalism, especially in a rapidly advancing technology environment?

II. How do ICT workers making sense of the continuous development of digital skills for their professional identity?

Awareness

15. To what extent have the demand for developing digital skills affected your professionality? Do you see this as a threat or an opportunity? Why?
16. Can you describe what skills are needed to support your work?
17. In your opinion, with technological development, will there be a need for new skills in your profession?

Actions

18. Are you personally active in improving your digital skills? If not, why?
19. If yes, can you recall an event when you learned digital skills? Please describe the situation for me.
20. How does this knowledge help your work?

21. To what extent is the company's support in the development of the skills of its employee?

III. In what ways does the Digital Talent Scholarship program support the continuous development of digital skills for their professional identity?

22. Can you describe the experience of joining the Digital Talent Scholarship Program?
23. What did you learn from this program? Did it change you? Did you learn something more?
24. When did you join the program?
25. What is your motivation for joining the program?