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CLOUD COMPUTING ADOPTION: BRAND EQUITY IMPACT ON USERS' CHOICE

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Abstract

Cloud computing is becoming a strategic choice for organizations and individuals offering great facilitations for startup organizations with cost reduction and flexible and handy scalability. But with the many advantages associated with the adoption of cloud computing, the environment suffers from many risks like: security, privacy, trust issues, and lack of standards. Still some large venders are emerging with many concerns in relation to data residing on others' servers. This paper will explore the cloud computing environment, its risks, and the factors influencing its adoption. Finally, a proposed framework is depicted and empirically tested to estimate the associations between intentions to use cloud computing and the following factors: security, privacy, prior online experience, vender's brand reputation, trust in the brand name, and brand equity. Results indicated a significant prediction of trust in the brand by experience and brand reputation. Also, trust significantly predicted brand equity, and brand equity significantly predicted intention to use the cloud service. Results and conclusions are discussed at the end of paper.

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Introduction

In the so called digital age, experts predicted the end of brand management all together; these predictions are far from being accurate. Not only brand management still exists, but so many digital brands have risen. Some companies even created great brand equity such as yahoo, Facebook and Google that put them ahead of a number of the most established traditional off-line brands.

Despite the claims that Internet can erode brand power due to many emergent business models like name your price, and price comparison sites, or simply the accessibility of vendors online, brand equity continues to impact users behavior, purchasing decisions, and adoption intentions [42].

In the past, IT was considered an organizational asset; like money, time and labor. Today, things are changing. The financial crisis left companies with less money that they went to utilize an IT infrastructure through outsourcing. Businesses no longer need to acquire, and maintain an IT infrastructure. Businesses can benefit from the concept of cloud computing [39].

Despite its great potential, cloud computing faces significant issues; the mere idea of entrusting your data to another company sounds dangerous to many people [32]. Ignoring the high risks embedded within this path seem unrealistic [14]. Security challenges, and the ability to sustain an acceptable level of data integrity and privacy as data storage is outsourced, are few of many challenges that face this emerging technology [29].

With the continuous growth in cloud computing, which will become a 19.5B business by the year 2016 [10], many brand names in the technology sector are competing for a higher market share [36]. Such issue makes it extremely necessary to study the aspects that make a user choose one vendor over the other, and how much of their choice depended on the venders brand equity.

Information based industries, such as cloud computing technology, are the most affected by the digital revolution. The Internet is not just another channel, it's the only channel. Such industry is dependent on the first impression they make on a user, and the way they greet a returning customer are all critical factors for the survival in the information industry. The online branding game is on and they have to win [43]. This paper will explore the literature related to cloud computing and the influence of brand equity on the intention to use cloud computing. The factors influencing brand equity will be explored. An empirical test will be conducted to estimate the research model. Finally, conclusions and future work will be depicted.

Literature Review

Introduction to Cloud Computing

Cloud computing is commonly used by various users as they can easily connect using web service or web browsers. CC is characterized by its dynamic infrastructures, global access, massive scalability, fine grain pricing, standard platforms, and management services. Cloud computing is defined as *"an information technology-based business model, provided as a service over the Internet, where both hardware and software computing services are delivered on-demand to customers in a self-service fashion, independent of device and location within high levels of quality, in a dynamically scalable, rapidly provisioned, shared and virtualized way and with minimal service provider interaction"* [25].

Other researchers defined cloud computing as a convenient model that allows for ubiquitous, on-demand network access to a sharable pool of computing resources (e.g., networks, servers, storage, applications, and services) that can be easily used with minimal management effort or vendors interaction [28]. It's a term used to refer to accessing resources (software applications, storage, and processing power) over the Internet, it has helped businesses to improve capabilities and add capacity without the need to install new software, train employees to use it, and worry about its maintenance [23].

There are four service models for cloud computing [50] [21] [26] [22]:

1. *Software as a Service (SaaS):* which offers an application as a service on Interne; making collaborate access of software and data easier than ever, where organizations or individuals pay per use.
2. *Platform as a Service (PaaS):* Used by developers for developing new applications. Allow them to launching new application for minimal expenses.
3. *Infrastructure as a Service (IaaS):* Providers Provide the features on demand utility, organizations pay fraction of the cost on the contrary to acquiring the infrastructure, small portions of cloud are provided for free (Sharon, 2012).
4. *Desktop as a service (DaaS):* Virtual Desktop Infrastructure where a third party can host desktop services, data storage, security and backup managed by service provider.

Another typology of cloud computing is distilled from the literature where four deployment models were proposed. The models depended on the status of organization and the cloud use [28][37] [46]:

- *Private cloud:* The cloud infrastructure is only dedicated to a single organization use or its business units, where the cloud is not open for public use. This type of cloud may be owned

by the organization itself or operated and managed by a third party.

- *Community cloud:* The cloud infrastructure is dedicated for the use of a specific community of consumers of a particular organization that have high security standards compliance considerations. Similar to the private cloud community, clouds can be managed and operated by the organization itself or a third party or somewhere in between.
- *Public cloud:* The cloud infrastructure is open for the use by the general public, business, and academic institutions. Also, organizations or governments may own, manage and operate this type of cloud, or some combination of the previous ones.
- *Hybrid cloud:* This cloud infrastructure is a combination of two or more distinct cloud infrastructures (private, community, or public).

The main characteristics of cloud computing are the following:

1) *scalability of infrastructure;* new capabilities can be added or dropped on need bases without the need to set up and modify infrastructure or set up new applications. 2) *Broad network access:* network availability and network access, with standard mechanisms through the heterogeneous platforms (e.g., mobile phones, laptops, and PDAs). 3) *Location independence:* clouds are location independent in some sense; there is practically no importance what so ever to the vendor's location. 4) *Reliability:* reliability is improved with the use of redundant sites, which makes cloud computing suitable for business continuity and disaster recovery. Finally, 5) *Economies and cost effectiveness:* Clouds regardless of the deployment model are much cheaper [50].

The previous review tried to explore the environment of cloud computing. The option of adopting cloud computing is not an easy one; it involves huge risks, but still provides substantial benefits and synergies. Fig.1 depicts a proposition by [38] that relates the type of business (institution) to the cloud computing deployment model. The framework is named Cloud Computing Business-Deployment Fit Model.

Type of Institution	Cloud Computing Deployment Model		
	Private	Hybrid	Public
Governmental Institutions	✓	✓	☒
Financial Institutions	✓	✓	☒
Small/Medium-Size Businesses	☒	✓	✓

Fig. 1: Cloud Computing Business-Deployment Fit Model

(Source: [38])

Based on the reviewed literature, it's safe to conclude that governmental institutions (with greater concerns as to where the service provider's jurisdiction) are most likely to create their own private cloud. Such option allows for better control, better security, and more reliance. An example case is the government of Japan which announced that by the year 2015 the country will have a private cloud that consolidates all governments IT systems, for better efficiency and less cost [12].

As for financial institutions, the idea of cloud computing seems to defy the principles on which theses institutions where founded. Due to the flexibility, high scalability and the low cost made possible by the cloud technology, banks and other financial institutions are easing their way to a new era of business. They are very much like governmental institutions and pretty much for the same reasons; financial institutions are most likely to adopt single tenant private cloud deployment model [15].

For better exploitation of this technology, both governmental and financial institutions may use public clouds for non-core activities in a hybrid cloud deployment model [12] [15].

While public clouds are less demanding in terms of cost (with using the pay as you go payment model), the freedom of service for businesses, and the management services offered by the service providers, make public clouds well suited for small and medium size businesses [33].

Online brand equity

The online environment has changed the branding game dramatically; a brand reputation in the online world has to be created, protected, and managed. Branding is one of the most important assets for any online vendor, if you are not searchable, if no one is talking about you, then you simply don't exist [19].

Users of information systems are most likely to experience some sort of anxiety as they chose

to store their information on a cloud. Such concerns may result from several risks associated with cloud computing, multi-tenancy [18][23] security and privacy [49][48]. These concerns are often referred to as perceived risk which is defined in literature as the nature and amount of concern the client may experience before making the decision to purchase a product or a service. Such concerns may result from inherited factors of the product itself, the place of purchase, mode of purchase, and product producer or service provider brand [11].

Brand equity is a source of reassurance for the customer in tangible goods, but it's equally important to the customer as he/she purchase an intangible service [8]. Given the fact that services provided through the Internet such as cloud computing services pose higher privacy and security threats to the user, increasing his/her perceived risk, and limiting their willingness to use those services, the desire to trust the vendor becomes even of greater importance.

Sources of trust in online brands

The literature is full of work related to trust in online services and brands. Research indicated a significant correlation between trust the intention to use a service or buy a brand in Jordan [3][4]. The following are the major factors influencing such level of trust.

Security and privacy: the more the user feels confident that his information is safe, the higher he trusts the website [6]. Users often look for clear privacy policies, because when the user find it easier to disclose personal information, that he wouldn't have disclosed otherwise [30] and therefore seen as a competitive advantage [6]

Word of the mouth: word of the mouth has repeatedly proven to be a powerful marketing tool. For a potential user to hear a good word on a vendor, would decrease the perceived risk and result in a higher level of trust, which in turn leads to higher intention to use or buy the brand [6] Word of the mouth often given in a form of advice is a major source of trust [7] this is usually due to the fact that users often trust their acquaintances more than they trust advertizing campaigns, it should be noted though that customers feel inclined to share their negative experience with other (negative word of mouth). So it is crucial that vendors try to meet customers' demands, listen attentively to their complaints and try to resolve them [30].

Vendor's reputation: vender's reputation is defined as the common perception of the brand held by most customers [30]. Better brand reputation means more online trust [16] [44] [6]. There for it isn't only important to build a good reputation online, but also to maintain such reputation, otherwise the vendor will end up losing customers [30]. Online experience: a good online experience has the power of further strengthening brand trust [6] , some of the most influential ways to improve users experience are using simple easy to understand

language, building a functional responsive site [44].

The Research Model and Hypotheses

In this study, our focus revolves around brand equity, which is a major factor in determining the intention to use a brand or buy from it. Our previous review and the understanding of the interactions of the previously mentioned constructs reflect a research model that is depicted in Fig .2. The major research questions to be answered in this work are the following:

RQ1: What are the factors influencing brand equity

RQ2: How far does brand equity shape customers intention to use the cloud.

Directly linked to the concept of perceived risk is trust; more trust in a particular brand has the power of decreasing the concerns consumers may experience regarding security or privacy [13] [34] [45]. More trust in a brand name is even more important than computer mediated environment and it has a great importance in creating brand equity [42]. When users and organizations work with cloud computing, security and privacy become important as data and information will reside on another party's server [48]. The privacy, security and trust association is of great value to the vendor, it's the reasons customer will accept the perceived risk and purchase the offered service,[27]. Privacy and security are important predictors of trust; they are explored much in research related to the services offered via the Internet. Users tend to favor vendors who guarantee their information security [9] as well as those who address their privacy concerns [17]. In a large scale study on the role of online trust in different websites, it was concluded that privacy and security are always relevant, and are of higher relevance when the risk of information preach are high [7] as any preach has the power to erode brand trust [43].

Based on the previous discussion, and taking into consideration the importance of privacy and security, the following hypotheses are stated:

H1: Information security is positively related to trust in the cloud

H2: information privacy is positively related to trust in the cloud

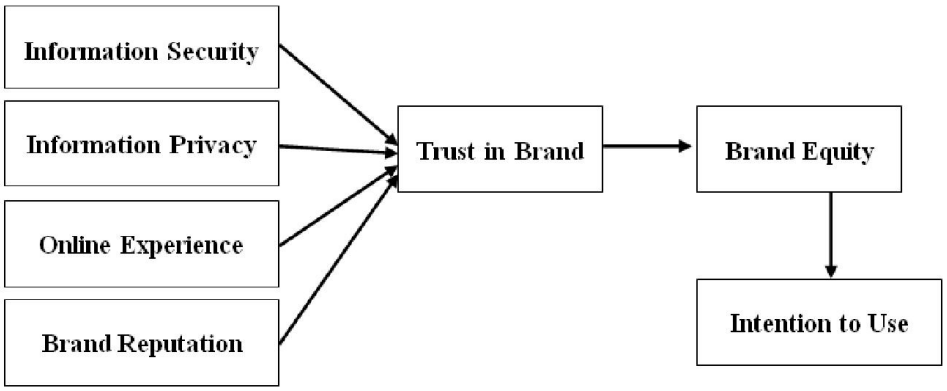

Fig. 2: The proposed research model

Any firm gains its reputation through the quality of the goods/services it offers and mainly customers prior experience and its credibility [40]. Brand reputation is also important in the online ever dynamic environment. Brand reputation is highly associated with trust [13] it is even suggested that vendor's reputation is more important to the customer than the value expected form the purchase itself [45]. Repeatedly by several studies, online experience also has significantly influenced trust in the brand [17] [44] [6]. Former experience with the vendor is a significant source of brand trust and a predictor of future use [30].

Based on that, the following hypotheses, related to customer's experience and vender's reputation, are stated:

H3: Customers' online experience is positively related to trust in the cloud

H4: Brand reputation is positively related to trust in the cloud

Trust has been seen as a driver of brand equity, a crucial factor in online environment [1] [5] [42], especially in the information based service environment that is highly associated with technological innovation where good branding is key to holding the customer attention[31]. Reestablished brand familiarity may decrease the perceived risk and thus improve the chances of adoption [32]. Some even suggest that the whole idea of brand equity is a surrogate for trust [20]

H5: Trust in the cloud is positively related to brand equity

Presumably, and based on [11] definition, brand name has an impact on our buying choices, where brand equity (brand awareness & brand meaning) impcats consumers behavior [8]. Also, since there is a greater inherited risk associated with cloud computing that gives even a greater weight to the brand equity, we propose the final hypothesis:

H6: Brand equity will positively influence the intention to use the cloud.

Data Analysis and Discussion

To test the research model and the hypotheses, we tried to target more professional

respondents through an online posted survey. The survey was posted on Google website and the link was sent to few e-mail lists and posted on a Facebook page. The survey items used were extracted from previous research and as shown in Appendix A at the end of paper. The model utilized 3 items for measuring information security, 3 items for information privacy, 3 items for brand reputation, 5 items for previous online experience, 4 items for trust in the brand, 3 items for brand equity, and 5 items for intention to use cloud computing (ITU). One of the items was deleted for redundant statement posted on the web (item 16). The sample reached in 48 hours 120, where we started analyzing the data. The demographics of sample are shown in Table 1.

It is obvious that the majority of sample holds a bachelor degree, and within the 20-40 years of age. Females are more than males, and missing values is not an issue.

To test the research hypotheses a structural equation modeling (SEM) analysis utilizing SmartPLS software and algorithms was conducted. A partial least squares SEM (PLS-SEM) does not assume normality but relies on a nonparametric bootstrap procedure to test the model.

In this procedure many smaller subsamples are drawn from the study sample and tested to reach the best model fit. The SmartPLS tool is free for academic purposes and calculates easily the item loadings and the correlations (path coefficients for the whole model are depicted). The results of the model estimation are shown in Fig. 3.

Table 1: Sample demographics

Gender	Count	%
Male	42	35.0%
Female	77	64.2%
Not reported	1	0.8%
Total	120	100%
Age	Count	%
Less than 20 years	6	5%
21-40 years	93	77.5%
41-60 years	19	15.8%
More than 60 years	0	0%
Not reported	2	1.7%
Total	120	100%
Education	Count	%
High School or less	11	0.2%
Bachelor	63	52.5%
Master/PhD	41	34.2%
Other	4	3.3%
Not reported	1	0.8%
Total	120	100%

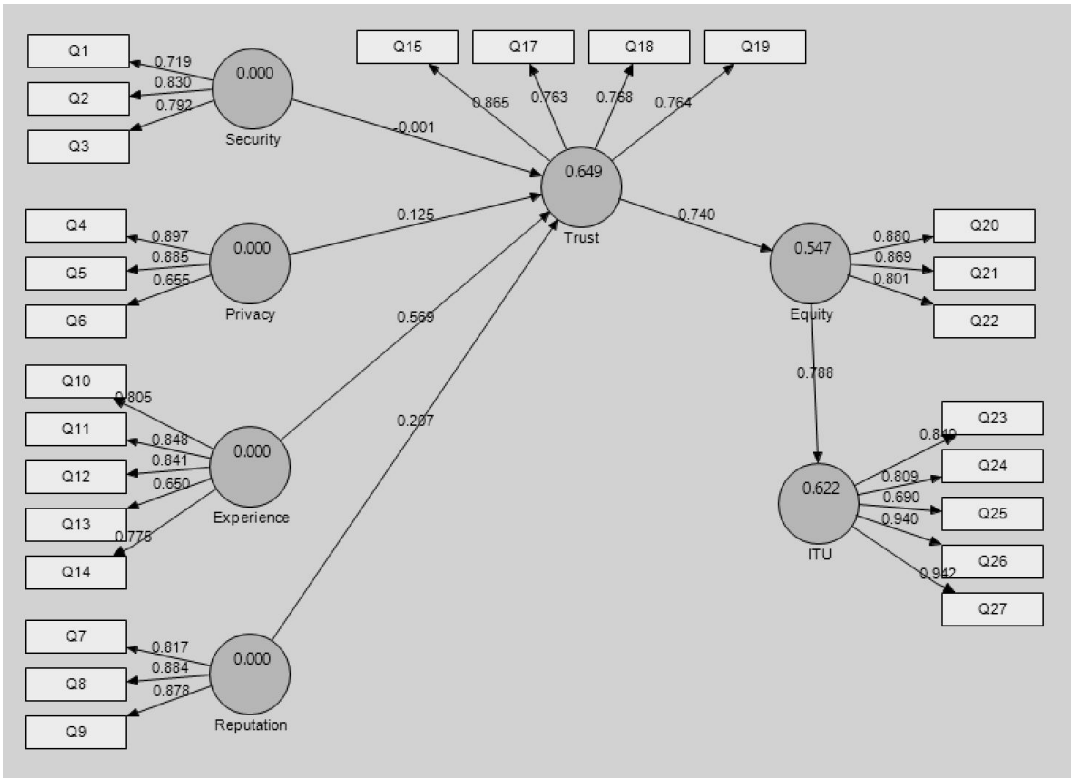

Fig. 3: The measurement model with path coefficients and factor loadings
The model is estimated using SmartPLS (Ringle et al., 2005)

The research model assumed a mediation effect of trust in brand and brand equity between the four independent variables and the ultimate dependent variable (ITU). Such issue is a test of the sequential building of influence of such domain, where we assume that security, privacy, experience and brand reputation all will have a significant influence on trusting a cloud computing website. Such argument will build into the brand equity and then users will use the service.

Results of the structural model indicated a good reliable set of measures (values on arrows between items and major variables. The values of loading are all above 0.6, which indicates an acceptable level in social sciences. The Second issue is the relationships between variables. Results indicated low values of beta between security/privacy and Trust. To make sure that the significance values are acceptable, a bootstrapping estimate is done, which is shown in Fig. 4.

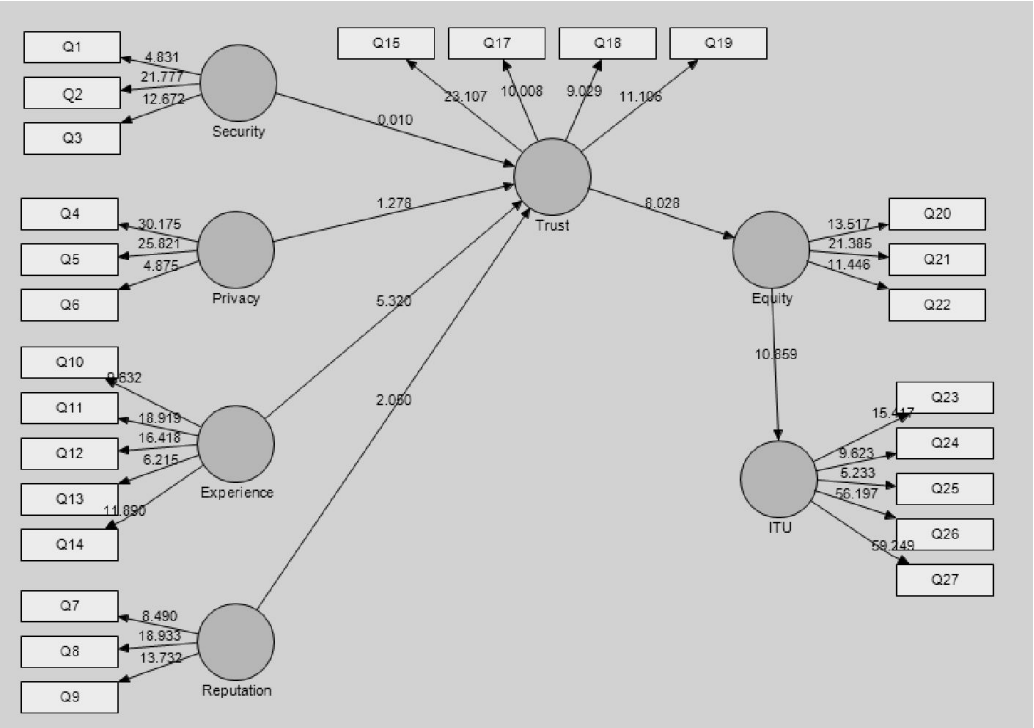

Fig. 4: The "t" values for all relaiosnhips
The model is estimated using SmartPLS (Ringle et al., 2005)

Results indicated that all loadings are significant at the 0.05 level (beta value above 1.96). Also, when we look at the loading on arrows between variables we can see that security and privacy are not significant predictors of trust. Only prior experience (beta = 0.569) and brand reputation (beta = 0.207) are significant predictors of trust and they explained trust with an R^2= 0.649. Such high value is a contribution of two new predictors of trust.

On the other hand, trust significantly predicted brand equity with an R^2 = 0.547, which equals the square of the beta value of 0.74. Also, on the same line, brand equity significantly predicted ITU cloud computing with an R^2 = 0.622 (again it is the square of 0.788). Our results indicates a full support of hypotheses H3-H6, but failed to support H1 & H2. The final research model resulting from this estimation is shown in Fig. 5.

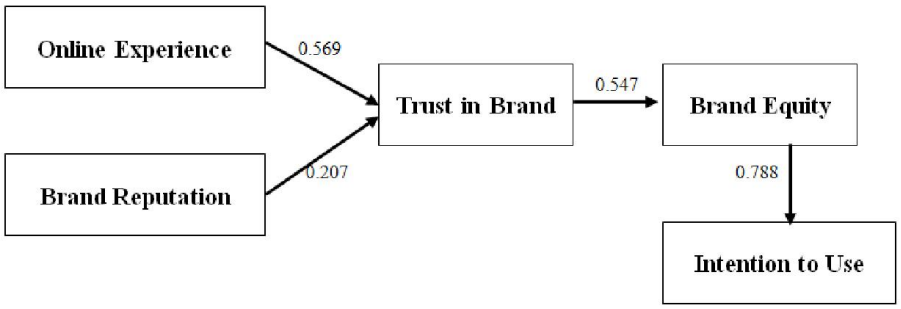

Fig. 4: The Final research model1 Fig. 4: The Final research model

Conclusions and Future Work

Cloud computing is emerging as a strategic choice for many organizations and for individuals, where many venders are offering Internet capacity to be used by users for free to save their data and information. It is still a concern for many to lose control over their data, where trust issues become vital. It is assumed that brand equity will be the ultimate definer of how people adopt certain cloud computing vender and if such factor (brand equity) will be influenced by the level of trust in the brand.

This paper tried to see if certain factors discussed in the literature are important in deciding on a brand and adopting it. Results of data analysis indicated that prior online experience and brand reputation are the major predictors of trust in a brand, while security and privacy failed to do so (total $R^2 = 0.649$). Also, trust in the brand significantly predicted brand equity (beta = 0.74, $R^2 = 0.547$) and brand equity significantly predicted intention to use cloud computing (beta = 0.788, $R^2 = 0.622$).

This study proposed 6 hypotheses and failed to support two of them. The inability to support H1and H2 can be attributed to the age of the sample used. 82.5% of our sample is younger than 40, and it has been shown repeatedly in literature that younger people have lower privacy and security concerns [24] [35]. Such issue calls for more research with larger sample and a test on age and other moderating factors.

This study suffered from the limitation of small sample, where users of cloud computing are still small compared to other IT applications. Also, the survey used is a new one and stated in Arabic language, where some respondents indicated that an English survey will do better when dealing with new technology. Based on that, future work should be emphasized to test the resulting model and see how security and privacy were not supported. Also, validating the new proposed instrument is essential when dealing with perceptional measures and subjective responses. Finally, brand equity showed a large explanation of variance in predicting the intentions to use cloud

computing, where more research is needed to see if other factors can influence such decision.

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Appendix A

Privacy & Security:	References used
I intend to checked check the security item before I sign up on a drive	Ruparelia, White, & Hughes (2012) Alam & Yasin (2010) Bart, Shankar, Sultan, & Urban (2005)
I feel secure when I provide personal information on a drive	
The CC site I use is protected against hacking	
I feel that my privacy is protected when I use a drive	
I am confident that my personal information will not be shared with other organizations when I use a drive	
I intend to read the privacy policy Before I signed up for a drive The drive privacy policy is easy to read and understand	
Brand reputation	References used
I think the drive I use has a good reputation	(Alam & Yasin, 2010) (Morgan-Thomas & Veloutsou, 2013)
The think that it one of the leading cloud vendors	
I think that the drive I use offers high quality services	
Users' experience	References used
My previous use of Google drive was satisfying	Alam & Yasin (2010) Christodoulides, Chernatonya, Furrerb, Shiua, & Abimbolac (2006) Morgan-Thomas & Veloutsou (2013)
My previous use of Google drive was exiting	
The layout of the drive page is appealing	
The Google drive page can be personalized	
I find that Google drive is easy to use	
Brand trust	References used
I trust the drive I use and its services	Ha (2004) Alam & Yasin (2010) Ruparelia, White, & Hughes (2012)
I feel comfortable using their services	
I prefer that using this drive than using any other cloud vendor	
The drive I use keeps its promises	
My interest is a priority for the	

drive vender I use	
Brand equity	References used
I think that the drive I use is reliable	Ha (2004) Rios & Riquelme (2010)
I think that the drive I use is dependable	
I believe that the drive I use offers valuable services	
Intention to use	References used
On the basis of this description, I would continue using this drive	Abu-Shanab & Pearson (2007)
I would tell interested friends to use of this drive	
I will strongly recommend it to others	
I expect that I will use this drive in the future	
I plan to use this drive in the future	