Theories & Traditions in Information Studies

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The following answers has been divided into three parts. First part is where a look into the four paradigms with ontology and epistemology. The second part contains of self-determination theory, the ontological and epistemological point of view and the placement within the four-paradigm matrix. The final part covers an analysis of the MoEN framework research paper including its strength and weakness, its usage of methods and theory, and the future possibility to become a standardized measurement tool.

Keywords: MoEN framework, four paradigms, ontology, epistemology and self-determination theory.

1 Four paradigm, Ontology & Epistemology

In 1989, Hirschheim & Klein published an article based on the two types of assumptions, ontological and epistemological by Burrell and Morgan and propose a theory presenting the four paradigms for the development of information systems. In the following paragraphs, I will discuss the representation of the four paradigms along with the implicit and explicit of ontological and epistemological dimension.

1.1 Research paradigm

A paradigm is a way of thinking about the world. According to Guba & Lincoln (1994), paradigms as basic belief systems based on ontological, epistemological and methodological assumptions (p.107). Pickard (2018) proposes three major questions: the ontological question, the epistemological question and the methodological question, for us to help to define a research paradigm (p.6). In other words, to improve the quality of the research, we have to understand our research paradigm to establish the approach and methodology that is best suited to examine the knowledge we are interested in (Rehman & Alharthi, 2016, p.56).

1.2 Ontological question

Ontology is the study of the nature of being and reality. (Duarte & Baranauskas, 2016) the ontological questions are primarily focused on "Who are we?", "What are we here for?" etc (p.2).

For example, in the movie I, Robot (Proyas, 2004) Dr Susan Calvin ask Sonny: Sonny, do you know why Dr Lanning built you?. Sonny replies with a question: No, but I believe my father made me for a purpose. we all have a purpose. Don't you think, detective? This is an ontological question. Sonny is trying to figure out, why Dr Lanning made him who he is.

Ontology makes us ask questions as "Do we make choices that influence the outcome? Is there an external force controlling our outcome? It enables us to examine our underlying belief system and philosophical assumptions as to the researcher, about the nature of being, existence and reality (Kivunja & Kuyini, 2017, p.27). In other words, are there forces determining our outcome, that are beyond our control? Ontologically, either you are realist or anti-realist (Scotland, 2012). Meaning, you either accept the facts are real and independent of the human mind or you accept that reality is only individual. Ontology examines the nature of reality, while epistemology examines how you can examine reality (Duarte & Baranauskas, 2016, p.2).

1.3 Epistemological question

Epistemology is the study of knowledge, acquisition of knowledge, and the relationship between research participant and researcher (Duarte & Baranauskas, 2016 p.2). The epistemological questions are primarily focused on "How do we know what we claim to know?", "How does an individual come to know something?" etc. Another famous philosophical question proposed by Bishop George Berkeley in 17th century "If a tree falls in the forest with no one around, does it make a sound?" (as cited in Stallings, Bille J. & Evans, 1928, p.122). According to Kivunja & Kuyini (2017), epistemology is important because it helps you to establish the faith you put in your data (p.27).

1.4 Four paradigms

Hirschheim & Klein (1989) suggests the ontological and epistemological assumptions yield two dimensions: a subjectivist-objectivist dimension and an order-conflict dimension (p.1210). These dimensions were originally adapted from (Guba & Lincoln, 1994). The order-conflict debate has been around for a longer period, which focuses on the approaches of stabilizing effects of social order versus approaches focused on change (Burrell & Morgan, 1979 p.10). Hirschheim & Klein (1989) perceive the order-conflict debate centred around two dimensions where the order perspective focuses a social world, characterized by order, stability, integration, consensus, and functional coordination, versus the conflict, stresses change, conflict, disintegration, and coercion (p.1201).

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Burrell & Morgan (1979) describes the subjective-objective approach to science terms is what they call assumptions about the nature of science can be thought of (p.21). Let’s take the example of a falling tree in the forest by Bishop George Berkeley. An objectivist will say a falling tree in the forest will make a sound even if no one hears it. A subjectivist will argue if no one heard the tree falling in the forest, then it would not make a sound.

Hirschheim & Klein (1989) maps the two dimensions onto one another to form four paradigms: functionalism, social relativism, radical structuralism and neohumanism (p.1201) (Figure 1 shows in the diagram below). These four paradigms are designed to help us understand the paradigms and used as a starting point to classify Information Studies Development methods.

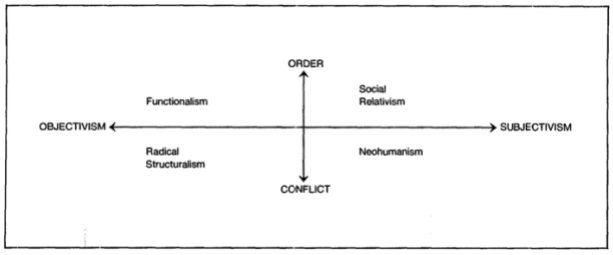

Figure 1. Information Systems Development Paradigm (Hirschheim & Klein, 1989, p.1202)

1.4.1 Functionalism

A combination of objectivism and order is functionalism. Functionalism is the oldest and has provided the dominant framework in sociology and the study of organisations (Burrell & Morgan, 1979, p.25). The functionalist paradigm school of thought was originated with the insights of the leading French sociologist Emile Durkheim, who lived during the late nineteenth and early twentieth century (Pierce, 1960, p.87). According to Pierce (1960), Durkheim's main interest was how society is bound together to which he develops this theory by studying the aboriginal tribes of Australia. Burrell & Morgan (1979) characterises functionalism by describing the status quo, social order, consensus, social integration, solidarity, need satisfaction and rational choice (p.26). They pursue to explain how the individual elements of a social system interact to form a unified whole (Hirschheim & Klein, 1989, p.1201). Through epistemological perspective, a functionalist gains knowledge about the organisation by searching for measurable cause-effect relationships, while the ontological assumptions provide, functionalism is believed that there exists an independent, realistic organisational reality (Nabende et al., 2009).

1.4.2 Radical structuralism

Radical structuralist has an objective perspective and see an unequal power distribution as one largely caused by or possibly resolved by the objective relates in our social structure (Burrell & Morgan, 1979, p.33-34). For example, the transgressive approach teaches students to transgress against racial, sexual and class boundaries (Hooks, 1994). Hooks want to change and educate the students with the intersectionality of race, capitalism and gender, which produce and spread systems of oppression and class domination. According to Burrell & Morgan (1979) a radical structuralist stresses on structural conflict, modes of domination, contradiction and deprivation (p.34). From an ontological point of view, the radical structuralism is the reflecting belief in a pre-existing observed reality, while the epistemological perspective will debate in the specific form of a materialistic view of history (Nabende et al., 2009)

1.4.3 Social relativism

They have a similar perspective as the functionalism, however, has a subjective perspective of social reality. Social relativism wants to understand the world as it is but they want to see it at a subjective level experience of each individual rather than overall reality (Burrell & Morgan, 1979, p.28). Hirschheim & Klein (1989) argue social relativist seeks explanation within the realm of individual consciousness and subjectivity and the framework of reference of the social actor as opposed to the observer of the action (p.1201). In order words, they seek to explain the stability of behaviour from the individual point of view. Social relativism wants to understand the subjectively created world as it is. The ontological status of reality is not given but socially constructed (Burrell & Morgan, 1979 p.28). Social relativism rejects the observing behaviour to understand it and we must directly experience to understand it, in an epistemological debate (Nabende et al., 2009).

1.4.4 Neohumanism

They still have a subjective reality as the social relativism have, meaning the individuality is their primary interest. However, they believe, different social and organizational forces play roles in our understand (Hirschheim & Klein, 1989, p.1201). This means neohumanism stress our thinking or consciousness is dominated by the views of the social and organizational actors. According to Burrell & Morgan (1979), our consciousness is dominated by the ideological structures with which we interact, and these drive a cognitive block between ourself and our true consciousness, which prevents human fulfilment (p.32). Hirschheim & Klein (1989), means the neohumanist paradigm focuses on all forms of barriers to emancipation, in particular, ideology, power and psychological compulsions and social constraints (p.1201). In an epistemological point of view, we can both argue, by developing and testing hypotheses to explain and predict what happens in the social world by searching for patterns, and reject the observing behaviour for mutual understand and emancipation (Nabende et al., 2009).

1.5 Summary

Ontology is a study of nature and helps researchers how certain are they about the nature of the object they are studying. Epistemology influences how researchers frame their research to discover knowledge through the relationship between a subject and an object. Hirschheim & Klein (1989) adapted the ontological and epistemological assumptions yield two dimensions: a subjectivist-objectivist dimension and an order-conflict dimension, which forms four paradigms (p.1201). These four paradigms are designed to help us understand the paradigms and used as a starting point to classify Information Studies Development methods.

2 Self-determination Theory

In 1985, Ryan & Deci published a theory called Self-determination theory, that describes the concept of each persons' motivation and their ability to make choices. The following papers contain a brief description of self-determination theory along with intrinsic and extrinsic motivation, the main principles of self-determination theory is used within the field of Information Studies and ontology, epistemology and the four paradigms on self-determination theory.

2.1 Self-determination theory

Self-determination theory is a motivational theory in psychology developed by Deci & Ryan in 1985, which suggests, people are motivated by three innate psychological needs. These three innate are autonomy: *our ability to make our own choices,* competence: *our ability to control our outcome through skills, knowledge and expertise,* and relatedness: o*ur connection to other people and the sense of we are part of a community and we are cared for* (Ryan & Deci, 2000, p.54-55). Self-determination theory outlines two types of motivations, intrinsic and extrinsic motivation, where these three needs endorse intrinsic motivation.

2.1.1 Intrinsic motivation

Intrinsic motivation is doing an activity because you find the activity interesting and enjoyable. According to Ryan & Deci (2000), intrinsic motivation is characterized as a behaviour being done for its inherent satisfactions rather than for some separable consequence. It should satisfy our basic psychological needs (p.57).

"Who has ever had to motivate a child to play? it's all right there in our nature to be active and play as an expression of our inherent act of nature" (Christian, 2015).

Ryan & Deci (2000) says that intrinsically motivated activities were said to be ones that provided the satisfaction of innate psychological needs (p.56).

2.1.2 Extrinsic motivation

Sansone & Harackiewicz (2000), wrote that researchers have adopted two different perspectives when defining extrinsic motivation, (1) when motivation is based on something extrinsic to the activity and (2) when motivation is based on something extrinsic to the person while working towards a given goal (p.445). In contrast, Ryan & Deci (2000) says, extrinsic motivation is doing an activity because the activity leads to some separable consequences, such as reward, avoidance of punishment, trying to gain social approval (p.58). Nevertheless, they also mean, there are several levels within extrinsic motivations as from external regulation: *which behaviours are performed to satisfy an external demand or obtain an externally imposed reward contingency* (p.61) to the most autonomous level of integrated

regulation: *which occurs when identified regulations have been fully assimilated to the self* (p.62) Integrated regulation level of extrinsic motivation can be confused with intrinsic motivation, especially with both being autonomous and unconflicted. However, according to Ryan & Deci (2000), their behaviour is motivated by integrated regulation, due to the presumed instrumental value with an outcome that is separated from the behaviour (p.62).

2.2 Self-determination theory in IS

Ryan & Deci (2000) study is focused on educational and learning sectors. With some quick google reveals that other published scientific papers are within the field of Information Studies (IS). The first research paper that I find interesting is the study of teachers' motivation to use e-learning technology. The second paper explains the designing for motivation, engagement and wellbeing in digital experience. The final paper outlines the relationship between game design elements and intrinsic motivation.

The research paper, *The role of self-determination theory in explaining teachers' motivation to continue to use e-learning technology*, is built on self-determination theory, where the authors study the context of teachers' utilization of e-learning technology in connection with on-site courses (Sørebø et al., 2009, p.1177). In this study, the authors predict the teachers' extrinsic motivation, confirmation of pre-acceptance expectations and intrinsic motivation by perceived autonomy, perceived competence and perceived relatedness using an extended IS continuance theory (p.1178). The results show, students basic psychological needs and intrinsic motivation can be useful for predicting the teachers' e-learning continuance reasons (Sørebø et al., 2009, p.1183). In this research, they use the three innate psychological needs to along with intrinsic and extrinsic motivation. Even when it is within the field of the educational sector, the study focus e-learning.

Peters et al. (2018) publish a paper regarding how technology designs support or undermine the three innate psychological needs, thereby increasing motivation and engagement, and ultimately, improving user wellbeing. Evidence within the context of the workplace, computer games and health, the authors build a METUX model (Motivation, Engagement and Thriving in User Experience) based on the three innate psychological needs (p.1-2). The authors conclude the paper as the impact of technology on the psychological experience and wellbeing of an individual can be better understood and designed for, by focusing on the three innate psychological needs as defined by Self-determination theory (p.12).

Alexiou & Schippers (2018) publish a paper which outlines the relationship between game design elements and intrinsic motivation. They discuss how the satisfied three innate psychological needs are expected to enhance the intrinsic motivation of the players (p.2557). As a result, the paper defines the role of narrative, aesthetics and core game mechanics in promoting greater learning outcomes through intrinsic motivation and engagement (Alexiou & Schippers, 2018, p.2560).

2.2.1 Summary

As per, we can see how other researchers use the self-determination theory to build upon or extending their theory to research further within their fields. The most interesting part is that all three papers use the three innate psychological needs from Self-determination theory and uses in their advantage to advocate and investigate for their study. Sørebø et al. (2009) use student's intrinsic motivation to predict teachers e-learning significance, while Alexiou & Schippers (2018) use intrinsic motivation to increase gamers learning outcome. As the three studies show, self-determination theory is been used not just within the field of the educational sector, but also in different other sectors regarding IS. Even it can be used as a base to build and develop more theories.

2.3 Ontology, Epistemology and the Four Paradigms

As stated in section 1, there are different philosophical stands and paradigms to which depends on the research focus and questions. The phenomenon of intrinsic motivation was first recognised within experimental studies of animal behaviour by discovering, even in the absence of reinforcement or reward, many organisms engage in exploratory, playful, and curiosity-driven behaviours (Ryan & Deci, 2000, p.56). I will place the study close to order in the Information Studies Development matrix. The researchers just tried to observe the ongoing process to better understand the individual organisms engaging behaviours. This is basically a social relativism paradigm. The social relativist believes that meanings are formed, not given (Hirschheim & Klein, 1989, pg.1201), which is why I believe intrinsic motivation is closely related to the social relativist paradigm.

The idea of extrinsic motivation itself reminds me of neohumanism paradigm, where something external in the form of reward or consequences is influencing our outcome. Hirschheim & Klein (1989) means, different social and organizational forces play roles in our understanding (p.1201). Ryan & Deci (2000) paper solely focused on the learning sector. One can argue in a learning sector, there should be influences. However, both Alexiou & Schippers (2018) & Sørebø et al. (2009) have a subjective perspective to learning, which I can closely relate to social relativist paradigm. Their study does not focus on influence intrinsic motivation, but the study itself focuses on the relationship between extrinsic motivation and the subjective. Particularly, I can see that the teachers of the e-learning system have been investigated through a social relativist lens, which helped the researchers to understand the system more subjectively with different viewpoints. This approach is a social relativist paradigm. Therefore, I can conclude the ontological basis for these studies are the reality is subjective and socially constructed (Scotland, 2012, p.11).

Epistemology tells us *How do we know what we claim to know*? (Duarte & Baranauskas, 2016 p.2). According to Scotland (2012), the interpretive epistemology is one of the subjectivism, that is based on real-world phenomena (p.9). Burrell & Morgan (1979) places the interpretive paradigm in the subjective-regulation matrix (p.22), which Hirschheim & Klein (1989) adapted into social relativism paradigm (p.1201). Subjective-regulation research will lead to a more effective research process for in-depth studies (Scotland, 2012, p.11). This is reflected in the self-determination theory, where the experimental research with "free choice" demonstrate subjective-regulation research via an in-depth understanding of the participants' intrinsic motivation (Ryan & Deci, 2000, p.57).

2.4 Conclusion

To conclude, the discussion of the main principle of Self-determination theory along with the usage of the theory within the field of Information Studies leads to the importance of the three innate psychological needs. Self-determination theory is been used not just within the field of the educational sector, but also in different other sectors regarding IS. Even it can be used as a base to build and develop more theories. Furthermore, in the Information System Paradigm matrix, Self-determination theory should be placed within the social relativism paradigm. As we have seen, the studies have been predominately researching the subjective rather than the objective. Both intrinsic and extrinsic motivation has been focused on the order rather than the conflict.

3 MoEN A study of Mobile Engagement

A study of mobile engagement (MoEN) is research paper published by Kim et al. (2013) to investigate and test the MoEN model. This is a study of behaviour and motivation to engage with smartphones. The following contains a summary of the report, analysis of strength and weakness, usage of the theory and analysis of the model. Furthermore, there are traces of other theories and models to support my arguments.

3.1 Mobile engagement study

In 1994, Wilkie published a book called Consumer Behaviour, which proposed the concept of human behaviour is a combination of three components that is cognition behaviour: *the individual's opinion about an object including people, products, brands*, etc, affective behaviour: *the personal feelings on has towards an object*, and conative behaviour: *the individual's tendency to act or exhibit in action or behaviour* (Kim et al., 2013, p.362). To be motivated means to be moved to do something, which means a person who feels no motivation or desire to act is defined as unmotivated,

where someone energized is considered motivated (Deci & Ryan, 1985, p.54). Hence, studying the motivation of users to partake in activities using mobile technology may offer information to help understand their ongoing actions of engagement behaviour (Kim et al., 2013, p.362). Then there is a question of what drive users to engage with their smartphones. Kim et al. (2013) means, there are three engagement motivations which drives users to occupy with their smartphones, utilitarian: *user's needs, saving time or accomplishing a task*, hedonic: *entertain users* and social: *connecting with others* (p.362). Smartphone engagement can promote a range of user experiences that can be functionally, hedonically or socially oriented, based on user background (Kim et al., 2013, p.362).

On the other hand, smartphones alter our connectivity, behavioural quest for information, lifestyle, etc. Smartphones provide users with a range of experiences that frequently compel them to participate in behaviours that create value and satisfaction on an ongoing basis. Smartphones help users to control when, where and how they participate in preferred activities that suit their three engagement motivations (Kim et al., 2013, p.362). To understand the purpose of smartphones user engagement through user motivations, perceived value and satisfaction, this study by Kim et al. (2013) studies, proposes and test a mobile user engagement (MoEN) model (p.362).

3.1.1 MoEN framework

MoEN is a conceptual framework which combines the three components of the human behaviour, the three engagement motivations and with perceived value, satisfaction and mobile users' engagement intention. Kim et al. (2013), systematise MoEN as the cognitive stage has utilitarian and perceived value, the affective stage has hedonic motivation and satisfaction, social motivation is in between cognitive and affective stages, and cognitive attitude has mobile users' engagement intention (p.363).

Using the MoEN framework, Kim et al. (2013) founded three proposition with twelve hypotheses that designed a twenty-one survey questionnaire to measure smartphone users' behaviour among the undergraduate students at a southeastern university in the U.S, with a valid response of 297 samples (p.364-366).

3.1.2 Results

As result Kim et al. (2013) elaborate, all three engagement motivations have a significant positive impact on overall satisfaction and continued engagement (p.366). Their results indicate that hedonic and social motivation have clear positive effects on perceived value, while utilitarian motivation is insignificant. However, the perceived value of mobile users has a significant positive impact on overall satisfaction and continued engagement. Furthermore, all proposed hypotheses and propositions are supported by the findings, except proposition 1, which is partially supported. Finally,

the results reveal mobile users' engagement motivations has an impact on perceived value, satisfaction and mobile engagement intention (Kim et al., 2013, p.367).

3.2 Strength and weakness

When we discuss the strength and weakness, there are different perspectives we can look into. From a methodological perspective, the only source of any data collection for this study was through a survey (Kim et al., 2013, p.365). The purpose of the survey was to validate the research model. According to Wright, (2005), there are both advantages and disadvantages of conducting an online survey. Through evaluating the advantages and disadvantages, we should be able to understand determine the strength and weakness of the research paper. We could also look into the sampling size, how were the sample selected? (Coughlan et al., 2007, p.660).

3.2.1 Survey research

One benefit with virtual communities is the research can access to individuals who share a specific interest, attitudes or even with values regarding with an issue or activity (Wright, 2005, Access to unique population section). Kim et al. (2013) focus the study among the undergraduates from a specific university, which will be impossible to conduct other types of research method than a survey. Especially this is a self-reported engagement survey methodology (O'Brien et al., 2018, p.28). I will argue, this is one of the strengths of this research. Although there was no indication of a pilot testing. A pilot study is a quick testing to test the research protocols, data collection instruments, sample recruitment strategies, etc (as cite in Abu Hassan et al., 2006, p.70). A pilot testing gives a quick validation of the survey, yet Kim et al. (2013) hasn't written anything in the report.

3.2.2 Time

Another benefit of a survey is that in a brief period, an online survey enablers researcher to reach thousands of individuals with similar features (Wright, 2005, Time Section). Kim et al. (2013) didn't mention anywhere on how they reached the 604 participants within 2 days (p.363).

3.2.3 Samples

Sampling is one of the major issues when it comes to any survey (Wright, 2005, Sampling Issues). We have no clue about how they distributed the survey, through virtual groups or online community. In other words, the article does not describe the delivery method among the students. On the other hand, it is quite common not to describe the population in a study. All we know is they are university students. Kim et al. (2013) describe as they believe that now and, in the future, students are the major mobile users and this generalizability to larger populations. Of course, the article is

seven years old and a lot has changed, this includes big data, which means not only students but also all range of age group has begun to use smartphones. According to DST (2018) just in Denmark, 9 out of 10 danish population uses smartphones, where the younger generation, from 15 and above, has a higher smartphone usage percentage. Henceforward, is it reasonable to use the sample population?

3.2.4 Summary

There are both strength and weakness in this research paper. Surveying all students in a university, yet without pilot testing. They were able to collect 604 samples within 2 days, yet there is no description of survey delivery method, which makes hard to investigate. Also is it acceptable to focus just on the university students? Nowadays, smartphone technology has increased and become a relatively new phenomenon. As such, the amount of smartphone users has increased, which means replicating the study needs altering. In the following sections we will look into the theories and models used in the study.

3.3 Common method bias

When it comes to a questionnaire, the reverse code questions became a standard procedure. In a multi-item measurement, reversed questions are to control for and/or identify acquiescence response bias (Herche & Engelland, 1996, p.366). Meaning, a survey validation technique which rephrases a positive question in a negative way to check if the respondents are giving consistent answers. There is no trace among the MoEN measurement items (Kim et al., 2013, p.368). If so, then there is a question of, how did they identify the acquiescence response bias. They examine the correlation matrix of the constructs and Harman's single factor test to check the severity of the common method bias (p.366). Correlation matrix indicates strong evidence of the existence of common method bias when the correlations are greater than .09. Kim et al. (2013) mean common method bias is not likely to be a significant concern for this study with the highest correlation being .682 (p.366). Another approach they used was Harman's single factor test combined with and without latent common method variance factor to check the ratio of two models. The ratio result being 43:1, Kim et al. (2013) conclude that the results of the analysis indicate no common method bias.

Each of the methods has its own standpoint on preventing bias. Harman's single factor test has been widely used by researchers to indicate common method variance. However, the basic assumption of this approach is that there is either a single factor emerge or the bulk of the covariance between the measurements will be compensated for by one general factor (Podsakoff et al., 2003, p.889). Furthermore, they elaborate that this is a diagnostic technique to which the authors do not believe it is a useful remedy to deal with the problem of common method bias. Yet, this will not solve the problem of acquiescence response bias.

3.3.1 Summary

As mentioned above, multi-item questionnaire scales generally include reversed and non-reversed items. Using such a mix of items is to alert inattentive respondents that the content of items varies, but also to reduce bias due to acquiescent respondents that can exist in scale ratings (Swain et al., 2008, p.116). This is also a weakness of the study in my opinion.

The proposed framework MoEN by Kim et al. (2013) is the central point of this study, irresectable of its ups and downs. They used Harman's single factor test to check the severity of the common method bias, which the result was negative (p.366). This method was used to prevent bias in the questionnaire. However, how reliable Harman's single factor test with researchers accusing the approach of being a diagnostic technique. I have also questioned why acquiescence response bias model was not used, especially there is an expectation of transforming MoEN into a standardized measurement framework. In the next part, I will compare standardized measurements and MoEN model.

3.4 Standardized measurements

Testing of the structural model, including calculating path coefficients and r-squares, which can be viewed as standardized beta weights and explained differences as in a regression analysis (Kim et al., 2013, p.367). They employ structural model testing to test the proposed hypotheses (p.366). Can MoEN framework consider as a standardized measurement for mobile user engagement?

In any survey, questions are important, but which questions considered to be good questions? This is where standardized questionnaire comes in play. A typically standardized questionnaire goes through the process of psychometric validation (Sauro & Lewis, 2012, p.185). This means researchers have spent a vast amount of resources for sculpture a structure that is most reliable, valid and sensitive. Using these three assessing quality we can look from MoEN perspective to assess the quality as a standardized measurement instrument (Kim et al., 2013).

3.4.1 Reliability

Reliability refers to how consistent responses are to the questions, which can be measured using coefficient alpha or also known as Cronbach’s alpha method (Sauro & Lewis, 2012, p.187). This is an internal reliability measure which will range from 0 being poor reliability to 1 being perfect reliability. According to Sauro & Lewis (2012) for research and evaluation, reliability in the range of 0.7 and upward is acceptable (p.187). In the reliability coefficients table, Kim et al. (2013) calculated the correlation alpha, which shows all items are above 0.7 except for mobile engagement intention item with 0.696 (p.365). This again raise a question on the study.

3.4.2 Validity

Validity refers to how accurately a method measure something. A result can be considered valid if a method measures what it claims to measure, and the results correspond closely to the real-world values (Sauro & Lewis, 2012, p.187). There are different types of validities while Kim et al. (2013) use construct validity (p.366). Construct validity is a concept or characteristic that can not be directly observed but can be measured by observing other indicators that are associated with it (Middelton, 2020, Construct validity section). She further elaborates that the researchers must ensure that their measurements are carefully constructed based on applying existing knowledge to achieve construct validity. Does MoEN questionnaire contain only relevant questions that measure mobile user engagement intentions? The results of the construct validity findings suggest that the constructs tend to have enough convergent validity (Kim et al., 2013, p.366).

3.4.3 Sensitivity

Sensitivity refers to how well good and poor interfaces can be distinguished between by the questionnaire. According to Sauro & Lewis (2012, p.187) a questionnaire should be sensitive as possible to experimental manipulation, if it is reliable and valid. Sensitivity is measured using a resampling technique to see how well the survey can differentiate at minimum sample size. The smaller minimum required sample rate is the more sensitive a questionnaire (p.187). There is no evidence of sensitivity in our research paper.

3.4.4 Summary

Can MoEN framework consider as a standardized measurement for mobile user engagement? My answer will be yes and no, but MoEN has some potentials which could build upon in the future. Standardized measurement has three core elements. The reliability coefficients table has an acceptable correlation alpha, except for mobile engagement intention item. Construct validity results suggest there is enough convergent validity. While there is no trace of sensitivity. In the next final section, we will look into the methods used to analyses the data.

3.5 Data analyses methods

In this section, we will look into the different methods used by Kim et al. (2013) to analyse the collected data. Kim et al. (2013) primarily use three methods to analyse the collected data. Structural equation model was used to analyse the data for the measurement model and the structural model using SmartPLS software. Exploratory factor analysis was used to ensure the required degree of convergent validity of the research instruments. Common method bias analysis was used to analysis the

Common method bias that I have explained previously under *common method bias* section.

3.5.1 Structural equation model

Structural equation modelling (SEM) is a multivariate statistical analysis tool that is used to analyse structural relationships. According to Kline (2011) researchers enjoy SEM due to its nature of answering the questions they want to answer and it thinks about research the way researchers do (p.14). Kim et al. (2013) used the SEM to analyse data for the measurement model and the structural model. They used SEM to study the interrelationships between the theory of latent constructs that takes a confirmatory approach (p.365). Efforts have been made to adapt SEM techniques to fit smaller sample sizes, yet SEM is considered and efficient for larger sample sizes (Kline, 2011, p.11). What is a larger sample size in SEM? Kline (2011) wrote that a sample size of $N < 200$ participants may be too small when analysing a complex model (p.11). Kim et al. (2013) have a valid response of 297 samples (p.365). Yet, it is a question of if this is considered as a large sample size.

3.5.2 Partial least squares

Partial least squares is a method of SEM which allows estimating complex cause-effect relationship models with latent variables (Kline, 2011, p.287). SmartPLS is a software that is commonly used to predict interactive effects of latent variables (Kline, 2011, p.288), to which Kim et al. (2013) use SmartPLS 2.0 M3 to evaluate the proposed hypotheses (p.366).

3.5.3 Exploratory factor analysis

Exploratory factor analysis (EFA) is a statistical multivariate approach to classify the smallest number of hypothetical constructs that can justify explaining the covariation found within a series of calculated variables (Watkins, 2018, p.219-220). In other words, to define the common factors between measured variables that describe the order and structure. Kim et al. (2013) use EFA to conduct, summarize and confirm the acceptable level of the convergent validity of the research tools. To qualify the acceptable level, all items loadings should be higher than 0.50 and the measurement items for each construction load should be just one factor, which is reflected among the EFA results, where all items loaded over 0.538 (p.366).

3.5.4 Summary

There has been used primarily three models to analyse the data in different stages. Common method bias analysis has been mentioned and analysed under *common method bias* section. SEM has been used to analyse the data for the measurement

model and the structural model using SmartPLS software. SEM require a large amount of sample size, at least N < 200 participants to reach an efficient result. The study has a valid response of 297 samples, to which is a barely acceptable sample size. Exploratory factor analysis has been used to conduct, summarize and confirm the acceptable level of the convergent validity of the research tools. The study has EFA results of all items loaded over 0.538, which is qualified since the acceptable level of all items loadings should be higher than 0.50.

3.6 Conclusion

Mobile engagement (MoEN) is a research study paper published by Kim et al. (2013) to investigate and test the MoEN model by studying the users' behaviour and motivation engagement with smartphones. The survey questionnaire was used to collect the data, which itself is a strength to reach the undergraduate students of 604 participants within 2 days. However, there is no delivery nor distribution method description, which makes it hard to examine. The future prediction of the study was that only university students will use smartphones, therefore the study was conducted among the undergraduate students. Now after seven years, the smartphone became an everyday gadget for all age group. This questions the research paper's certainty.

There have been used several methods and tools to analyse the data. Harman's single factor test was used to check the severity of the common method bias. This technique has been accused as a diagnostic technique by researchers. I have questioned, why acquiescence response bias model was not used if indeed there is a perception of standardized measurements.

Can MoEN framework consider as a standardized measurement? The reliability coefficients table has an acceptable correlation alpha, except for mobile engagement intention item. Construct validity results suggest there is enough convergent validity. While there is no trace of sensitivity. These are the core three elements for qualified for standardized measurement. Hence, my answer will be yes and no, but MoEN has some potentials which could build upon in the future.

There are also other methods used to analyse the data. SEM, which again raise the question of validity, since SEM is used for large sample sizes and 297 valid responds samples consider to be barely acceptable. EFA results of all items loaded over 0.538, which is qualified since the acceptable level of all items loadings should be higher than 0.50.

Overall, the research paper has ups and downs. It is seven years old research paper and there have been a lot of changes in the field of smartphone technologies and the usage of it. If we are supposed to use the MoEN framework, then there should be alteration in the questionnaire and the methods. MoEN framework should also be tested not just among the students but also other age sectors from 15 and upwards. After all the focus of the study was to examine the MoEN framework.

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