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Smartphones: resource dimensions and uses

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Abstract

Understanding the adoption of technologies is crucial for researchers and practitioners, as identifying key factors helps to predict and explain users' attitude towards adopting or rejecting technology. However, as smartphones are well-diffused technologies, there is contention that research efforts shift to understanding their usage comprehensively. As personal technologies that users make meaning of, smartphone usage is assumed to be more comprehensive than that of previous generation mobile phones. This chapter examines how the usage of smartphones is redefining and increasingly adding value to consumer consumption processes.

Keywords: *smartphone, use dimensions, value, consumerisation of IT*

Introduction

The continually evolving usage of smartphones suggests that they are both consumer and prosumer devices used for both personal and business purposes. Individuals pursue goals with their smartphones and construct meaning regarding their devices, hence the smartphone as an extension of self (Arbore, Graziani, & Venturini, 2014; Jung, 2014). However, while a significant body of work informs on the personal use of smartphones globally, the business orientation of smartphone use is lacking from an individualistic standpoint. Value and use are complementaries; perception of smartphone value influences adoption and experiential value is resultant of usage. The proliferation of smartphones comes with dependency, as people increasingly hinge on smartphones for varying reasons. One of such reasons appears to be the ability of the smartphone to serve as a business administration resource, wherein it is used to mediate business activities and processes.

This occurrence is evident in the United Kingdom (UK). A 2013 study reports that 85 per cent of the adult population would not leave home without smartphones; and smartphone penetration is projected to be at 90 per cent of the population by 2020 (Deloitte, 2017; Google Confidential and Proprietary, 2013). Another recent nationwide study by the country's telecom regulator, Ofcom (2016), which aimed to

investigate how heavy reliance on a smartphone could affect digital behaviour and media literacy, found interestingly that micro-business owners choose to use the smartphone to run their businesses. This suggests that the business use of smartphones transcends the organisational context in which it has been predominantly studied. Considering the rising trend of entrepreneurialism in the country, as a result of people valuing autonomy and creativity over linear career progressions, rather than a response to a recent recession or a waning job market (Yoshioka, 2016), it is surprising that smartphones are still generally viewed as technological products users consume, rather than resources used to facilitate business administration. In fact, there is a consensus amongst market experts that smartphone use for leisure and enjoyment is likely to exceed its use for productivity purposes (Yang & Kim, 2012). The adoption of workflow apps, when compared to communication apps, was found to be modest among UK workers in a recent survey (Deloitte, 2017).

To advance understanding with respect to the usage and the resource dimension of smartphones in the *adoption of technologies context*, this enquiry utilises the concept of the business actor. In the context of this study, business actors are individuals involved in business activities who use their smartphones actively for business administration. Hence their use is assumed to be different from both the broad consumer archetype and business users within the enterprise. Research shows that these users are likely to be 'digital daters' (Forbes, 2010); i.e. they own and use more than one mobile device. It is of theoretical importance to gain more insights into the deployment of smartphones specifically for business purposes. The variety of technological platforms, multiple operating systems and therefore different application designs are the most significant drawbacks to ensuring the future success of m-business (Burger, 2007). In the case of these business actors, what rationales guide the use of a smartphone for business purposes? What impedes smartphone usage in this context? What unique values does smartphone use offer in this context? What influences the preference of smartphones amongst other available mobile devices?

Theoretical Context

Physically, the smartphone is a technological convergence that can be understood objectively through device specifications; the effect of human interaction facilitates values that are intrinsic and individualistic. The subjective view of smartphones regards them as an extension of self (Arbore *et al.*, 2014; Jung, 2014). Analysis of the definitions provided by publications since 2007, when the iPhone changed the paradigm of the platform (Sarwar & Rahim Soomro, 2013), indicates that smartphones are defined by what they are physically, and the potential and implications of their application through human interaction.

There is agreement that smartphones are mobile devices: a categorisation of mobile technologies (which include a network infrastructure that facilitates connectivity) and Information Systems (IS) scholars have contended that smartphone technology deserves investigation in its own right (Chen & Park, 2007; Y. M. Kang, Lee, & Lee, 2014); yet the term lacks a standard definition in the literature (Kim, Chun, & Lee, 2014). Cumulatively, smartphone definitions include 'technicality', 'socio-technicality',

or 'contradiction'-oriented approaches within two broad perspectives of 'user/personal/consumer' and 'business/enterprise' vantage points.

Within the literature, the dominant view in describing smartphones focuses on the object itself: the artefact and the technological innovation. Hence, technicality has been a route to defining smartphones. Technicality defines the degree to which the perception of a mobile service is technologically excellent in the process of providing services; users' perceptions of ease of use, system reliability, connectivity and efficiency determine it (Kim *et al.*, 2007; Verkasalo, López-Nicolás, Molina-Castillo, & Bouwman, 2010). From this standpoint, the smartphone is a 'convergence of PDA and mobile phone technologies, with multiple capabilities akin to computerlike functionality' (Chen & Park, 2007; Gill, Kamath, & Gill, 2012; Kang, Cho, & Lee, 2011; Kang, Lee, & Lee, 2014; Kim *et al.*, 2014; Putzer & Park, 2010). Publications concurrently describe the smartphone as an enterprise- or prosumer-focused device that incorporates an operating system capable of enterprise applications such as mobile e-mail, Personal Information Management (PIM) synchronisation, security and device management features (Beurer-Zuellig & Meckel, 2008); suggesting they are potential business resources.

Cumulatively, the technical-oriented definitions indicate that smartphones differ not only from static Information Technology (IT) but also from the previous generation of telephony: mobile (feature) phones (Calvosa, 2015; Y. M. Kang *et al.*, 2011, 2014). Beyond being mobile, smartphones can multi-task as they run advanced mobile operating systems. Additionally, smartphones can run apps, and provide the user with the ability to personalise the device (Jung, 2014). The technical-centric approach to defining the smartphone as being mainly artefact/architecture-oriented accommodates a passivity towards the application and implications of the technology.

The socio-technicality viewpoint partially addresses this limitation about the implications of smartphone technology; thus, it is defined beyond mere technical architecture. For instance, Yang and Kim (2012) define smartphones as programmable phones that provide their users with advanced capabilities and features to enhance their daily work and personal lives, insinuating that smartphones are user-empowering information technology (IT) (Jung, 2014).

While this view embraces the implication of applying the technology, its shortcoming lies in its optimism. In other words, it downplays the less desirable consequences of usage, such as addiction (Ahn, Wijaya, & Esmero, 2014), distraction-related concerns (Gill *et al.*, 2012), and younger generation social disorders that affect broader society, such as phubbing and nomophobia (Anshari *et al.*, 2016), which have resulted from smartphone dependency. Phubbing is a term that refers to people snubbing others around them as they concentrate on their phones. Nomophobia is a common social phobia that may develop if an individual is obsessed with their smartphone and begins to show uncomfortable behaviour when faced with a situation where they have no access to their phone (Anshari *et al.*, 2016).

In agreement with Feenberg (2002) that 'a complete definition must show how the orientation toward reality characteristic of technology is combined with the realisation of technology in the social world' (p. 175), in the reviewed literature, Deloitte's (2017)

report on the 'state of the smart', presents the most robust description of the smartphone:

'... a multi-purpose device the likes of which has never existed before. It is a digital Swiss army knife with a set of tools that is millions of apps deep. It can be a powerful productivity tool, which can also goad users into obsessing over inbox size, rather than effective communication. It can be used to work when away from the office, and not to work while in it' (p. 8).

This approach to viewing the smartphone is a critical evaluation of the socio-technical perspective, as it accounts for technicality and both ends of the implication spectrum. The device can hence be a blessing or curse; research indeed shows that smartphone use involves numerous paradoxes (Bruzzi & Joia, 2015; Lipman, 2013). The consumerisation of IT shows the appeal of personal device use for work purposes. The descriptions of the smartphone above indicate both 'product' and 'resource' orientations of the technology within society.

Smartphone Use

In exploring the business use of smartphones, understanding smartphone use entailment is crucial, as it links back to 'system use', which IS scholars have understood traditionally as the frequency of using a system (DeLone & McLean, 2003; Venkatesh, Morris, Davis, & Davis, 2003). Indicative of the existing IS literature, the 'adoption' and 'use' of the smartphone are complementary research areas. The latter mainly concerns the post-adoption stage, wherein successful adoption has taken place as resistance is overcome (Choi & Yoo, 2015; M.-K. Kim, Chang, Wong, & Park, 2013). Concerning smartphone value, two distinct dimensions provide an explanation for values users derive and those they perceive, which influence adoption. Experiential values have been demonstrated to be the outcome of using smartphones, from the user standpoint (referred to as user values) (Bødker, Gimpel, & Hedman, 2009, 2014; Jung, 2014) – which can lead to broader life values (Park & Han, 2013).

However, studies have mainly focused on the general consumer standpoint and thus limit the extent to which they inform on the business usage (and associated value) of the smartphone. Aldhaban (2012) found that smartphone studies relating to business and marketing are lacking compared to those on adoption and software/security issues. The consumer-centric orientation of smartphone issues might be a reason for the relatively low interest from scholarship regarding the business use. Being personal devices, studying the typical use of the consumer would hardly reveal the resource dimension of smartphones; mundane usage makes up a significant amount of the average users' smartphone usage (Ahn *et al.*, 2014; Meeker & Wu, 2013). Employing the distinction of 'time-in' and 'time-out' usage, Bødker, Gimpel, and Hedman (2010; 2014) demonstrate how technology use evolves over time and provide theoretical explanation of this changeⁱ; they show how smartphones go from having 'representative meaning that was greater than functional value to being merited according to the ability to blend in with other activities' (p. 11).

Understanding the adoption of technologies is becoming crucial for researchers and practitioners, as identifying key factors helps to predict and explain users' attitude towards adopting or rejecting technology (Aldhaban, 2012; Davis, 1989; Venkatesh, 2000). However, as smartphones are well-diffused technologies, there is contention that research efforts shift to understanding its usage comprehensively – being personal technologies that users make meaning of, smartphone usage is assumed to be more comprehensive than previous generation mobile phones (Jung, 2014; Tossell, Kortum, Shepard, Rahmati, & Zhong, 2012). IS Scholars have detailed some factors that influence individuals' adoption of smartphones, albeit mainly from a consumer standpoint. Aldhaban (2012) proposes a taxonomy of smartphone adoption factors to identify and explain key factors influencing the adoption of smartphones. Each main factor has sub-factors that contribute to its influence on adoption (see Figure 1).

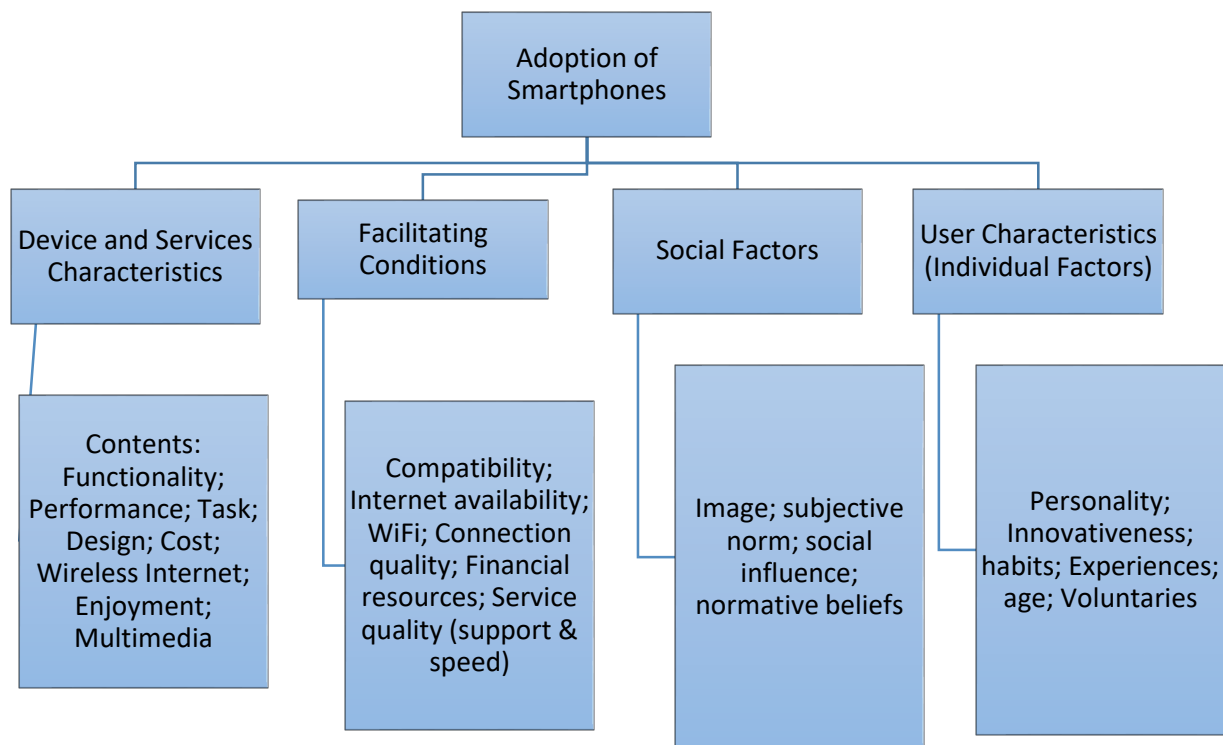


Figure 1: Taxonomy and critical factors of smartphone adoption (Adapted from Aldhaban, 2012)

In the existing literature, the adoption process suggests two perspectives of the adopter: a passive responder to technology or an active agent in the adoption process.

Smartphone Value: Perceived and Experiential

Smartphone use is indicated to be the result of adoption and results in values for the smartphone user – these can be both positive and negative. From an adoption

standpoint, the perceived values of the technology, which are judged by the potential adopter, influence the adoption or rejection of the technology. For instance, the Technology Acceptance Model (TAM), which is arguably the most influential IS theory, regards two key variables – perceived usefulness (PU) and perceived ease of use (PEOU) – as central to individuals’ decision to adopt a given technology (Davis, 1989; Li, 2010). The value-oriented approach challenges this, contending that the presumptions of the model consider the potential adopter a passive responder to technology, as opposed to an active agent in the adoption process (Bagozzi, 2007; Jung, 2014; Lamb & Kling, 2003). Consequently, studies have investigated the experiential values users pursue and achieve by using smartphones (Bødker *et al.*, 2009; Jung, 2014), as they are experiential computers.

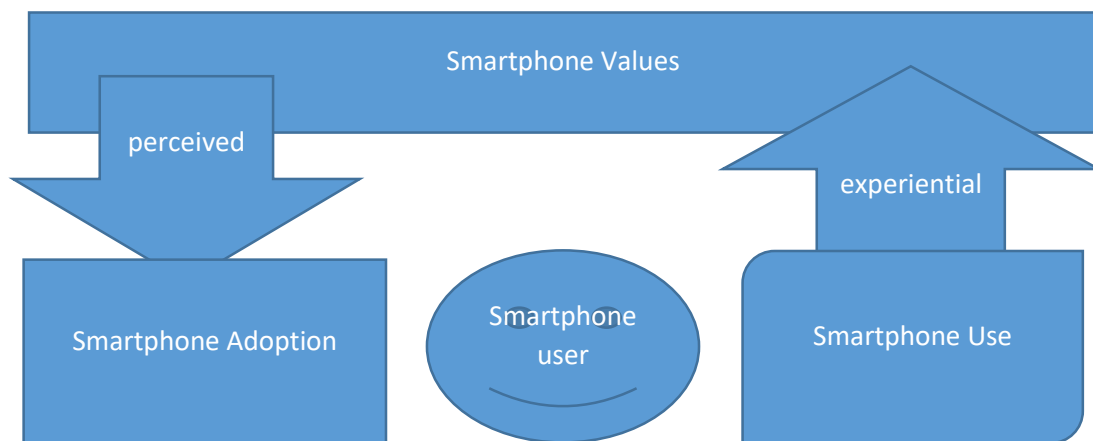


Figure 2: Smartphone use entailment: adoption, use, user and values relations of smartphones

The disparity between Consumer and Business perspectives

The notion of the smartphone user is crucial in the smartphone usage framework, as the user is the agent who adopts and uses, pursues and derives value from the technology. Segmenting technology users has provided insights into the nuances of technology value and has been a means of approaching smartphone adoption and usage studies. One means of segmenting considers the disparity between users and non-users of the technology. Alternatively, segmenting can be based solely on different kinds of smartphone users. Kang *et al.*'s (2014) study is an exemplar of the first route and reports that service-oriented functional attributes – ‘wireless Internet’ and ‘mobile applications’ – are consistent with the adoption of smartphones, regardless of user. However, mobile apps are more important to smartphone users, while the availability of the wireless Internet is more critical for feature phone users. Kim *et al.* (2013) examined the perceived risks and switching barriers on non-adopters’ intention to use smartphones, arguing that consumer perception of usefulness does not always translate into actual adoption. The study suggests that *perceived usefulness, financial risk and cost-effectiveness* generally influence the intention to use smartphones. Put differently, those who choose to avoid smartphones have

additional concerns about the non-attractiveness of other service providers (Kim *et al.*, 2013).

Based on the alternative segmenting approach, Canio *et al.* (2016) segment smartphone consumers using activities they perform on personal mobile devices; identifying users regarding *demographics, smartphone owned, hours of usage, and reason to use*. Five main profiles of users emerge from their study: *utility users, gamers, unfriendly users, moderator users, and supersmartphoner*s. Using similar segmenting tactics, Arbore *et al.* (2014) focused on multifaceted motives for adopting personal technologies, providing an analysis of the drivers of overall perceptions and the role of individual differences among potential users in forming these attitudes. The research identifies three smartphone user types: *pragmatic segment* – driven by expected functional value; *symbolic segment* – driven mainly by symbolic value; and *IT worried* – which represents individuals concerned with the hedonic value of technology. Their study result indicates that *value drivers, control beliefs, and normative beliefs* play different roles in determining smartphone acceptance depending on three individual characteristics: *playfulness, public self-consciousness, and innovativeness*. An earlier study on the impact of personality traits on smartphone ownership and used by Lane and Manner (2011), applied logistic regression and hierarchical linear regression to analyse results from 312 participants. The study found that extraverted individuals were more likely to own a smartphone and reported greater importance for the texting function of the device.

Cumulatively, these studies provide insights into smartphone use, as they demonstrate nuances of 'collective' usage. They also present a shift from what makes users adopt the technology, to what ownership usage reflects. However, while smartphone studies have providing insights about smartphone users, they mainly centre on the archetypical consumer, who might consider smartphones as mainly a product.

From a business perspective, existing IS literature indicates two broad categorisations of smartphone users; within these categorisations, some delineations exist. Broadly, smartphone business users include organisational and non-organisational users. Organisational users include individuals such as employees who work within a firm; these could be mobile or non-mobile workers (e.g. Bao, Pierce, Whittaker, & Zhai, 2011; Beurer-Zuellig & Meckel, 2008). The consumerisation of IT has made studying such users paramount.

Non-organisational users include business actors like micro-business administrators, proprietors, entrepreneurs and knowledge workers. These business actors use smartphones for work but do not function within an organisational setting; rather, the business in this context operates within a dynamic 'service system' (Maglio & Spohrer, 2007). Between the two broad categorisations of business users, nuances exist in their adoption and usage of smartphones for business. For one, the organisational user is mainly an acceptor of technology, i.e. passive in the adoption process. Mostly these users have their smartphones handed down by the employer. Where such is not the case, there are still organisational boundaries that limit the usage of smartphone for such users, such as IT policies that limit how, when and where these users utilise

these devices for work. Additionally, device affordances and environmental context can serve as constraints to business use of smartphones (Bao *et al.*, 2011).

Managerial implications

The 'use' construct links back to the notion of system use, which has traditionally been assessed based on the frequency of using a technological system within the organisational context. Venkatesh, Morris, Davis, and Davis (2003) define 'system use' as the frequency, duration, and intensity of an employee's interactions with a particular system. This viewpoint considers use regarding an acceptor, within an adopting organisation. Moreover, scholars have critiqued the construct of 'use' as being too simplistic and needing further development to include both the 'extent' (i.e. used features) and 'nature' (mechanism of used features) (Bødker *et al.*, 2009; DeLone & McLean, 2003). Smartphone use is assumed to be more comprehensive than the previous generation static IT (Jung, 2014; Tossell *et al.*, 2012). The descriptions of the smartphone suggest dual perspectives of 'product' and 'resource'. While they are platforms for consuming services, they equally are platforms for rendering service. The resource dimension is evident in one such practitioner view of the smartphone:

'A smartphone is a mobile communications device that uses an identifiable open OS ... Third-party applications can be installed and removed, and they can be created for the device's OS and application programming interfaces (APIs) ... The OS must support a multitasking environment and user interface that can handle multiple applications simultaneously ...' (Gartner, 2018).

Such portrayal of a smartphone, significantly based on its technicality, suggests that the multi-tasking ability and availability of apps are critical for smartphone use. However, the transformational abilities of mobile applications are not comprehensive enough (Pratap & Srivastava, 2013). While apps are becoming strategic and marketing tools for companies, individuals' usage suggests a mainly regular use for activities such as media consumption, browsing and social networking.

Following the dual perspectives of smartphones, business use mainly reflects the resource dimension. However, this dimension is understood mainly in organisational terms. IT business value, particularly concerning m-business usage of IT and research concerning the consumerisation of IT and concurrent trend of BYOD (Bring Your Own Device) enrich this use dimension. Smartphone use from a business perspective indicates various values including collaboration, efficiency, cost reductions and productivity gains (Bao, Pierce, Whittaker, & Zhai, 2011).

In this context, Beurer-Zuellig and Meckel's (2008) is a seminal study on the resource usage of smartphones to meet the need of workforce mobilisation. The study elicits the influence of e-mail on work processes and communication amongst sixteen German companies and finds that smartphones have the potential to improve and accelerate work processes through timely provision of information, enhanced reachability and the simplification of coordination processes. In an organisational

context as well, Chen, Yen, and Chen (2009) provide empirical evidence on the possible influences of attitude towards smartphone use, including organisational culture, policy and the external environment. Context is shown to be impactful on smartphone use in different ways (Chow & Ma, 2017; Müller, Gove, Webb, & Cheang, 2015; Tri Do, Blom, & Gatica-Perez, 2011).

Within the organisational setting, nuances exist when juxtaposing mobile and non-mobile workers' use of smartphones. Bao, Pierce, Whittaker, and Zhai's (2011) study provides a snapshot of smartphone use which helps explain why even highly capable phones are not yet substitutable for computers, concerning non-mobile workers. Implicitly, the scholars' conclusions bolster the 'conditional value' of smartphones (cf. Bødker *et al.*, 2009; Ofcom, 2016). When compared to other mobile devices, usage of the smartphone is demonstrated to be more varied than tablets. Therefore, it is increasingly important to investigate how smartphone usage unfolds concerning different types of context. The disparity of mobile device use is unique in different contexts, hence the need for different design solutions (Müller *et al.*, 2015).

Generally, the outcomes of using IT have been traditionally examined through approaches limited mainly to the context of system use itself (e.g. system satisfaction, usage intention, and intention to return) (Jung, Pawlowski, & Kim, 2017). This study differentiates from previous studies in the way it approaches context, i.e. it is sensitive to the context in which the system is used, not solely the context of system use itself. While we know that people pursue goals with smartphones (Jung, 2014), it is unclear how the smartphone facilitates the business goals of individuals and the challenges associated with the materialisation. Moreover, user values of the smartphone (Bødker *et al.*, 2009; Jung, 2014) alone do not fully explain the impact and potential business value of the technology.

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Key terms and definitions

Smartphone: A product-service system used by individuals for service consuming and service rendering purposes.

Product (use): An experiential good manufactured to meet market needs. Hence smartphone as a product reflects a category which encompasses an ecosystem of manufacturers, app developers, suppliers and users. From a service reference point, product-use emphasises the consumption of services on smartphones.

Resource (use): Assets that possess unique capabilities, hence can be employed to reach individuals' goals. From a service perspective, resource-use hence emphasises the smartphone as a service rendering device; a crucial aspect of work, and user empowering technologies.

Business Actor: Individuals who actively carry out business administration functions with the aid of personally owned mobile devices.

Digital daters: Individuals (mainly business actors) who own and use more than one personal mobile computer for varying purposes.

Consumerisation of IT: A multi-faceted term that indicates the adoption of consumer devices and applications in the workforce; defined based on stakeholders' perspectives. From an employees' perspective, it captures individuals' usage and familiarity with devices and applications in personal life that are useful when applied to individuals' jobs. From the perspective of an organisation's IT department, it defines a plethora of devices and applications used within the corporate firewall that may not be part of a sanctioned list; hence may be viewed as either opportunity or threat. The market perspective defines it as every device and application that originates in the consumer market and that at least originally was not targeted to be used in addition to, or in lieu of, enterprise IT (see Harris, Ives, & Junglas, 2012).