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Culture as a Determinant in Innovation Diffusion

Henrik Vejlggaard

Abstract

This study focuses on how culture may influence the rate of adoption of a television innovation, which is also a service innovation. The starting point is to understand theoretically what consumers may perceive they adopt when they adopt an innovation such as digital terrestrial television (DTT). To understand this, service theory is introduced to help define DTT in the eye of the consumers. The proposition is that a country's culture may affect the rate of adoption of a service innovation no matter how the service innovation is perceived, but if the service innovation is perceived as part of or connected to a service offering that is broadly founded in the culture, there may be a stronger motivation to adopt the service innovation. The study introduces a novel approach to analyse culture in an innovation diffusion context by selecting 10 cultural variables that may have an influence on the rate of adoption of DTT in Denmark. The empirical part of the study concludes that these 10 cultural variables can play a role in innovation diffusion.

Keywords: digital terrestrial television, service innovation, service theory, service package, rate of adoption, cultural variables, national culture, television culture

1. Introduction

One of the big questions in the diffusion of innovations (DOI) research field is what determines the rate of adoption of an innovation. The answer is without doubt complex but research do offer some answers. One answer from literature is that five categories of variables determine the rate of adoption: (I) perceived attributes of innovations, (II) type of innovation-decision, (III) communication channels, (IV) nature of the social system, and (V) extent of change agents' promotion efforts ([1], p. 222). However, these five categories of variables have not received equal attention in research. It is notable that the category that has been most extensively investigated (perceived attributes) has been found to be the most important variable in determining the rate of adoption ([1], p. 222). Historically, DOI research has focused on what determined the rate of adoption of goods and products. But what determine the rate of adoption of products may be different from what determine the rate of adoption of service innovations. This is notable, because, as Dwyer et al. write, 'It seems plausible that intangible service offerings [...] may be more influenced by national culture than are tangible product goods. This area appears especially ripe for exploration' [2]. This study will follow this recommendation and focus on how culture may influence the rate of adoption of an innovation within

the broadcasting industry, namely, digital terrestrial television (DTT), with a case study approach. The case is from Denmark.

DTT has been characterised as a digital innovation, specifically 'a new digital television service' [3]. But what does that make of DTT? Is DTT about the adoption of a technological innovation or of a service innovation? A technological innovation and a service innovation are presumably two very different types of innovations. However, there is also a convergence between technology and services, which does not necessarily make it clear if an innovation is about new technology or a new service or both. This chapter will address the convergence of service and technology issue in a diffusion perspective, as this is likely to be one of several convergence issues in broadcasting in the future. For instance, this particular convergence issue may affect the adoptive process of innovations within the broadcasting and other service industries.

The adoptive process of innovations has been studied for more than a hundred years ([1], Chapter 2), resulting in a mainly empirically driven science [4], based on quantitative research ([1], p. 196). While this study is conceptual in nature, it will also follow the empirical, quantitative tradition. Therefore, the aim of this study is two-fold: the first aim is to introduce a novel conceptual approach to analyse culture in an innovation diffusion context (alternative to existing research approaches, cf. the Literature Review). The second aim is to test the conceptual approach empirically.

2. Culture and diffusion of innovations

The word 'culture' has different meanings in different contexts. Often a specifying word is put in front of 'culture' to identify a specific type of culture, for instance, national culture, community culture, or company culture. The early diffusion of innovation research appears to have focused mainly on community culture. This may have to do with the fact that most studies in early diffusion research took place at a community or village level ([1], Chapter 2).

As mentioned in the introduction, there are five categories of variables that appear to determine the rate of adoption. As presented by Rogers, norms and network interconnectedness are two aspects of variable (IV) nature of the social system. Culture may be related to the social system and, indeed, to the other variables as well. However, variable IV appears to relate to the individual's social system or to norms and degree of network interconnectedness at community or village level, not at a national level. Based on this interpretation, national culture is not explicitly included in Roger's overview of variables that determine the rate of adoption of an innovation.

It has been established that national culture is a complex, multifaceted phenomenon [5, 6]. However, it has also been questioned if such a thing as national culture exists [7]. This may have to do with the notion that the term 'national culture' may imply the existence of a uniform and/or normative culture in a country. Some academics argue that cultural variability within nations is so great that it is fruitless to make generalisations with respect to national culture [7]. However, research has found that this objection has little empirical support. National culture does exist in many nations across the globe [8, 9]. This study concurs with Erumban and de Jong who state that 'all individuals live and work within a cultural environment in which certain values, norms, attitudes, and practices are more or less dominant and serve as shared sources of socialisation and social control' [10] and with Dwyer et al. who state that 'culture and country are not the same, we used the country as a surrogate for culture for practical purposes as has largely been done in prior research' [2].

Rogers only makes few references to 'general' culture in *Diffusion of Innovations*. One of the references is to individualistic culture and to collectivistic culture ([1], p. 179), which are both well-documented culture characteristics (cf. [11]). Individualistic cultures are those in which the individual's goals take precedence over the collectivity's goals. Collectivistic cultures are those in which the collectivity's goals take precedence over those of the individual [12]. Each type of culture may have different influence on the adoptive process: in a collective culture, the innovation-decision process may be based on what the community as a whole decides or what community elders decide, whereas in an individualistic culture, the innovation-decision is based on the individual's decision, cf. [13]. This attests to the influence of culture on the adoptive process. In his writing on cultural relativism, Rogers hinted at some cultural categories that are normally considered part of culture: cultural relativism is 'the viewpoint that each culture should be judged in light of its own specific circumstances and needs. [...] Each culture works out its own set of norms, values, beliefs, and attitudes that function most effectively for its people' ([1], p. 441). Here, norms, values, beliefs, and attitudes are considered cultural variables that not only can be part of a community culture but also can be part of a national culture.

Historically, this aspect of DOI has been part of the anthropological research tradition in innovation diffusion research. Anthropological research has shown the influence of cultural values on the adoption of an innovation—or the failure of adoption ([1], p. 49). However, anthropology no longer played a big part in diffusion research by the end of the twentieth century ([1], p. 50).

As mentioned, with respect to (IV) nature of the social system, Rogers mentions norms and interconnectedness. In sociology, a norm is defined as 'a standard or rule, regulating behaviour in a social setting [...] dependent upon shared expectation and obligations' ([14], p. 421). Rogers writes that norms 'are the established behaviour patterns for members of a social system. [...] The norms of a system tell individuals what behaviour they are expected to perform' ([1], p. 26). Interconnectedness is the degree to which the units in a social system are linked by interpersonal networks ([1], p. 412). Both norms and interconnectedness can be viewed as aspects of an individual's social system and as aspects of a wider culture. While there can be said to be overlaps between 'social system' and 'culture', in this chapter, there is the understanding that the social system is the individual's social system and culture represents a wide group of people.

Culture is notoriously difficult to define [15]. It has been pointed out that culture represents a series of mutually incompatible concepts ([16], p. 50). With this in mind, it is imperative that the researcher is very clear about his or her understanding of culture, either by following an academic convention or by taking a substantiated standpoint (the latter is the case in this chapter).

In 2006, in a meta-analysis, Baldwin et al. [17] counted the existence of over 300 definitions of culture. The definitions range from the most restrictive (high art) to the most expansive (the totality of humanity's material and nonmaterial products) ([18], p. 11). The Baldwin et al. meta-analysis showed that researchers of culture typically have one of seven different approaches: they view culture as structure, function, process, refinement, products, group, or power [19]. This study has a structural approach to defining culture.

Kluckhohn [20] has written that 'It is important not to confuse culture with society'. This chapter also distinguishes between society and culture, that is, the understanding is that society is a wider concept than culture, a distinction that leaves political practice, economic practice, and administrative practice out of this study's understanding of culture. Consequently, this study positions itself broadly in the middle of the restrictive-expansive definitions continuum mentioned above.

According to a literature review ([21], p. 10), there appears to be two different perspectives on culture: (1) culture is pure ideology encompassing values and behaviour [22] and (2) culture is both ideology and material elements (artefacts) [23, 24]. The Baldwin et al. literature review also identified that culture includes material culture, especially with the product approach. In some definitions of culture, language is also part of culture (for instance, ([25], p. 15), ([26], p. 25), and ([27], p. 5). Samovar et al. ([28], p. 14) have pointed out that language 'transmits values, beliefs, perceptions, norms'.

The understanding of this chapter is that culture is about values, behaviour, material culture, and language. With respect to values, a distinction must be made between personal values and cultural values. Commonly, personal values are defined as the central beliefs and purpose of an individual ([14], p. 664), that is, they are at the core of what it means to be human. Some of these values appear to permeate a culture, and these aggregated values are then called cultural values. The distinction made between personal values and cultural values also applies to personal behaviour and cultural behaviour, that is, cultural behaviour is the aggregated behaviour of a population. Therefore, this chapter defines culture as being about cultural values, cultural behaviour, material culture, and language in a country.

The cultural variables identified by Rogers as part of a community culture can be categorised as follows: values, beliefs, attitudes are about cultural values; norms are about cultural behaviour. Compared with the definitions above, these four variables can only be said to represent a partial view of culture. This conclusion can make it relevant to include other aspects of culture into this investigation of culture as a determinant of innovation diffusion.

3. Literature review

Many factors seem to influence the diffusion of innovations [29]. In a review of studies, Erumban and de Jong summarised that 'the socio-cultural ambiance, perceived values, institutions and political atmosphere might influence the perception of the individuals within a society in a certain way, and these factors may consequently impact the adoption decisions' [10]. In a study of factors affecting diffusion of technology, the conclusion was that the factors that may influence the diffusion process are 'virtually limitless' [30]. Much research has focused on the economic factors, for instance, the level of income and a country's openness to trade [31] and education [32]. However, the influence of the cultural setting of a society 'has hardly received any attention in the literature' [10].

Several studies have confirmed that national culture has considerable influence on consumer behaviour [33, 34]. Studies have also told us that there are considerable variation in the rate of adoption of the same product in different countries [2]. Kumar [35] categorised studies of cultural differences in innovation into six categories, one of which was adoption of/propensity to adopt innovations. Studies that belong in this category have studied the effect of culture on various types of innovations: electronics [2], information and communications technology (ITC) [10], and innovations in general [36]. These three studies all have in common the use of the Hofstede cultural dimensions and the focus on physical goods, not services.

Dwyer et al. studied the diffusion of seven electronic innovations across 13 European countries. 'The findings suggest that national culture explains a relatively sizable amount of variation in cross-cultural diffusion rates' [2]. The research team found support linking four cultural dimensions (individualism, masculinity, power distance, and long-term orientation) to cross-national product diffusion. 'More specifically the cultural dimensions of masculinity and power distance were

positively associated with the mean diffusion rate at the national level, whereas the dimensions of individualism and long-term orientation were negatively related to the mean diffusion rate' [2].

Yaveroglu and Donthu [36] studied the influence of culture on innovation and imitation (that is, will a culture, so to speak, have an innovator adopter category profile or a laggard profile) in a cross-cultural diffusion process comparison. The results indicate that cultures that are high on individualism (as is Denmark; cf. [37]), low on uncertainty avoidance (as is Denmark), and low on power distance (as is Denmark) are more likely to have a faster rate of adoption than cultures that are the opposite.

Erumban and de Jong studied the effect of culture on the adoption of ICT in more than 40 countries. They concluded that 'most of the Hofstede dimensions are important in ICT adoption. [...] In particular, the power distance and the uncertainty avoidance dimensions seem to be the most important ones' [10]. They found that countries with a low power distance score and with a low uncertainty avoidance score have a higher rate of ICT adoption (thus confirming the Yaveroglu and Donthu findings).

Many of the studies on the influence of culture on the diffusion process have used the Hofstede dimensions, and the Hofstede cultural dimensions can give answers to questions about the relationship between culture and adoption rates. However, the Hofstede cultural dimensions have also been criticised (for instance, [38, 39]), which, however, is not in itself a reason to dismiss them. It appears that the Hofstede dimensions have been used because it appears there have not been other options, or other options have been inadequate [10]. Therefore, we have to be aware that with the Hofstede dimensions, however meaningful they may be with respect to their original purpose, they are not necessarily the most meaningful to use in explaining the influence of culture on the innovation diffusion process. In theory, they could be some of the least meaningful aspects of culture to explain the influence of culture on diffusion processes. But we do not know as long as other avenues have not been explored. As Dwyer et al. [2] write 'Other approaches to culture and its measurement should be undertaken [...]'. This study will follow this recommendation and apply a different approach than dimensions of culture to explain the rate of adoption of DTT (notwithstanding this position, data from research on dimensions of culture will be included in the empirical part of this study).

Three papers on cross-cultural diffusion of innovations reviewed in this section are not directly related to the present study, in that, this study is about the adoption of a service innovation, not a product innovation. This must be considered because, as Dwyer et al. write 'National culture's influence on the diffusion of service innovations should also be investigated' [2]. Since Dwyer et al. made their recommendation, not much research on this subject appear to have been carried out. Some research on the influence of culture on diffusion has been carried out with respect to specific service categories, notably internet banking services. (Banking, like DTT, is an infrastructure service (cf. [40])). It also appears that the Hofstede dimensions are used in these studies (for instance, [41]). What can be learned from these studies is that in a specific service category, there may be specific factors that can influence the rate of adoption. For instance, internet access and internet behaviour are factors that can influence the adoption of internet banking in a country [41]. Likewise, one can theorise that access and behaviour, as aspects of a culture, are factors that can influence the adoption of other service innovations.

4. Research question

This study has its focus on culture, which can be both a determinant and a barrier to the rate of adoption of innovations. In this study, the focus is on the

determining factor because the case is about a 100% rate of adoption. Therefore, it does not seem obvious to focus on cultural barriers, though there may well have been cultural barriers. This observation leads to the following research question:

RQ: How can a country's culture have a determining influence on the rate of adoption of a service innovation?

The RQ mentions two variables that are related in a causal relationship: an independent variable (culture) and a dependent variable (the rate of adoption). In this study, the independent variable is being investigated both conceptually and empirically. Conceptually, it is taken into consideration that culture is a complex, multidimensional phenomenon, as mentioned above, and it is proposed that this independent variable cannot be investigated as just one variable. First of all, culture can be both a conditioning variable and a causal variable. One can say that national culture is a conditioning variable. Within a national culture, there can be certain patterns in values, behaviour, material culture, and language related to a specific phenomenon. An example could be healthcare; there can be a certain healthcare culture, for instance, trusting in religion or in evidence-based science when one is sick. In a similar vein, one can speak of a pop culture that relates to fashion, music, and consumption behaviour [42]. One can also speak of a television culture: there can be a pattern surrounding all aspects of television, both what goes on in television and what goes on in front of the television screen. Healthcare culture, pop culture, and television culture are here, as an analytical concept, called topic cultures. However, a topic culture is not separate from the national culture; it is an integrated part of national culture. With this understanding, in this study, the relationship between national culture, topic culture, and the rate of adoption of an innovation is as follows:

National culture (conditioning variable) → topic culture (determining variable) → rate of adoption (effect variable).

This study is related to a specific service offering, and the topic culture is thus the culture that relates to this specific service offering within the wider culture. The topic culture will be specified in Sections 6 and 7.

5. A case study approach

This study uses a case study approach to answer the RQ: this method is meaningful to use when the RQ begins with 'why' or, as is the case in this study, 'how' ([43], p. 8). The case study approach can be defined as follows 'A case study is an empirical enquiry that investigates a contemporary phenomenon [...] within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident' ([43], p. 18). The study method relies on multiple sources of evidence ([43], p. 18). In order to study a real-life phenomenon it must have a beginning and an end. One argument for using this method is when one attempts to explain causal links in real-life that are too complex for surveys [...], in situations where a description of the real-life context is necessary ([44], p.147).

In this study, the contemporary phenomenon is the launch of DTT; the real-life context is Danish culture. It is a study of how culture may have influenced the rate of adoption of digital terrestrial television (DTT) in Denmark. DTT was launched in Denmark in March 2006, and the adoptive process ended in November 1, 2009. Within this period, there was a 100% rate of adoption of DTT, both among households and organisations, on a nationwide scale [3]. This is considered to represent a fast process (cf. [45]), but no comparison with other cultures that are very different

from Denmark appear to have been investigated with respect to the rate of adoption of DTT. Denmark was chosen because of the documentation of the rate of adoption of DTT in Denmark. With a 100% rate of adoption, the adoptive process is complete, living up to the criteria that the real-life phenomenon must have ended. This means that, with a complete rate of adoption, a discussion of determinants is more final than in an on-going process, where some unforeseen determinant can play a role.

Even though the rate of adoption was identical for both households and organisations, the types of variables and the innovation-decision processes will not have been identical ([1], Chapter 10). But what was identical was the national culture in which the two diffusion processes took place. Vejlgård [3] suggested that Danish culture could have played a role as a determinant in the 100% rates of adoption. In another study, it was noted that the variable that was expected to be the strongest determinant (the perception of the innovation's attributes), appears to have played a weak role in the diffusion of DTT among households in Denmark [46], indicating that other variables may have played a stronger role. One such other variable could be culture. Thus, both of these studies seem to make it relevant to examine culture as a possible determinant in the diffusion of DTT.

The case study method does not preclude the use of quantitative data; indeed, a case study can be based only on quantitative data ([43], p. 19). This study has a quantitative part.

To sum up, this study has a descriptive element as well as a causal element and is explanatory in nature. The descriptive element is Danish culture, the independent variable. The causal element is the relationship between the independent variable and the dependent variable, the rate of adoption of DTT. The causal relationship between the independent variable and the dependent variable is the study object. The dependent variable is analysed in a service perspective, and the independent variable, Danish culture, is defined with a predetermined number of variables of interest that are studied empirically using multiple sources of evidence. The unit of analysis for the empirical part of the study is the Danish population.

6. DTT in a service perspective

A starting point in this chapter is to understand theoretically what consumers may perceive they adopt when they adopt DTT. In technical terms, DTT is the transmission of television signals as digital units (bits) through the air [47]. Before DTT, there was analogue terrestrial television (ATT), which is based on broadcasting TV signals using radio waves. In popular parlance, both ATT and DTT are TV signals. As terrestrial television was already in existence, DTT is an improved TV signal. DTT allows for more TV channels to be broadcast terrestrially, in principle making it possible to launch new TV channels to television viewers who receive television signals via antenna. However, there is no guarantee that DTT leads to more (gratis) television channels being in the air. If no new channels are launched, the main benefit to viewers is a better television screen quality (higher resolution), but this should be viewed as an improvement in the television set, which also is likely to improve the television watching experience for many consumers. But a television watching experience (experience understood as the outcome of watching television) is not something that can be adopted. However, experience services (cf. [48], p. 12), such as going to the zoo, to the cinema, or to an amusement park, are all service offerings that can be adopted (or rejected). A subscription service to a cable channel or a free 'subscription' to public service television channels can also be adopted (or rejected).

The next step is to establish if DTT has a fit with an established service sector. Service management categorises services into service sectors and service industries. Guile and Quinn [40] have made an overview of service sectors and service industries. One sector, the infrastructure services sector, consists of the communications, transportation, utilities, and banking industries. Television is part of a communications industry subcategory, the broadcasting industry, which offers different types of services: TV content production, TV channels (broadcasters, the curators of TV content), and TV signal distribution companies (with distribution taking place via different platforms: cable, satellite, terrestrial, online). From an industry point of view, terrestrial television is a distribution service.

In New Service Development (NSD), a service innovation is defined as new and/or improved service offerings, service processes, and service business models [49]. Even though the service has existed as ATT, DTT is, per the definition of a service innovation, a service innovation, even though it is 'only' an improved service. In a NSD context, one can also speak of DTT as a service improvement and, thus, as a new service (cf. [50], p. 4).

It has been pointed out that 'Service managers have difficulty in describing their product' ([51], p. 18). If service managers have difficulty in describing a service, it is not likely to be less difficult to consumers. Consumers are not likely to have a precise grasp of the television industry and know which companies produce and curate content (sometimes it is the same company) and which companies that distribute the TV signals through various platforms and by different brand names. A point here is that consumers may not perceive, understand, or experience DTT as a (new) way of distributing TV signals. However, by applying the concept of a service package, it may become clearer how consumers may perceive DTT. As with all service offerings, DTT can be understood as a service package (cf. [52], pp. 75–79). However, a service offering can be packaged in different ways. There is no definitive way to define a service package; in service literature, two service management academics, among others, have presented service package models: Grönroos [48] and Fitzsimmons et al. [51]. Their models not have different features but also have some components in common. As the Fitzsimmons model includes the experience of the consumer, the service package model by Fitzsimmons et al. is used to analyse DTT in detail. The Fitzsimmons service package model is defined 'as a bundle of goods and services with information that is provided in some environment' ([52], p. 18).

The Fitzsimmons service package model is graphically rendered as an onion model, with the (core) service experience in the middle; the explicit service and the implicit service are placed in a circle around the (core) service experience; and any supporting facility, any facilitating goods, and information are placed around the explicit and implicit services. **Table 1** is a description of each of the seven elements of the Fitzsimmons service package model with respect to DTT.

From the service provider's point of view, the core service experience is the actual service that is provided. In **Table 1**, the core service experience is defined from a typology of core service experiences [53]. However, as has been pointed out, the consumer's view may be different from that of the service provider. From the consumer's point of view, the explicit service may be the service that the consumers perceive as being delivered. The explicit service is here defined from a typology of experiences, based on experience economy theory. In experience economy theory, there are four domains—entertainment, aesthetic, education, and escapism—based on a two-dimensional matrix: customer participation (passive or active) and environmental relationship (absorption or immersion) ([54], pp. 45–47). Watching television is considered a passive experience and an experience that is absorbed by the viewer. This type of experience is defined as entertainment. For the consumer, the explicit experience of DTT is that of being entertained by watching television.

Service Package models elements	DTT service package
Core service experience	Enabling (cf. [53], p. 33): being able to watch television
Explicit service <i>The benefits that are readily observable by the senses and that consist of the essential or intrinsic features of the service.</i>	Being entertained by (more) television channels. Television belongs to the entertainment domain (cf. [54], pp. 45-47).
Implicit service <i>Psychological or emotional benefits that the customer may sense only vaguely or the extrinsic features of the service.</i>	Emotional benefits may be para-social (cf. [55], p. 230) or social experiences; an extrinsic feature may be social status or being informed.
Supporting facility <i>The physical resources that must be in place before a service can be delivered.</i>	In this case, a technological production facility and a network of terrestrial television masts must be in place.
Facilitating goods <i>The physical goods needed to access the service.</i>	Antenna and television set.
Information <i>Any type of information and knowledge that is necessary to use the service.</i>	Knowledge on how to receive TV-signals and how to use a television set.

Table 1.
Characteristics of the service package model exemplified with DTT.

By using service theory to define DTT, a more nuanced view of what DTT may be in the mind of the consumer appears. It is likely that consumers may view DTT as a service that enables them to be entertained. This insight is important to better understand the new service that the consumers adopt when they adopt DTT. If consumers view DTT as a new service that delivers more entertainment content, in a better television screen quality than before, this may then influence how they view the benefits of the implicit service: television has several emotional benefits, most notably television offers para-social or social experiences ([55], p. 230). Extrinsic features may be about social status or about being informed and having something to talk about. These benefits do not change with DTT, and if they were important to the consumer with ATT, they are likely to be important with DTT.

How a service is perceived by the consumer may affect the motivation to adopt this service. If DTT is perceived as a part of or being connected to an experience service, the motivation to adopt may be higher than if it is perceived as ‘just’ technology. There may be different perceptions of DTT among the consumers, but in one way or another, many consumers are likely to relate DTT to being entertained by watching television.

When perceived as part of or connected to an experience service, DTT becomes more a part of cultural life than if it is perceived purely as technology: watching television is a cultural habit that takes place in a culture. In this way, one can also say that television plays a certain role in a culture.

The proposition in this study is that a country’s culture may affect the rate of adoption of a service innovation, no matter how the service innovation is perceived; but if the service innovation is perceived as part of or connected to a service offering that is broadly founded in the culture and if the service innovation is perceived to be more about entertainment than technology, there may be a stronger motivation to adopt the service innovation.

7. Selection of cultural variables

As per the recommendation mentioned in the literature review, this study takes a novel approach to examining the relationship between national culture and the diffusion of an innovation; one that is not based on data from the Hofstede studies.

This is not without peril: as has been pointed out, it is well-known in academia that culture is difficult to define [15]. However, this study concurs with Pizam that culture is an umbrella term for a very large number of categories of phenomena ([56], p. 393). These phenomena have also been termed cultural variables or cultural factors by Smith ([57], p. 72). Some of these variables were identified in Section 2: norms, values, beliefs, and attitudes. However, it was also pointed out in this section that these variables only represent a partial view of culture. Therefore, other variables must be investigated before selecting the variables that are to be included in this study to represent the definition of culture utilised in this study.

A question is, how many variables can be said to represent key aspects of a culture? There is no objective answer to this question. However, the following guidelines will be used to determine the number of variables: the selected variables must represent all four main cultural categories. The actual number of variables is determined by the number of cultural variables in a literature review of cultural variables in the social science approach to study culture, carried out independently of the present study by Reisinger and Turner [21], as this literature review appears to overlap with cultural variables mentioned in Section 2. Approximately 50% of the cultural variables included in the literature review will be considered an adequate number of variables to represent key aspects of a culture. Also, the selection of variables must be relevant and meaningful with respect to the study object.

According to the literature review, the following variables are representative of different academic definitions of culture: culture is a way of life of a particular group of people [58, 59]. Culture indicates a pattern of social interaction [60]. Culture is a collection of beliefs, habits, and traditions [61]. Culture is the socially acquired ways of feeling and thinking [62–64]. Culture is about mental rules [60]. Culture is a system of knowledge [65]. Culture is a system of symbols and meanings [64, 66, 67]. Culture is the sum of people's perceptions of themselves and of the world [68]. Culture refers to morality, tradition, and customs [68]. Culture is about social interactions, rules about behaviour, perceptions, thoughts, language, and nonverbal communication [69]. Culture is about values, norms, customs, and traditions [22]. Culture is a combination of ideological and material elements, for instance, food, clothes, and tools [23, 24].

The literature review mentions 21 variables at least once. Therefore, the number of variables that must be selected to represent key aspects of a culture is, as a minimum, 10 variables.

The analysis of the service innovation revealed that the explicit service is about being entertained by (more) television channels. This will be input for the cultural variables to be selected for the empirical part of this study. The variables selected do not have to be the same for the national culture and for the topic culture. In this case, with respect to topic culture, the selected cultural categories should give insight into television culture, both with respect to what goes on in the television and what goes on in front of the television screen. Concretely, this can be about the types of television sets and the various television services, policies affecting television viewing, the aggregated television habits of the Danish population, and the television content.

Television belongs in several cultural categories in this literature review overview. First of all, television is about a television set, which is a designed object, belonging in the cultural artefacts category. The behavioural categories are important because watching television is mainly about behaviour. Four behavioural categories have been selected: way of life, rules, habits, and traditions. Way of life, habits, and traditions are selected because they broadly represent key behavioural aspects of culture. Rules are selected to understand if Danish culture is about following the rules of society (or not), which can have an influence on the propensity to adopt a new service that has been decided by Parliament. Television content typically represents certain values in

a society, and it may be relevant to examine if what goes on in society is reflected in what goes on in television. Therefore, beliefs, thoughts, and feelings are included in the analysis. Because the language of the television programmes can have an influence on many aspects of culture, the variable language is included in the analysis. (In Denmark foreign television programmes are subtitled, not dubbed.)

All in all, nine variables have been selected. However, these variables need to be defined in order to be applied in this study: beliefs are about being sure that someone or something exists or that something is true (religion). We can have thoughts about many parts of society; here thoughts are considered ideology, which is about what is considered good and bad (politics). Ways of feelings can be about how you feel about your fellow man (social feelings) and your country (national feelings). Way of life is synonymous with lifestyle, and in this context lifestyle is based on a consumer behaviour approach to lifestyle, defining lifestyle as activities and interests (activities, for instance, work, holiday, sport; interests, for instance, home, family, recreation) ([70], pp. 171–172). Rules are prescribed behaviour. Habits are acquired behaviour that has become nearly or completely involuntary. Traditions are inherited behaviour (more formal behaviour than informal customs). Tools are physical objects broadly defined. Language is here a language group. With these interpretations and definitions, 10 cultural variables have been selected. In the present analysis, the proposition is that the following selection of variables represents the conditional variable and/or the determining variable:

- *Cultural values*: beliefs, ideology, social feelings, and national feelings.
- *Cultural behaviour*: lifestyle, rules, habits, and traditions.
- *Cultural artefacts*: tools.
- *Language*: language group.

With this selection of variables, all four main cultural categories will be included in the investigation, representing different aspects of national culture and of topic culture. The values of the cultural values will vary: in some categories, the value may be qualitative; in others, quantitative. When quantitative, it has to be established what the typical value of each of the selected cultural categories is with respect to the Danish population. This also means that what is studied are collective variables. Here, the term ‘typical value’ is a numerical value, defined as ‘50% or more’ of the population. The population of Denmark must in one way or another give answers to one or more questions that can be categorised in relative terms. The answers that represent 50% or more of the population will be considered as typical in this study.

If the analysis using these 10 variables does not result in any meaningful findings, the analysis can be carried out with other variables from the literature review overview. If the inclusion of these variables also does not give any meaningful results, this study’s approach to study culture as a determinant in innovation diffusion has failed and is not useful for giving insight into the national culture and television culture of a country.

8. Methodology

The overall methodological approach of this chapter is the case study approach, a qualitative approach. As outlined above, this study focuses on examining the

independent variable, Danish culture, understood simultaneously as a conditional variable and as a determining variable. Studies of culture, historically within anthropology, have been qualitative, with a focus on participation-observation and other qualitative methods. However, often qualitative social research does not have a broad and truly representative sample population, which is also one of the criticisms of some qualitative research. This study seeks to counter this critique by gathering quantitative data (statistics) and using numerical values of the selected cultural variables.

As the DTT switch-over process took place in 2006–2009, quantitative data on Danish culture circa 2006–circa 2009 must be gathered. Investigating any possible cultural determinants of the rate of adoption of DTT in Denmark was not considered at that time. Almost a decade later, there are, therefore, three options: (A) gather primary data on the 2006–2009 culture of Denmark retroactively, (B) utilise existing data on the 2006–2009 culture of Denmark, and (C) do not investigate. The latter option would terminate any further inquiry under the premise presented above and leave us without insight that is lacking in research. Gathering primary data on the culture of 2006–2009 retroactively would not be credible. Therefore, option B is chosen. In this study, the existing data will be document data.

Documents have a variety of forms, for instance, books, charts, newspapers, institutional reports, survey data, and various public records [71]. The analytic procedure then ‘entails finding, selecting, appraising (making sense of), and synthesising data contained in [the] documents’ [71]. One can add to that ‘evaluation’. As has been pointed out as a general observation, ‘Adopting explicit evaluation criteria increases the transparency of [the] research and provides [...] the means to highlight the strengths and limitations of [the] research’ ([72], p. 303). It has been pointed out by Bowen [71] that it is not ideal to rely on document data, but as Merriam [73] has pointed out, in some cases it is the only realistic option. Bowen writes that documents ‘may be the most effective means of gathering data when events can no longer be observed or when informants have forgotten the details’ [71].

Document data are typically qualitative; however, the extracted data in this study are mainly quantitative (statistical data). When utilising statistical data from multiple document sources, one has to be critical of the sources in order to secure validity and reliability ([44], p. 73). In qualitative studies, a distinction between qualitative validity (general validity) and statistical validity (number of respondents) is often made. In this study, in a first methodological stage of the research process, the statistical validity and reliability refer to the statistics used as input. The statistical input data must in one way or the other have response categories where one of the response categories represents at least 50% of respondents of a representative sample. With this methodology, the unit of analysis is de facto the Danish population.

It is here assumed that culture changes slowly, that is, culture does not change from year to year, but rather from decade to decade or over longer periods of time. Therefore, data that represent aspects of culture at various times in the period 1995–2015 are considered having validity for the time period when DTT was introduced in Denmark. The population sample must be representative of the Danish population. The method used for data gathering must be documented and live up to well-established data gathering criteria, for instance, with respect to response rates, as this affects reliability. With high statistical validity and high reliability, higher credibility is also secured, which is a key issue in all qualitative research.

Otherwise, the criteria for selecting the sources for the empirical part are:

- The source must contain quantitative data pertaining to one or more of the selected cultural variables.

- The quantitative data must in one way or the other have response categories where one of the response categories constitutes at least 50% of respondents.
- The data must be representative of the Danish population. If not, this must be clearly stated.
- The method used for data gathering must be documented in connection with the publication of the data, unless it is an opinion poll.
- If the source is an opinion poll, it must be based on a randomly selected sample that is representative of the Danish population, carried out by a professional polling organisation, using generally accepted methods of data collection, with the data having been published by the requestor, with the name of the polling organisation clearly stated.
- Data must be valid for the period 1995–2015. If several sources are available, the one closest to 2009 will be chosen.

9. Data gathering

The following document types were gathered and included in the study, as they live up to the selection criteria:

Scholarly research articles and books: [74–78]. *Academic reports and books:* Bille et al. [79] and Bonke [80]. *Master thesis:* Stephensen et al. [81]. *Cross-cultural surveys:* two cross-cultural surveys are used as sources: (1) these data were collected over multiple years, among employees working for IBM. For Hofstede's most recent book, data was collected after 2001. However, scores in this study are from the website, not from the books (the scores on the website were recalculated by Hofstede to fit a scale of 0–100). These data represent national culture [37]; (2) these data were collected over multiple years in international corporations [38]. Seventy-five percent of responses represent management; 25% represent nonmanagement. The sample is a minimum of 100 respondents. These data are not representative of the Danish population. *Opinion polls* (carried out by a professional opinion poll institute) [82, 83]. *Laws:* (Full-time Employee Law) [84] and (Media Responsibility Law) [85].

Miscellaneous documents: broadcasting schedules of church services broadcasted on the DR channel was counted manually for the year 2009, based on the daily newspaper Politiken (unpublished data) [86], Corruption Perception Index, [88] Survey of media development in Denmark 2009–2010) [87], Survey of media development in Denmark 2012 [89], Distribution of programme types in the public broadcasting system [90], Contract between the Ministry of Cultural Affairs and the public broadcasting system 2007–2010 [91], Survey of media development in Denmark [92], Survey of media habits in Denmark [93], and the official monitoring report on daily television viewing in Denmark [94].

All in all, the data span the period circa 1997–2014 which is within the timeframe stated in the methodology section ('circa' because some data were gathered before they were published). However, data that are collected at different times and used in the same analysis should warrant some caution: in this time period, the numerical values of all variables could have changed which can affect the validity of the data. However, this would not necessarily affect the outcome of this study. The sources may have varying credibility and reliability, but overall all sources are considered having high credibility and high reliability and are thus suitable to be included in an academic study.

10. Findings

10.1 Conditional variable: national culture

Faith: 91% of Danes say they do *not* base their daily living on religion ([74], p. 345).

Ideology: 69% of Danes think 'Freedom is more important than equality' ([76], p. 155). This will typically lead to an individualist culture. That that is the case with respect to the Danes can be confirmed by two sources: (1) a 74% score on the Hofstede individualism dimension means that Denmark is an individualist culture [37]; (2) a 67% score from the 1990s on the individualist-collectivist dimension confirms the stability of this score ([38], p. 51).

Social feelings: Trust is a feeling that is widespread in Denmark—76% of Danes have social trust, that is, trust in other people. 62% have trust in institutions ([78], p. 253).

National feelings: Danes have positive feelings about their own country—93% are proud to be Danish ([75], p. 326).

Lifestyle: The official workweek in Denmark is 37 hours [84].

Rules: With respect to following rules, 62% of Danes take the so-called universalist approach on the universalist-particularist dimension ([38], meaning they would put rules first and foremost. It is also practised on a private level: when Danes observe someone they know wanting to drive while under the influence of alcohol, 81% have acted to stop it [83]. Adherence to rules is clearly practised at the government level, as Denmark is the country in the world with the least corruption (no. 1 on the Corruption Perception Index 2014) [87].

Traditions: Danish culture is normative. Normative societies prefer to maintain time-honoured traditions and norms while viewing societal change with suspicion. People in such societies exhibit great respect for traditions [37]. Eighty-three percent of the Danes support the monarchy [82].

Language groups: Danish is the primary discourse language in Denmark.

10.2 Determining variable: television culture

Faith: There are no religious television stations in Denmark [92], and there appear to be very little religious programming in Danish television channels [86]. However, the Danish Broadcasting Corporation (DR) has an obligation as part of a so-called public service contract to broadcast some religious broadcasting [91]. DR broadcasts church services on a certain number of Sundays and religious holidays.

Ideology: Danish television channels are independent of party political influence of politicians and the government [85]. All political views are represented fairly evenly in the public service television channels [81].

In Denmark, there are no government-run television stations, though the Danish Parliament lays out some guidelines for broadcasting certain types of content for public service television stations, with a focus on Danish language programming and programmes relating to Danish society and culture. These guidelines do not apply to commercial television stations [91]. In other words, Danish television stations are independent of government authority and the government's politics, except with respect to the public television service obligations.

The programming of the two main Danish DR public service channels had the following programming content in 2009: presentation of programmes (4%), education (3%), sport (1%), entertainment (6%), music (6%), non-Danish movies and series (30%), Danish movies and series (4%), general topics and culture (27%), current news (15%), and general news (8%) [90].

Social feelings: In 2008, Danes had the highest trust in television news among 14 news sources [77].

National feelings: the ratio of Danish to non-Danish television programming varies from television channel to television channel. However, the DR public service channels have a specific obligation to broadcast programming in Danish and on Danish culture [91].

Lifestyle: In 2009, Danes, both men and women, had 8 hours of free time per day ([80], p. 11). Two hours a day are spent on practical work; 2.5 hours are spent on relaxation; 2 hours are spent on social activities with other people; the rest is mainly spent on eating and drinking [93]. All of these activities can take place in front of the television. The daily leisure activity that many Danes spend most time on is television ([79], p. 291).

Habits: Danes watch a lot of Danish television—94% and 93%, respectively, watch the two main Danish public service television channels on a daily or weekly basis ([79], p. 53). In 2009, there was a record in television viewing in Denmark: on average Danes watched 3 hours 9 minutes of television per day [88]. Television watching peaks at 9 PM when 55% watch television [93]. 65% of the population are interested in watching entertainment programmes; 72% are interested in watching movies ([79], p. 56).

Traditions: One strong tradition in Danish culture and Danish television culture is watching the Queen of Denmark's New Year speech, which is broadcasted live on the main public service television channels on New Year's Evening. Approx. 60% the Danish population watch the speech [94].

Tools: 99% of the Danish population own at least one television set ([79], p. 51). In 2009, more than 53% of the population had more than one television set in their primary home. In 2009, 56% of Danish households had at least one flat TV screen [89].

Language groups: 70% of programming on the two main DR public service channels were in Danish in 2009 [90].

11. Analysis

Television appears to be an embedded part of cultural life in Denmark. Therefore, it is likely that many aspects of national culture and of television culture could have played a part in determining the rate of adoption of DTT in Denmark: almost all Danes own one or more televisions sets, and they are used—the main measured leisure activity in Denmark is television watching. Most of the content of Danish television can broadly be categorised as entertainment. The Danes to a large extent watch television in popular entertainment categories, though categories that are not categorised as entertainment may also be perceived as entertainment by some viewers.

The television culture seems to be a reflection of the national culture: religion does not play a big part in Danish cultural life, neither in the real life nor on television. If religion played a big part of what was broadcasted, that would be at odds with the general Danish culture. (In other cultures, religion may play a big part both in the general culture and in the television content.) When there is a balance between the general culture and the television content, this is likely to have a positive influence on the motivation to adopt DTT.

In Denmark, television is independent of government interference. Politicians do not have a say over content, exempt within some broad guidelines, which matches the Danish individualist-independent culture. With respect to political content, all points of views are represented on television, which indicates that most viewers will feel that their views are represented on television.

To a large extent, television programming is based on commercial considerations and/or broad public service guidelines. Danish television stations are independent of government authority and the government's politics, which is likely to make the Danes take a positive attitude towards television. This is likely to have had a determining influence on the rate of adoption of DTT.

Trust in public institutions is high in Denmark. While trust in media is generally low, trust in television news is high. Trust in public institutions can have a positive determining influence on the rate of adoption of DTT, and the fact that television is second highest in trust can have had a determining influence on the rate of adoption of DTT.

The Queen's New Year televised speech plays a big part in the public discourse in Denmark, in the media, and in private conversations, around New Year's evening [95]. Thus, the Queen's speech can be perceived as playing a part of the implicit service of DTT: being able to take part in the private and public discourse surrounding this broadcast event. This is just one example of a television tradition, but if the Danes perceive this as an implicit service of DTT, this is likely to have had a determining influence on their motivation to adopt DTT. The existence of a tradition of watching television on certain occasions can have a determining influence on the adoption of DTT.

Finally, one can make a somewhat banal observation: Danish is spoken in a big part of the content in the public service channels. The fact that in almost all areas there is coherence between the national culture and the television culture, also with respect to language, is likely to have had a positive determining influence on the rate of adoption of DTT.

If the Danes viewed DTT as an enabling service, making them able to watch television, this is likely to have had a determining influence on their willingness to adopt DTT. Likewise, if the Danes viewed the explicit service of DTT as being entertained, this is also likely to have had a determining influence on their willingness to adopt DTT.

12. Discussion

It seems that television plays a role in Denmark that would motivate many television viewers to want to be able to watch television also when DTT would be the only option for watching television. In conclusion, one can say that both the national culture and the television culture of Denmark were conducive to adopting DTT in Denmark.

The proposition in this study has been that a country's culture may influence the rate of adoption of a service innovation, no matter how the service innovation is perceived, but if the service innovation is perceived as part of or connected to a service offering that is broadly founded in the culture, there may be a stronger causal relationship between the culture and the rate of adoption of the service innovation. This study has made the argument that adopters may have associated DTT with entertainment, which plays a big part in Danish television culture. This study did not investigate if DTT was perceived as part of an entertainment domain by Danish adopters; therefore, this cannot be confirmed empirically. But with respect to convergence, this study hints that the convergence of content and technology that takes place at the industry level may not be particularly confusing to consumers because they may not make the distinction between service/content and technology in the first place.

Ten cultural variables from a list of 21 cultural variables that have some overlap with cultural variables identified in previous research represented the framework for the study. The selected variables represented all four categories of the definition of culture. Therefore, the answer to the RQ is that cultural values, cultural behaviour, material culture, and language in unison may have a

determining influence on the rate of adoption of a service innovation. It would be overstating the findings to suggest that specific variables have specific influence, but it is certainly relevant for further research to establish a ranking of the influence that different cultural variables may have on the rate of adoption of service innovations. The framework appears to be meaningful in studies of cultural determinants of the rate of adoption of innovations, not just of service innovations. However, in studies of other topics, it may be relevant to include other cultural variables than the ones used in this chapter.

Rogers categorised the determinants in five categories, based on research up to 2003. Based on the findings of this study and the other studies mentioned in the literature review, it appears meaningful to add a sixth category, (VI) culture. With this addition, it is likely that we can get more precise insight into what determines the rate of adoption of an innovation. This may then have consequences with respect to the relative influence of the causal variables. Rogers pointed out that 'Little research has been carried out to determine the relative contribution of each of the five types of variables [...] ([1], p. 223). This study cannot offer precise insight into the relative contribution of each of the now six categories of variables that determine the rate of adoption. However, it is likely that the determining variable that is the strongest predictor will vary with type of innovation, the innovation's target group and the context of the innovation, including the cultural context. This study has not generated findings on the relative influence of culture on the rate of adoption of DTT, but it is likely to have played a role. The fact that both households and organisations within the same culture had a 100% rate of adoption can hint of a not minor determining influence of culture. The relative influence of culture certainly seems relevant to include in future research.

As has been pointed out, it seems plausible that intangible service offerings may be more influenced by national culture than are physical goods and products. This study cannot establish this, as a comparison has not taken place. But a point is that a positive correlation (i.e. culture affects the adoptive process of service innovations) may be true for all service innovations, but the actual influence can be either positive (speeding up) or negative (slowing down) the rate of adoption: in the case of DTT, the television culture in Denmark is likely to have had a speeding up influence on the rate of adoption of DTT. But in a country, where television does not play a strong role in the culture, this may have a slowing influence on the rate of adoption of DTT. Thus, it may not be the national culture as such that has the biggest cultural influence but rather the topic culture. Therefore, the concept of topic cultures is also relevant to include in future DOI research.

As was pointed out by Fitzsimmons et al. [51], companies may have difficulty in putting into words what their services are. This may or may not be the same for consumers. But the difference is that consumers do not have to put this into words; they just have to react to an innovation that may influence a big part of their everyday life. Especially when the innovation in question is a service improvement of an existing service, the consumers have insight into at least some features of the innovation, and they know if they need the service or not. When the innovation is a service that is important in their daily life (their media habits) and the cultural life of the country, it is not likely to be a question of *if* they want to adopt but a question of *when*. By making the distinction between national culture and topic culture, we are likely to get better not just at understanding a causal relation but also of being able to predict the outcome of an adoptive process. The latter is a key element in diffusion of innovation research, which is not only descriptive but also predictive: we want knowledge on how to predict the rate of adoption of innovations. Thus, the findings of this study are also relevant to the forecasting research field.

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