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Conceptual Model for Understanding the Drivers influencing Technology Certifications

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Abstract

This paper delves into the significance of technology certifications in the evolving landscape of information technology (IT) professionals. As businesses increasingly rely on complex information systems, the demand for skilled IT professionals continues to rise. Technology certifications, which establish a minimum level of expertise in the profession, play a crucial role in ensuring that IT professionals possess the necessary skills and knowledge on existing and emerging technologies. For individuals, certifications validate their deep knowledge and real-world experience, making them sought-after assets in the job market.

Technology certifications offer IT professionals opportunities to up-skill, re-skill, and cross-skill in response to new requirements and challenges. They signify proficiency in specific technologies, enhancing career prospects and potentially boosting earning potential. Furthermore, many employers view certifications as a credible indicator of an IT professional's competency, making them a prerequisite for certain positions.

Cloud computing certifications, in particular, have gained prominence due to the increasing adoption of cloud platforms by businesses. The market for cloud services is projected to grow rapidly, creating a demand for skilled cloud professionals. Cloud certifications not only validate expertise but also open doors to lucrative career opportunities. However, the plethora of certification choices poses a challenge for individuals, requiring careful consideration of factors influencing their choice.

Drawing on the technology adoption lens, this paper aims to explore the factors influencing an individual's choice of technology certification. By examining perceived attributes, attitudes, beliefs, and environmental characteristics, we seek to provide insights into the decision-making process surrounding technology certification selection. Ultimately, our research aims to inform individuals and organizations alike in navigating the complex landscape of technology certifications and maximizing their value in the rapidly evolving IT industry.

Keywords: Technology adoption, technology certification, UTAUT.

Introduction

As businesses continue to rely on increasingly complex information systems, the need for experienced information technology (IT) professionals continues to grow. One way to ensure that IT professionals have the necessary skills and experience on existing and new technologies is through certifications[1]. Dictionary attribute certification as "*an action or process of providing someone or*

[1] https://www.thebalancecareers.com/certifications-in-the-tech-industry-2071456

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something with an official document attesting to a status or level of achievement" (Certification n.d.). Certification of technology establishes a minimum level of expertise in the profession, identifying a core set of knowledge and standards that all users of technology should possess. Individuals with specific technology certifications are sought-after since the rigorous exams and certification prerequisites showcase both deep knowledge and real-world experience[1]. For organizations, the professionals who have passed a certification exam or series of exams can be presumed to have the specific knowledge to be more productive members of the IT department and respond better to any incidents outside the normal environment. Organizations that invest in their staff through training and certification will thus have a more technically advanced workforce able to respond to new challenges quicker[2].

With the growing relevance of technology certifications, on various topics of relevance, a number of certification choices are already available for those willing to get certified. Here we focus on cloud certifications given its relevance in the present context. Organizations need an infusion of cloud skills to match their monetary investment in cloud platforms and environments. With businesses implementing cloud platforms, the market for cloud services is likely to grow rapidly through 2022 (Costello 2019). With impending growth, it is easy to visualize that becoming skilled and expertise in the cloud will aid any IT professional. A cloud certification can also make a big difference in a cloud professional's career. According to a published report[3], three of the five highest-paying certifications are in cloud computing. In the domain of cloud computing, a number of cloud certifications are already available for beginners and professionals[4]. While few are specific to leading firms like Amazon, Microsoft, and Google, others are focused on specific skills. This makes the choice of certification a difficult task, and same is evident from queries posted by individuals regarding which cloud certification to opt for in the public domain[4]. The study attends to this problem. Thus, we raise the following question: What are the factors that influence an individual's choice of technology certification?

We resort to the technology adoption lens to address our research question. Dictionary define adoption "*as the action or fact of choosing to take up, follow, or use something*" (Adoption n.d.). From this perspective, technology adoption refers to the act of choosing to take up an intended technology. Literature on technology adoption broadly categorizes the key concepts characterizing this process as the technology's perceived attributes, the individual's attitude and beliefs, and the environmental characteristics having an impact on this process (Karahanna et al. 1999). Thereby, we are able to draw parallelism with technology certification, which also involves making a choice. The choice of technology certification is also expected to be governed by an individual's preferences, for example his/her prior experience, attitudes and beliefs, and also social attributes (i.e. how others might perceive).

Theoretical Foundation

Information Systems (IS) research, investigating adoption of technologies, has been significantly influenced by the work of Davis (1989) who proposed the technology acceptance model (TAM). The model and its revisions has been applied to different technologies (e.g., office automation and business application) under different situations (e.g., time and culture) with different control factors (e.g., gender, organizational type, and size) and different subjects (e.g. undergraduate students, MBAs, and knowledge workers), thereby demonstrating its robustness to its proponents (Legris et al. 2003).

Venkatesh et al. (2003), in an attempt to consolidate the cumulative knowledge related to technology adoption, compared the similarities and differences among the eight models which previously used in the context of understanding individual adoption of new information technologies, and having origins in sociology, psychology and communications. These models are Theory of Planned Behaviour (TPB),

[2] https://www.globalknowledge.com/us-en/resources/resource-library/articles/10-benefits-of-it-certification-for-you-and-your-employer/#gref

[3] https://www.globalknowledge.com/ca-en/resources/resource-library/articles/top-cloud-certifications/

4 https://www.quora.com/Which-cloud-certification-is-the-best-in-2020

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Theory of Reasoned Action, Technology Acceptance Model (TAM), combined TAM and TPB, Model of PC Utilization, Diffusion of Innovation, Motivational Model and Social Cognitive Theory (Venkatesh et al. 2003). The Unified Theory of Acceptance and Use of Technology (UTAUT) based out of this exercise (Figure 1) identifies four antecedents of the acceptance of information systems. They were developed by tailoring the fourteen initial constructs from the eight acceptance theories (Venkatesh et al. 2003). The significant constructs are performance expectancy, effort expectancy, social influence, and facilitating conditions. Performance expectancy is the degree to which an individual believes that using the system will help him/her to attain gains in job performance (Venkatesh et al. 2003). Effort expectancy is defined as the degree of ease associated with the use of the system (Venkatesh et al. 2003). Social influence is defined as the degree to which an individual perceives that important others believe he or she should use the new system (Venkatesh et al. 2003). Finally, facilitating conditions are defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system (Venkatesh et al. 2003). According to UTAUT, performance expectancy, effort expectancy, and social influence were theorized and found to influence behavioral intention to use a technology, while behavioral intention and facilitating conditions determine technology use. Furthermore, four significant moderators were identified: gender, age, experience (referring to prior experience with the technology in general), and voluntariness of use (i.e. the extent to which potential adopters perceive the adoption decision to be non-mandatory), and these are found to moderate various UTAUT relationships. UTAUT has demonstrated to be an effective and stable theory to explain technology acceptance (Tarhini et al. 2016). It is considered to be one of the most reliable theory explaining technology acceptance with its predictors being able to explain about 70% variance in usage intentions, which is significant in comparison to the eight models used to develop it (Martins et al. 2014).

Even though UTAUT considers individual acceptance of technology in an organizational context (Venkatesh et al. 2003), research has applied UTAUT as is, applied it with other theories, or extended it to study a variety of technologies in both organizational and non-organizational settings (Venkatesh et al. 2016). IT has penetrated almost every aspect of the society, and various individuals in various contexts now use it. The continued growth of UTAUT-based research has partly arisen due to the proliferation and diffusion of new ITs—such as enterprise systems (Sykes 2015; Sykes et al. 2014), collaboration technology in knowledge-intensive firms (e.g., (Brown et al. 2010)) , mobile Internet for consumers (e.g., (Thong et al. 2011; Venkatesh et al. 2012)), agile IS (Hong et al. 2011), e-government for citizens (Chan et al. 2010), and health IS in the healthcare industry (e.g., (Venkatesh et al. 2011))— in organizations and in society. We argue that UTAUT can be adopted in our research context to examine the factors influencing an individual's choice of technology certification.

Conceptual Model and Hypotheses

Construct Equivalence

Here we present an explanation on why we think UTAUT can be suitable in our problem context. A similar question was raised by Straub (2009) on the appropriateness of TAM and/or UTAUT in the context of educational settings. The authors note that although an educational environment shares some characteristics with a business environment, the influences of technology change on relationships with students and teacher identity are not captured in the TAM (Wolski and Jackson 1999). However, with UTAUT, it remains unclear of the extent to which it will be applicable to more informal types of learning (Straub 2009). It is possible that the key determinants of UTAUT might shift in importance depending upon the environment.

Table 1. Contextual Interpretation of UTAUT Constructs

Select UTAUT Constructs	Interpretation (Technology Certification Context)
Performance Expectancy	The degree to which an individual believes that getting certified will help him/her to attain gains in job performance.

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Effort Expectancy	The degree of ease associated with obtaining the certification.
Social Influence	The degree to which an individual perceives that important others believe he or she should be obtaining the certification.
Facilitating Conditions	The degree to which an individual believes that the environmental factors will support him or her in obtaining the certification.
Experience	The degree of knowledge or skill that an individual has in the topic of the certification.
Voluntariness of Use (Choice)	The extent to which an individual believes that his/her choice of the certification to be non-mandatory.

It is possible to interpret the UTAUT constructs considering the technology certification context. Like the technology adoption context, here also such decision is likely to be influenced by an individual's preferences and the environment. In Table 1, we provide a contextual interpretation of the constructs that demonstrate how the constructs can be adapted to provide an explanation behind an individual's decision of registering for a technology certification. We detail on the constructs below and put forward our hypotheses.

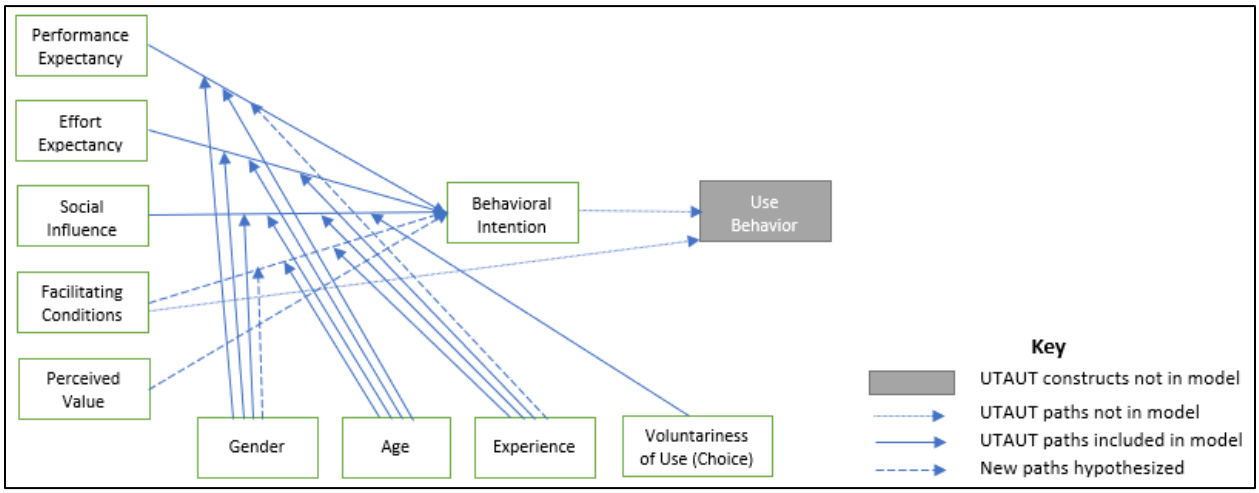

Figure 1. Conceptual Model

List of Hypotheses

We restrict the scope of our investigation till the behavioral intention box in Figure 1. Accordingly, we furnish arguments behind our hypotheses below.

Performance Expectancy

Performance expectancy as defined above is an indicator of an individual's belief that the system will provide gains in job performance (Venkatesh et al. 2003). A technology certification decision is likely to be shaped by the individual's belief that the intended certification will help him/her with job related gains. One may also set a personal goal for himself/herself to earn an intended technology certification, whether for professional recognition or personal achievement. Certifications one earns this way may be the most satisfying, as one is rewarding himself/herself for the efforts and improves the employability of the individual. If it happens to lead to a raise, promotion and recognition - so much the better. Hence there are some performance expectations associated with one deciding for a technology certification. Such an expectation is also likely to influence how much effort an individual is willing to exert in obtaining the certification. More is expected performance reward, more behaviorally inclined an individual is likely towards the task in concern (i.e. obtaining the certification). Thus, we hypothesize as follows.

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H1: Performance expectancy has a positive influence on an individual's intention to opting for technology certification.

Effort Expectancy

Effort expectancy has been conceptualized as the degree of ease associated with using a system (Venkatesh et al. 2003). The choice of the certification can be molded by the extent of effort that might be needed. For example, cloud computing professionals having practice knowledge might perceive that a given (cloud) certification will substantially contribute to his/her job prospect, and feel that getting certified will involve less effort owning to the practice-based knowledge s/he possesses. The opposite scenario is also possible where one perceives that a specific form of certification might involve a lot of effort which might be beyond what s/he might be capable of exerting. In such a case the individual might not opt for the certification, and instead can choose to explore other alternatives that may be available. The expectation of effort is thus likely to influence to influence the behavioral intention towards the decision of technology certification. Thus, we hypothesize as follows.

H2: Effort expectancy has a positive influence on an individual's intention to opting for technology certification.

Social Influence

Social influence is also expected to impact the technology certification decisions. For example, considering an organizational context my superiors at work might perceive that the specific technology certification will be the key towards achieving organizational goals, which prompts me to go for the intended certification. Similar type of influence also exists in the personal sphere. For example, my friends and family can recommend that opting for the particular technology certification can substantially boast my chances of job or a promotion. The intention behind certification can also be triggered by peer pressure. These kinds of feedback are expected to make one behaviorally inclined towards opting for the certification. Thus,

H3: Social influence has a positive influence on an individual's intention to opting for technology certification.

Facilitating Conditions

Facilitating conditions, as defined, represent the extent to which an individual believes that a supporting environment exists to facilitate use of the technology (Venkatesh et al. 2003). In the technology certification context, we make one change to the original UTAUT related to this construct. While the original hypothesis in UTAUT for the work context argued for no direct effect of this construct on behavioral intention, we argue that there would be an effect in the technology certification context.

To understand these facilitating conditions, we explored some of the obstacles to the certification. There are several certifications available on topic and one may not access to experts to suggest which certification to opt for. One may not have the time for the certification. One may reside in an area having limited technological opportunities and hence opting for a certification may appear pointless. These constraints are expected to have an impact on how much on is behaviorally inclined to obtaining the certification. Thus, we hypothesize,

H4: Facilitating conditions has a positive influence on an individual's intention to opting for technology certification.

Perceived Value

Perceived value, in consumer behavior, represents the overall value estimation of an object (Babin et al. 1994). Perceived value as a subjective and relative concept (Gallarza et al. 2011) is an overall assessment of the utility of a product and/or services based on perceptions of what is actually received and given (Zeithaml 1988). In the technology certification context, perceived value represents the utility a

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certification can provide to its recipient. The nature of the utility can be diverse, and it can distinguish certified individuals from those who are not certified. However, greater the perception of value from a certification, more positive intention can result in individuals towards obtaining those. Thus, we hypothesize,

H5: Perceived value has a positive influence on an individual's intention to opting for technology certification.

Moderator Relationships

From the theoretical point of view, there may be a reason to expect that gender will moderate the relationship between each of performance expectancy, effort expectancy, social influence and behavioral intention. Research on gender differences indicates that men tend to be highly task-oriented (Minton and Schneider 1980) and, therefore, performance expectancies, which focus on task accomplishment (i.e. obtaining the certification), are likely to be especially salient to men. Effort expectancy, in contrary, is likely to be more salient for women than for men. Evidences also indicate that women tend to be more sensitive to others' opinions and therefore find social influence to be more salient when forming an intention (Miller 2012). Gender schema theory suggests that such differences stem from gender roles, cognitions and socialization processes reinforced from birth rather than biological gender per se (Bem and Allen 1974; Bem 1981; Kirchmeyer and Bullin 1997; Motowidlo 1982).

In addition to the moderating linkages hypothesized in UTAUT, we expect gender to moderate the impact of facilitating conditions on the behavioral intention. Gender studies note that the perception of obstacles an individual encounters tend to differ across gender and can be attributed to their personality, psychological state and physical conditions for continued professional education and skill development (Kleftaras 2000; Moustakas 2018). This permits us to argue that the presence or absence of the facilitating conditions might not be perceived alike across genders. Based on these theoretical evidences, we hypothesize as follows:

H6: Gender will moderate the relationship between each of performance expectancy, effort expectancy, social influence, facilitating conditions and behavioral intention to opting for technology certification.

Similar to gender, we expect age to moderate the relationships between each of performance expectancy, effort expectancy, social influence and behavioral intention. Levy (1988) notes that studies of gender differences can be misleading without reference to age. Evidence suggests younger workers to place more importance on extrinsic rewards (Hall and Mansfield 1975). Further Increased age has been shown to be associated with difficulty in processing complex stimuli and allocating attention to information (Plude and Hoyer 1985), both of which are necessary if one is opting for technology certification, given the need to meet the qualifying requirements. Rhodes' (1983) meta-analytic review of age effects conclude that elderly individuals are more likely to place increased salience on social influences concerning a behavior.

In addition, we also expect that age will moderate the relationship between facilitating conditions and behavioral intention. Elderly individuals might consider themselves too old to opt for a technology certification[5], and hence the dependence on a facilitating environment can be expected to be muted. Based on these arguments, we deduce our next hypothesis as:

H7: Age will moderate the relationship between each of performance expectancy, effort expectancy, social influence, facilitating conditions and behavioral intention to opting for technology certification.

Experience here relates to the extent of knowledge or skill that an individual has in the topic of the certification. Certifications involve examinations that can assess the knowledge of the relevant concepts

[5] https://learntocodewith.me/posts/tech-career-obstacles/#Obstacle-5

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along with the application of knowledge to test problem solving skills. Similar to age, we expect experience to moderate the relationships between each of performance expectancy, effort expectancy, social influence, facilitating conditions and behavioral intention. This is based on the rationale included above that gender, age, and experience work in tandem (see Levy (1988). It can be expected that more experience one has, coupled with the certification will contribute to better fulfillment of job expectations. This is because prior expertise along with the necessary knowledge gained though the certification will equip an individual with better prospects of recognition and achievement. We further expect, in the case of experienced individuals, the extent of effort that might be needed to obtain the certification can be less in comparison to others. The experienced individuals already have some familiarity with the topic of certification and hence are expected to be more at ease in comparison to those not having a similar expertise. The impact of social experience on behavioral intention can be expected to be reduced for experienced individuals. These individuals already have a connected knowledge on the topic and hence might not depend on other's suggestions on whether to opt for a certification. Considering facilitating conditions, like the case of age, the dependence on a facilitating environment is expected to be muted for experienced individuals opting for certification. Following these arguments, our next hypothesis can be stated as:

H8: Experience will moderate the relationship between each of performance expectancy, effort expectancy, social influence, facilitating conditions and behavioral intention to opting for technology certification.

We interpret the construct voluntariness of use (choice) as an individual regarding the extent to which the certification choice is non-mandatory. This differentiates between a scenario where an individual, driven by his or her personal goals opts for a certification and the scenario where the environmental requirements (say in an organizational context) mandates one to opt for a certification. Based on this depiction, the impact of social influence on the behavioral intention is likely to differ between when the certification is a self-pursuit and when it is an imposed requirement. Social influence impacts an individual's intention through three mechanisms: compliance, internalization, and identification (Warshaw 1980). The compliance mechanism causes an individual to simply alter his or her intention in response to the social pressure - i.e., the individual intends to comply with the social influence. Theoretical evidence indicates that individuals are more likely to comply with others' expectations when those referent others have the ability to reward the desired behavior or punish non-behavior (e.g., (French and Raven 1959; Warshaw 1980)). The arguments lead us to our final hypothesis which we state as:

H9: Voluntariness of use (choice) will moderate the relationship between social influence and behavioral intention to opting for technology certification.

Conclusion

The paper has shed light on the significance of technology certifications in the ever-evolving landscape of IT professionals. Certifications serve as a means to ensure that IT professionals possess the requisite skills and expertise on both existing and emerging technologies. By establishing a minimum level of proficiency in the profession, certifications identify a core set of knowledge and standards that all users of technology should possess. The growing relevance of technology certifications, particularly in the realm of cloud computing, underscores their importance in enhancing career prospects and enabling professionals to stay abreast of industry trends. With organizations increasingly investing in cloud platforms, the demand for skilled cloud professionals is expected to surge in the coming years. Cloud certifications not only validate expertise but also open doors to lucrative career opportunities, with some of the highest-paying certifications being in cloud computing.

The multitude of certification choices available, however, presents a challenge for individuals, necessitating careful consideration of the various factors that influence their decision-making process. Drawing on the Unified Theory of Acceptance and Use of Technology (UTAUT), we present a

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conceptual model showcasing the factors influencing an individual's decision to pursue a particular technology certification. By examining perceived attributes, attitudes, beliefs, and environmental characteristics, we seek to provide insights into the decision-making process surrounding technology certification selection.

In continuation, following the guidelines set forth by Moore and Benbasat (1991), we plan to conduct a two-stage validation exercise on our model constructs. Pre-tests and pilot-tests will be carried out to refine and finalize the measurement items, as suggested by Lewis et al. (2005). A web-based survey instrument will be used, containing questionnaire items that relate to each of the different measurement items and constructs that are contained in our refined model. The questionnaire will be used to collect responses from a large number of individuals that demonstrate an intention to enroll for a cloud certification. Based on statistical analysis of the survey responses, the validation of the model will contribute to the generalization of our findings. Therefore, we will apply structural equation modeling using PLS to perform the calculations (Straub et al. 2004; Urbach and Ahlemann 2010). The final results are likely to demonstrate the extent to which the UTAUT model can be adapted to investigate issues related to the technology certification context.

The study aims to contribute to the existing literature by offering a deeper understanding of the factors shaping individuals' choices of technology certifications. Ultimately, the findings can inform both practitioners and policymakers in the IT industry, enabling them to make informed decisions regarding training and certification programs. By empowering IT professionals with the necessary skills and expertise, organizations can build a more technically advanced workforce capable of responding to new challenges and driving innovation in the digital era.

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