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WhatsApp! Does Culture Matter to Persuasive System Design and Brand Loyalty?

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Abstract: The traditional paradigm prioritizes local culture in application design; however, popular applications with persuasive systems design (PSD) like WhatsApp appeal to a global audience beyond local cultural attributes. The purpose of this study is to test the moderating role of Hofstede's cultural dimensions on PSD and the relationship to loyalty in the context of WhatsApp. By employing an online survey, data were collected from the Netherlands, Germany, KSA, and Malaysia (N = 488). Using regression moderation analyses, the hypotheses were tested. Findings suggest that only two cultural dimensions, namely power distance and individualism, have a moderating role: power distance in Germany, and individualism in both KSA and Malaysia. This implies that managers must consider the possible influence of some cultural dimensions on loyalty. The study contributes to the literature by focusing on smartphone apps in countries with varying cross-cultural dimensions scores and utilizing the user's perspective instead of the designer's perspective.

Keywords: cross-cultural dimensions; loyalty; persuasive system design; smartphone applications; WhatsApp



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1. Introduction

As the smartphone app market is becoming more crowded, the study of consumer loyalty to apps is becoming more attractive to both business managers and academics. As of November 2020, there were 2.87 million apps available for Android users from Google Play and 1.96 million apps available for Apple smartphone users from Apple's App Store [1]. The advent of smartphones has proved that computers are designed to perform tasks beyond storing and processing data [2]. Recent studies observed that smartphones are mostly designed to influence human behavior and attitudes through applications (apps) that include social media, marketing, financial, and knowledge management services [3,4]. As a result, fierce competition among app developers emerged. Consequently, loyalty is a critical issue for designers and developers. Many available smartphone applications are either not downloaded or never used. Research indicates that only one-fifth of the available apps go beyond 1000 downloads, as 25% of those downloaded applications are ignored [4]. Therefore, convincing customers around the globe to accept and be loyal to smartphone apps is a paramount concern for the software industry.

Persuasive technology can significantly influence individual's behavior leading to the adoption of apps. A review of 72 studies on users' feedback showed positive results that technologies generate lasting behavioral change [5]. In healthcare, for example, persuasive technology has proven effective for encouraging the adoption of healthy behavior. Furthermore, the utilization of health technologies to guide the attitudes of patients can be positively influenced by an individual's self-efficacy perceptions [6].

On the other hand, cultural values may limit the globalization effect of social network systems (SNS). Some research explored the influence of culture on the relationship between persuasive technology, customer acceptance, and loyalty; for example, in 2015, Hoehle et al. created a model based on Hofstede's dimensions for exploring the relationship between SNS usability and loyalty behavior. The study concluded that it is not the national culture, but the attached cultural values that strongly impact that relationship [4]. In addition, Reinecke and Bernstein [7] also concluded that the culturally targeted acceptance of a website would be increased by factors such as localization of the user interface colors, messages, and hierarchy of functions.

Previous studies have concentrated on designing computer systems to be 'culturally correct'. Yet, such a perspective is no longer possible in a world where the rapid evolution of the digital age is impacting cultural trends [8]. Gaps between different cultures are narrowing, as seen in the case of the locally developed Mixi and the global platform Facebook in Japan. The once-dominant Mixi was supplanted by Facebook in 2014 [8,9]. The observation of such a shift from local to global SNS motivated this research.

Previous studies have limited their efforts to culture-based influences on adoption behavior as well as the persuasion of desktop applications. Contrary to previous studies, this study investigates the reasons for the worldwide achievement of some smartphone applications despite the exclusion of local cultures in the design process. Fogg [10,11] and Oinas-Kukkonen and Harjuma [12] established systematic guidelines to design persuasive systems; however, previous studies that empirically test their design are still lacking. Moreover, their research does not account for users' perspectives. As a result, this research fills a gap by investigating how Hofstede's cultural dimensions influence the persuasive system design (PSD) and user loyalty relationship, in the context of WhatsApp Messenger across four different countries: (1) The Netherlands, (2) Germany, (3) the Kingdom of Saudi Arabia (KSA), and (4) Malaysia.

Few studies have explored the effectiveness of PSD on loyalty within the national cultural context of countries. Consequently, this study aims to investigate whether the effect of PSD on loyalty is moderated by Hofstede's national cultural dimensions: power distance, individualism, masculinity, uncertainty avoidance, long-term orientation, and indulgence [13].

The practical relevance of filling such a research gap is essential. Understanding the moderating influence of national cultural dimensions on the relationship between PSD and loyalty is significant to limit this culture gap. In other words, revealing which cultural dimension/s may maximize or limit the effectiveness of PSD on brand loyalty is essential for marketing and system design managers to limit this culture gap.

The findings of this study will contribute towards the progression of mobile application development by incorporating relevant cultural dimensions. This can increase the efficiency and intention of apps, while decreasing the cost and time to market.

2. WhatsApp Context

WhatsApp is one of the most popular instant messaging apps for smartphones that transfer text, image, and video messages through the internet [14]. Worldwide, the monthly active users of WhatsApp have doubled within four years from 1 billion in February 2016 to 2 billion in March 2020 [14].

Figure 1 gives information on the popularity of WhatsApp in 2017 in The Netherlands, Germany, KSA, and Malaysia. Overall, 74% of the population aged above 15 years were active users of WhatsApp in the Netherlands, 73% in KSA, 68% in Malaysia, and 65% in Germany [15,16].

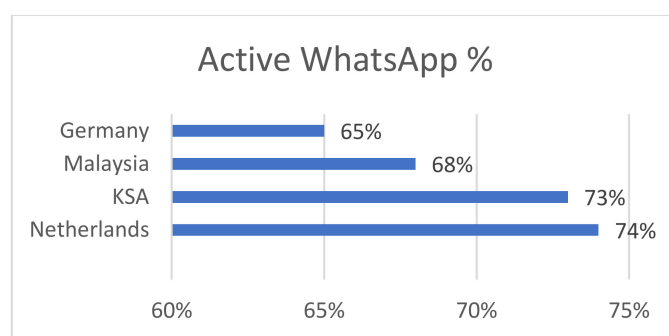


Figure 1. Active WhatsApp users in 2017—aged above 15 years old (Source: Statista, 2020).

Millennials make up the biggest number of WhatsApp users. In total, 54% of millennials use WhatsApp daily in comparison to 36% of baby boomers. Among older generations, WhatsApp is still not popular [17].

3. Theoretical Framework

3.1. Culture

Hofstede argues that our mental models indicate patterns of thought and behavior throughout our lifetimes. In his book *Cultures and organizations: Software of the mind*, Gert Hofstede defines culture as a “collective programming of the mind which distinguishes the members of one human group from another” with culture represented in layers such as symbols, rituals, heroes, and values [18]. After a survey of 50 cultures worldwide, he devised an organizational culture approach and created a cross-cultural model that includes four dimensions: power distance, individualism vs. collectivism, masculinity vs. femininity, and uncertainty avoidance. The model is used to gauge the attributes of a national culture. Two other dimensions, long-term vs. short-term orientation and indulgence vs. restraint, were later added to that model.

Power distance (PD) measures how less powerful individuals accept an unequal power distribution in their society. In high PD cultures, individuals tend to naturally accept hierarchical order and authority, while individuals in low PD cultures are inclined towards equal power distribution within their environment [19].

Individualism (IDV) vs. collectivism, is a measure indicating the strength of people’s ties to others that are not part of their family. Usually, countries in the ‘Western’ world are considered individualistic, while the ‘Eastern’ world exhibits collectivistic behavior in which individuals are under the influence of the groups that they belong to [20].

Masculinity (MAS) vs. femininity, represents “the degree to which gender inequalities are espoused by an individual” [21]. In countries with masculine values (e.g., Japan, Germany, and Switzerland), people often concentrate on material accomplishment, success, and competitiveness. In countries that espouse feminine values (e.g., Sweden, Norway, and Denmark), people value cooperation, a friendly atmosphere, modesty, and a better quality of life.

Uncertainty avoidance (UA) reflects “the extent to which people feel threatened by uncertainty and ambiguity and try to avoid these situations” [22]. Individuals from cultures with a high score of uncertainty avoidance (e.g., Japan and Greece) need more security and try to minimize uncertain situations in their lives.

Long-term vs. short-term orientation (LTO) describes the difference between societies with a long-term and short-term focus on future rewards. Long-term societies such as China, Japan, and Taiwan nourish values that provide future rewards, such as saving and persistence [23]. On the contrary, short-term societies such as the Philippines nourish personal stability and respect for tradition, and emphasize the present and past [24].

Indulgence (IND) vs. restraint refers to the cultural tendency between leisure/freedom and duty. Leisure and freedom are essential elements of indulgent societies like the U.S.A,

while low leisure and more duty are the dominant issues of restrained societies like India and China [25].

As social networking technology forms its own culture, it is important to understand how app design can incorporate cultural characteristics. Table 1 shows the Hofstede scores of the four countries that are part of this study: The Netherlands, Germany, KSA, and Malaysia.

Hofstede's clear distinction between cultures, based on measurable dimension scores, provides a framework for a systematic analysis of the interrelation between app design and culture.

Table 1. Related Hofstede's cultural dimension scores (scale: 1 to 100).

Country	PD	IDV	MAS	UA	LTO	IND
Malaysia	100	26	50	36	41	57
The Netherlands	38	80	14	53	67	68
Germany	35	67	66	65	83	40
KSA	95	25	60	80	36	52

PD = power distance; IDV = individualism; MAS = masculinity; UA = uncertainty avoidance; LTO = long-term outcome; IND = indulgence.

3.2. Persuasive System Design (PSD)

Fogg (1999, p. 27) described persuasive technology as “a computing system, device, or application intentionally designed to change a person's attitudes or behavior in a predetermined way.” Computers can be tools to enhance decision making and self-efficacy as well as reshaping the governing values of individuals [26]. Fogg developed a road map for designing persuasive apps. This roadmap includes seven strategies (reduction, tunneling, tailoring, suggestion, self-monitoring, surveillance, and conditioning). Fogg derived the term ‘Captology’ from computers in referring to the scientific field that involves the inquiry, design, and study of computing devices. Later, Oinas-Kukkonen and Harjumaa extended Fogg's model to help software engineers design persuasive systems with well-defined principles [12]. Their model, called persuasive system design (PSD), also benefits from earlier theories on human interactions with technology.

Oinas-Kukkonen and Harjumaa (2009) considered three critical types of requirements for system design: functional, non-functional, and constraints. The functional requirement defines the system behavior. The non-functional states the system's quality features like usability, reliability, security, and interoperability. Constraints involves market contingencies and cultural effects. They further argue that what makes an app persuasive is the quality of a system, which is a non-functional requirement, and it must be well-defined [12]. The PSD model systematically outlines 28 principles that can be used as a whole or in part by designers. The principles belong to four groups: social support, dialog support, primary task support, and system credibility [12].

Social support allows individuals to build habits and learn to connect via an app. In other words, individuals prefer to start and keep using apps which are in use by peers in their social circle. Dialog support provides feedback in the form of praises, rewards, suggestions, and reminders. It defines the key principles for keeping customers active and motivated in using the system. Primary support helps users to achieve the primary goal of the app; it involves a group of techniques that help users focus on a task until it is successfully completed. System credibility promotes a sense of system reliability. If an app attains credibility, it also gains the ability to change behavior across technological devices [12]. Matthews et al. [27] found that all four categories of PSD principles decidedly present in persuasive apps with varying degrees of presence of the principles from each category. This implies that all the categories within the PSD model are relevant to persuasive design; therefore, this study considered the PSD as one independent variable to study the moderating effects of culture on its relationship with brand loyalty.

3.3. Loyalty

Scholars, as well as app managers, have been examining the factors that affect mobile app users' loyalty. Oliver (1999) described loyalty as a strong commitment to repurchase or frequently utilize services in the future. Later, with the proliferation of computing devices and the enhanced connectivity to the internet, the term e-loyalty was devised to describe consumers' desire to favor a specific digital device or a service conducted via electronic devices, and consequently, their recurrent purchasing actions [28,29].

Several studies were conducted to understand the core drivers of commitment to continue the use of mobile and desktop applications [30–32]. Mobile brand loyalty was found to be moderated positively by brand identification, as well as three values: emotional, social, and functional [33]. The most influential factor was the emotional value. However, the effects of gender and age seem to be insignificant in determining mobile brand loyalty [33]. Liébana-Cabanillas et al. [34] found that design aesthetics and personalization influence and moderate the brand loyalty due to consumers' beliefs that higher quality means more personalized mobile services.

Diverse cultures convey loyalty and satisfaction towards products and services via different means. Germans, for example, prefer to purchase mobile services from providers with a lower price and portable phone numbers, while French customers consider the cost of switching mobile services to be the most important factor. In the United States, corporate credibility and cost are the main drivers for consumer loyalty. Although switching cost is also a deterrent factor in Korea, service quality also plays an important role. Similarly, service quality is the most important factor for Turkish consumers as well [35]. A study by Bonanni and Cyr [36] compared consumer loyalty among four countries—the United States, Canada, Germany, and Japan—to conclude that legitimacy is a significant factor for individuals in all four countries. However, while German and Japanese consumers' greatest concern is online payment security, Canadian and American consumers are more comfortable when they are assured of the legitimacy of the online vendor [36]. Another study investigated the characteristics of mobile commerce loyalty in China and the United States. Those two countries have similar mobile infrastructures but different cultural profiles. The study concluded that the Chinese mobile services are similar to those in the United States in terms of ease of use, perceived value added, innovation, privacy, and functionality, but were different in terms of enjoyment, perceptions of cost, and subjective norms [37]. Another study in Southeast Asia compared the loyalty models in Thailand and Taiwan, which have different levels of education, income, and standards of living. Despite those differences, the study revealed similar predications of e-loyalty as related to service quality in e-commerce websites and customer satisfaction [38].

A comparative analysis of e-loyalty was conducted in Argentina and Spain [39]. The study used Hofstede's cross-cultural dimensions as the basis of its research. The findings indicated that e-service quality, satisfaction, and e-loyalty result in different outcomes. The effect of e-service quality on e-loyalty is greater for Argentina, a country classified as masculine, individualistic, and less pragmatic. However, satisfaction has more of an effect on e-loyalty in Spain, a country classified as collectivistic, feminine, and more pragmatic.

Overall, the literature showed the necessity to conduct further analysis of the moderating factors that impact loyalty in diverse cultures. This is now even more relevant to smartphones with the vast proliferation in the global market.

4. Hypotheses Development and the Conceptual Model

4.1. Power Distance, PSD, and Loyalty

In high power distance cultures, such as KSA and Malaysia, individuals endorse power inequality by accepting the value of authority, hierarchy, and social status. Leaders take final decisions through centralized decision making [20]. Younger members of society in high power distance cultures respect elders [40,41].

On the other hand, in lower power distance cultures, such as Germany and the Netherlands, individuals are inclined towards decentralized authority and are less concerned

with status. Decision making is more flexible and management structures are more decentralized [20].

While the research of Park et al. [42] shows a moderated effect of power distance on technology users' loyalty, Salehan et al. [43] indicated that technology drive is negatively affected by power distance. As a result, the research assumes that power distance (PD) moderates the relationship between persuasive system design (PSD) and user loyalty (UL), and the following hypotheses were formulated:

Hypotheses 1 (H1a). *PD moderates the relationship between PSD and UL in the Netherlands.*

Hypotheses 1 (H1b). *PD moderates the relationship between PSD and UL in Germany.*

Hypotheses 1 (H1c). *PD moderates the relationship between PSD and UL in KSA.*

Hypotheses 1 (H1d). *PD moderates the relationship between PSD and UL in Malaysia.*

4.2. Individualism, PSD, and Loyalty

In highly individualistic cultures, such as the Netherlands, individuals attend to their own needs as well as their families; however, they feel independent from the pressure of the larger whole. In other words, relations among people are loose in individualistic societies and speaking one's mind is a sign of honesty. They prioritized tasks over relations [20]. On the other hand, in low individualistic cultures, such as KSA and Malaysia, individuals are integrated into a strong and cohesive community that protects them in return for unquestioned loyalty. Individuals do not prefer direct confrontation among each other for developing and keeping good and peaceful relations [20]. This has implications for technology loyalty, since individuals with low individualism scores are open to social influence from peers and colleagues in selecting, purchasing, and adopting applications [44].

Very little literature was found to investigate the moderating role of individualism on PSD–loyalty relationship. Evidence exists that individualism significantly moderates the relationship between e-service quality and tourists' satisfaction with their e-purchase [45]. Park et al., 2017 also found a moderated effect of individualism on technology users' loyalty. Moreover, a previous study that compared mobile phone consumers in high individualistic cultures with consumers in collectivistic cultures found that they were having different levels of consciousness regarding quality, price, brand, and loyalty [46].

As a result, this research assumes that Individualism (IDV) moderates the relationship between persuasive system design (PSD) and user loyalty (UL):

Hypotheses 2 (H2a). *IDV moderates the relationship between PSD and UL in the Netherlands.*

Hypotheses 2 (H2b). *IDV moderates the relationship between PSD and UL in Germany.*

Hypotheses 2 (H2c). *IDV moderates the relationship between PSD and UL in KSA.*

Hypotheses 2 (H2d). *IDV moderates the relationship between PSD and UL in Malaysia.*

4.3. Masculinity, PSD, and Loyalty

According to Oyserman [47], the masculine view increases gender inequality through emotional and social role differentiation, while the feminine view supports gender equality. The masculine view underlines competition-based business environments that value assertive and ambitious attitudes, while the feminine view encourages modest and compassionate modes of conduct. Leslie [48] investigated the influence of culture on brand loyalty and supports that the masculinity vs. femininity dimension is a predictor of brand loyalty. Moreover, the adoption of technology is more likely to occur in countries with strong masculine cultural values, where people are more task-oriented, as opposed to strong feminine cultures, where individuals are more concerned with ease of use [21,49]. Montag et al., 2015 reported a moderated effect of the masculinity dimension on users' loyalty of a smartphone app. As a result, this study assumes that masculinity (MAS) moderates the relationship between persuasive system design (PSD) and user loyalty (UL).

Hypotheses 3 (H3a). *MAS moderates the relationship between PSD and UL in the Netherlands.*

Hypotheses 3 (H3b). *MAS moderates the relationship between PSD and UL in Germany.*

Hypotheses 3 (H3c). *MAS moderates the relationship between PSD and UL in KSA.*

Hypotheses 3 (H3d). *MAS moderates the relationship between PSD and UL in Malaysia.*

4.4. Uncertainty Avoidance, PSD, and Loyalty

Low uncertainty avoidance (UA) societies (e.g., Malaysia) get along with the uncertainty of the future by valuing practice over the future [50]. Therefore, they are more open to new experiences and developments. In contrast, high uncertainty avoidance societies (e.g., KSA) keep away from uncertainty, ambiguity, and stress by using rules, regulations, and orthodox behavior patterns for controlling the future, as described by Hofstede [51].

When using new technologies, people with high uncertainty avoidance (e.g., KSA) feel more comfortable with clear, simple instructions and minimal risk. On the other hand, societies with low uncertainty avoidance, like Malaysia, have a more relaxed attitude and take more risks in unknown circumstances [23]. Moreover, some studies have also argued that people in strong UA cultures prefer clear and simple website designs, while people in weak UA cultures can tolerate complex and hidden functions [52]. Finally, the study of Lam [53] has also found that people who scored high in individualism and uncertainty avoidance have greater proneness to brand loyalty. As a result, we assume that Uncertainty Avoidance could moderate the relationship between persuasive system design (PSD) and User loyalty (UL).

Hypotheses 4 (H4a). *UA moderates the relationship between PSD and UL in the Netherlands.*

Hypotheses 4 (H4b). *UA moderates the relationship between PSD and UL in Germany.*

Hypotheses 4 (H4c). *UA moderates the relationship between PSD and UL in KSA.*

Hypotheses 4 (H4d). *UA moderates the relationship between PSD and UL in Malaysia.*

4.5. Long-Term, PSD, and Loyalty

The long-term vs. short-term orientation (LTO) dimension explores a culture's stance between tradition and societal change. This dimension acknowledges the importance of some behavioral codes such as thriftiness, sense of shame, and perseverance which contribute to the development of the economy [24]. Hofstede and Bond (1988) assert two types of values: long-term (positive) and short-term (negative) values. The long-term valence encourages saving, persistence, and change. The short-term stance fosters stability and reverence for tradition that links the present with the past. This means that new ways of communicating and networking beyond the traditional means can have more support in long-term-oriented societies. Moreover, individuals in countries with high long-term scores (e.g., Germany and the Netherlands) perceive the world in flux so that preparation for the future is needed. In contrast, individuals in countries with short-term scores (e.g., KSA and Malaysia) emphasize the negative values and their traditions so that the past provides a moral compass for them. Chinese consumers, in comparison to Western consumers, tend to exhibit higher brand loyalty, because of their high uncertainty avoidance and long-term orientation that emphasizes continuity [54]. This leads to resistance to change and reduces the likelihood that customer loyalty will avoid the termination of valued relationships [54]. As a result, based on the literature, we can assume that long-term orientation (LTO) could moderate the relationship between persuasive system design (PSD) and user loyalty (UL).

Hypotheses 5 (H5a). *LTO moderates the relationship between PSD and UL in the Netherlands.*

Hypotheses 5 (H5b). *LTO moderates the relationship between PSD and UL in Germany.*

Hypotheses 5 (H5c). *LTO moderates the relationship between PSD and UL in KSA.*

Hypotheses 5 (H5d). *LTO moderates the relationship between PSD and UL in Malaysia.*

4.6. Indulgence, PSD, and Loyalty

Indulgence (IND) is the most recent dimension of Hofstede's cultural model, with insufficient research on it in comparison to the other five dimensions. Indulgence refers to societies where leisure is strongly emphasized. On the other hand, restrained societies are encouraged to sacrifice more effort and time on assigned tasks rather than personal leisure [25]. People with high leisure and freedom are likely to experience more happiness, in contrast to people with low leisure and high duty. Moreover, individuals are more likely to experience positive emotions in indulgent societies since they have a sense of control over their personal lives [25]. The opposite is likely to happen in restraint societies in which people can have a perception of helplessness. As a result, the research assumes that indulgence (IND) moderates the relationship between persuasive system design (PSD) and user loyalty (UL).

Hypotheses 6 (H6a). *IND moderates the relationship between PSD and UL in Netherland.*

Hypotheses 6 (H6b). *IND moderates the relationship between PSD and UL in Germany.*

Hypotheses 6 (H6c). *IND moderates the relationship between PSD and UL in KSA.*

Hypotheses 6 (H6d). *IND moderates the relationship between PSD and UL in Malaysia.*

4.7. The Conceptual Model

The conceptual model, as illustrated in Figure 2, is primarily based on Oinas-Kukkonen and Harjumaa's (2009) PSD framework [12] and Hofstede and Hofstede's (2005) cross-cultural model [55]. The conceptual model of the study comprises three types of variables: an independent variable, a dependent variable, and moderating variables. The dependent variable is smartphone app users' loyalty (UL). The independent variable is the persuasive system design (PSD). Moderating variables, based on Hofstede's cross-cultural dimensions, are as follows: power distance (PD), individualism (IDV), masculinity (MAS), uncertainty avoidance (UA), long-term orientation (LTO), and indulgence (IND). The research through the conceptual model examines whether the cross-cultural dimensions moderate the relationship between PSD and app user loyalty.

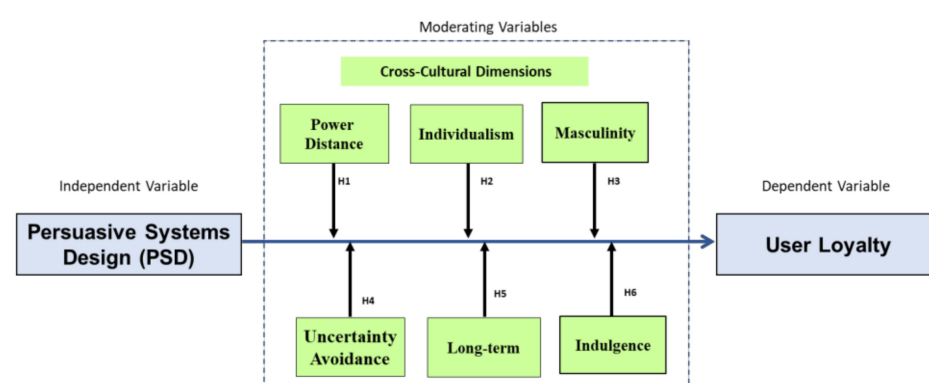


Figure 2. The conceptual model for the study.

5. Methodology and Analysis

5.1. Data Collection

The study used an online survey to collect data from respondents in four countries. Two countries from Western Europe (the Netherlands and Germany), one country from the Middle East (KSA), and one country from Southeast Asia (Malaysia) were chosen. The chosen countries were selected for their opposing culture dimension scores within the Hofstede's value survey module (VSM); for example, both Malaysia and Saudi Arabia

have high scores with power distance (Malaysia = 100, KSA = 95) and low individualism (Malaysia = 26, KSA = 25), while Germany and the Netherlands have low power distance scores (Germany = 35, the Netherlands = 38), and high individualism scores (Germany = 67, the Netherlands = 80), as shown in Table 1 above. Despite the cultural score variation, all four countries have a high percentage of active WhatsApp users, as shown in Figure 1 above.

Respondents from the Netherlands, Germany, KSA, and Malaysia who have a WhatsApp experience were invited to participate. The online research survey was shared across WhatsApp groups, through the help of educational institutions in the four countries. Independent sharing of the survey link was also encouraged in WhatsApp groups.

Table 2 shows the participants' demographics characteristics: country, gender, age, level of education, and length of WhatsApp usage.

Table 2. Demographics of respondents.

Item	n = 488	Percentage %
Country		
The Netherlands	167	34.2%
Germany	125	25.6%
KSA	100	20.5%
Malaysia	96	19.7%
Gender		
Male	287	58.8%
Female	201	41.2%
Age		
18–23	136	27.9%
24–29	144	36.3%
30–41	102	20.9%
42–53	47	9.6%
54 and over	26	5.3%
Education		
Primary school	3	0.6%
Secondary school	68	13.9%
Certificate/Vocational training	40	8.2%
Associate Degree/Diploma	109	22.3%
Undergraduate/Bachelor's Degree	189	38.7%
Postgraduate/Master/PHD	79	16.2%
Usage of WhatsApp		
Less than 1 year	31	6.4%
1–3 years	129	26.4%
3–5 years	207	42.4%
5 years and above	121	24.8%

5.2. Measurements

Persuasive system design (PSD) was measured using a 19-item scale (reduction, tunneling, tailoring, personalization, self-monitoring, rehearsal, suggestion, liking, social role, social facilitation, social comparison, normative influence, social learning, cooperation, trustworthiness, expertise, real-world feel, authority, and third-party endorsements). The scale was developed by the researchers using 19 design PSD principles out of 28 principles suggested by Oinas-Kukkonen and Harjumaa (2009). One item corresponds to each principle (e.g., Reduction: I can send messages on WhatsApp with few steps). However, nine principles (simulation, praise, rewards, reminders, similarity, competition, recognition, surface credibility, and verifiability) were ignored due to their inapplicability in WhatsApp.

Hofstede's cross-cultural scale was measured using a 29-item scale adopted from Krüger (2016) [56] to cover the 6 cultural dimensions: power distance (5 items), uncertainty avoidance (5 items), individualism (6 items), masculinity (4 items), long-term orientation (5 items), and indulgence (4 items).

Brand loyalty scale was measured using a 5-item scale [57,58]. A 5-point Likert ordinal scale (5—Highly Agree; 4—Agree; 3—Somewhat Disagree; 2—Disagree; 1—Highly Disagree) was utilized in this study.

5.3. Reliability

A pilot study was conducted to identify the inner errors in the questionnaire [59]. In general, 10% of the parent study is the recommended size for a pilot sample [60]. The pilot sample size comprised 67 respondents (14% of the parent study). Moreover, the analysis of Cronbach's alpha by interpreting the coefficient of reliability ensured the representativeness of sampling and generalizability of research findings [61]. Therefore, the pilot study validated that all variables were properly adopted.

Table 3 represents the reliability analysis of the scales used in the study using Cronbach's alpha. The results of the reliability analysis of all variables except IND indicate that the coefficient values of Cronbach's alpha are reliable for analysis [62]. Consequently, IND was not considered for further analysis.

Table 3. Reliability of PSD, culture dimensions, and UL scales.

Variables	No. of Items	Cronbach's Alpha
Persuasive System Design (PSD)	19	0.941
Power Distance (PD)	5	0.859
Individualism (IDV)	6	0.879
Masculinity (MAS)	4	0.800
Uncertainty Avoidance (UA)	5	0.881
Long-Term Orientation (LTO)	5	0.824
Indulgence (IND)	4	0.585
User Loyalty (UL)	6	0.860

5.4. Regression Moderation Analysis

To test the moderating effects of the national culture dimensions on the relationship between the persuasive system design (PSD) and user loyalty, an ordinary least squares regression moderation analysis, as suggested by Hayes (2017), was conducted to assess H1a, H1b, H1c, H1d; H2a, H2b, H2c, H2d; H3a, H3b, H3c, H3 d; H4a, H4b, H4c, H4d; and H5a, H5b, H5c, H5d.

To assess H1, the persuasive system design was entered as the main predictor (PSD), with power distance as the moderator (PD), and their interacting effect ($PSD \times PD$) as a further predictor [61].

H1a: The results obtained from the Netherlands' respondents' analysis (Table 4) suggested that the interaction ($PSD \times PD$) was not significant ($b = 0.32$, $t(163) = 0.53$, $p > 0.05$). Therefore, H1a was not accepted. Power distance (PD) does not moderate the relationship between loyalty and persuasive system design for respondents in the Netherlands.

H1b: The results obtained from Germany's respondents' analysis (Table 4) suggested that the interaction ($PSD \times PD$) was significant ($b = -0.76$, $t(121) = -1.99$, $p < 0.05$). The results showed that 36% of the variance in loyalty behavior was accounted for by the moderation model ($R^2 = 0.3638$), with the regression slope being significant ($F(121) = 3.9620$, $p = 0.0488 < 0.05$, $LLCI = -1.5236$, $ULCI = -0.0041$). Therefore, power distance (PD) does moderate the relationship between persuasive system design and loyalty for respondents in Germany.

In addition, Figure 3 indicates that, in Germany, for people who are rated high in PD, there was no significant difference between the loyalty of those who rated high in the receptiveness to the PSD techniques and those who rated low in the receptiveness to the PSD techniques. However, for those who rated low in PD, the loyalty of those who rated high in the receptiveness to the PSD techniques was significantly higher than the loyalty of those who rated low in the receptiveness to the PSD techniques. Therefore, among users in Germany with low power distance, those who are more receptive to the PSD techniques

show better loyalty than those who are less receptive, but this is not the case for users with high power distance, whose loyalty is high regardless of their receptiveness to the PSD techniques. Thus, H1b was accepted.

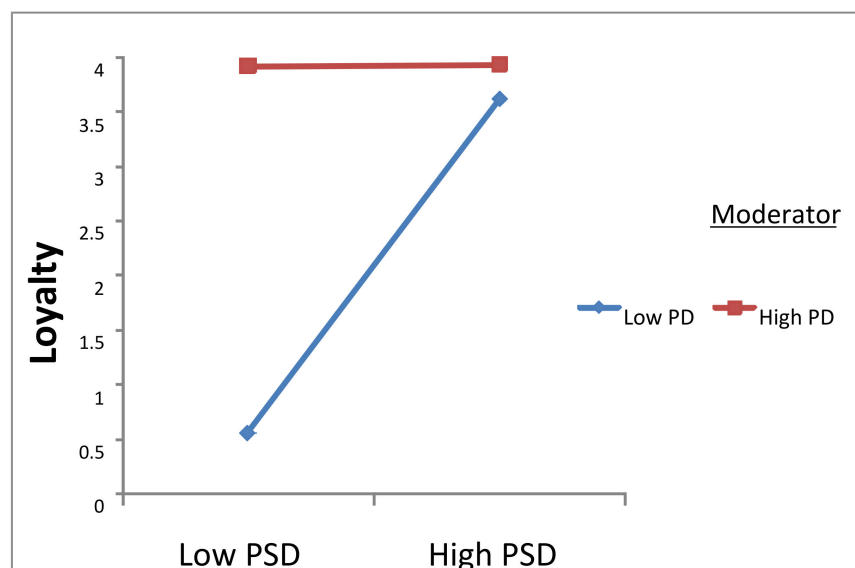


Figure 3. Interaction effect between PSD and PD on loyalty (Germany).

H1c: The results obtained from KSA's respondents' analysis (Table 4) suggested that the interaction (PSD \times PD) was not significant ($b = -0.38$, $t(96) = -1.05$, $p > 0.05$). Therefore, H1c was not accepted. Power distance (PD) does not moderate the relationship between loyalty and persuasive system design for respondents in KSA.

H1d: The results obtained from Malaysia's respondents' analysis (Table 4) suggested that the interaction (PSD \times PD) was not significant ($b = -0.49$, $t(92) = -1.36$, $p > 0.05$). Therefore, H1d was not accepted. Power distance (PD) does not moderate the relationship between loyalty and persuasive system design for respondents in Malaysia.

Table 4. Ordinary least squares regression (PSD \times PD).

	COEFF (b)	t	LLCI	ULCI	R2	R2 Change	F	p
PSD \times PD (The Netherlands)	0.3212	0.5293	−0.8771	1.5195	0.3404	0.0043	0.2802	0.5973
PSD \times PD (Germany)	−0.7639	−1.9905	−1.5236	−0.0041	0.3638	0.0298	3.9620	0.0488
PSD \times PD (KSA)	−0.3767	−1.0499	−1.0890	0.3356	0.4546	0.0137	1.1022	0.2964
PSD \times PD (Malaysia)	−0.4895	−1.3593	−1.2047	0.2257	0.5089	0.0315	1.8478	0.1774

Overall model: $p < 0.001$.

To assess H2, PSD was entered as the main predictor, with individualism as the moderator (IDV), and their interacting effect (PSD \times IDV) as a further predictor [61].

H2a: The results obtained from the Netherlands' respondents' analysis (Table 5) suggested that the interaction (PSD \times IDV) was not significant ($b = -0.38$, $t(163) = -0.64$, $p > 0.05$). Therefore, H2a was not accepted. Individualism (IDV) does not moderate the relationship between persuasive system design and loyalty for respondents in the Netherlands.

H2b: The results obtained from Germany's respondents' analysis (Table 5) suggested that the interaction (PSD \times IDV) was not significant ($b = -0.39$, $t(121) = -0.58$, $p > 0.05$). Therefore, H2b was not accepted. Individualism (IDV) does not moderate the relationship between persuasive system design and loyalty for respondents in Germany.

H2c: The results obtained from KSA's respondents' analysis (Table 5) suggested that the interaction (PSD \times IDV) was significant ($b = -0.51$, $t(96) = -2.20$, $p < 0.05$). The results showed that 34% of the variance in loyalty behavior was accounted for by the moder-

ation model ($R^2 = 0.3478$), with the regression slope being significant ($F(96) = 4.8590$, $p = 0.0299 < 0.05$, $LLCI = -0.9764$, $ULCI = -0.0511$). Therefore, individualism (IDV) moderates the relationship between persuasive system design and loyalty for respondents in KSA.

In addition, Figure 4 indicates that, in KSA, for people who rated high in IDV, there was no significant difference between the loyalty of those who rated high in the receptiveness to the PSD techniques and those who rated low in the receptiveness to the PSD techniques. However, for those who rated low in IDV, the loyalty of those who rated high in the receptiveness to the PSD techniques was significantly higher than the loyalty of those who rated low in the receptiveness to the PSD techniques. Therefore, among users in KSA with low individualism, those who are more receptive to the PSD techniques show better loyalty than those who are less receptive, but this is not the case for users with high individualism, whose loyalty is high regardless of their receptiveness to the PSD techniques. Thus, H2c was accepted.

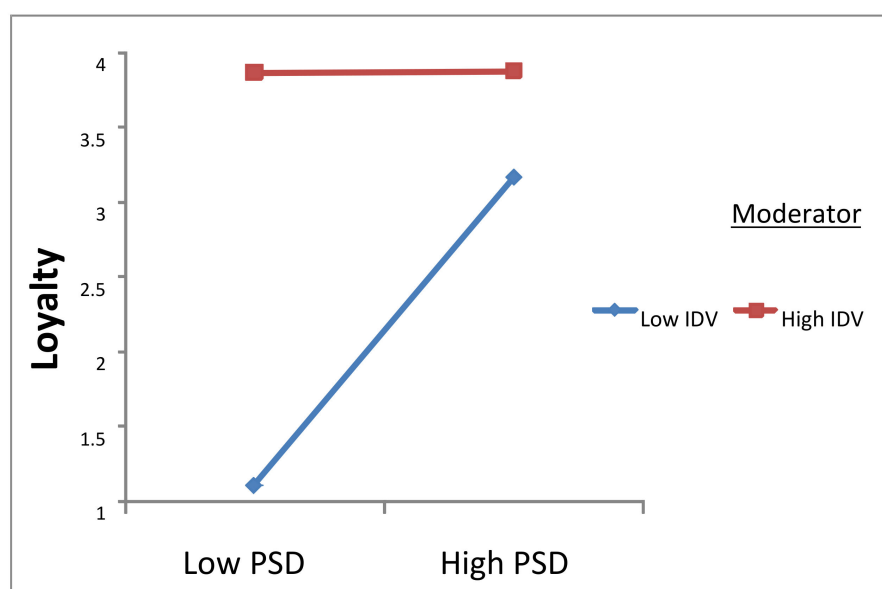


Figure 4. Interaction effect between PSD and IDV on loyalty (KSA).

H2d: The results obtained from Malaysia's respondents' analysis (Table 5) suggested that the interaction ($PSD \times IDV$) was significant ($b = -0.58$, $t(92) = -2.53$, $p < 0.05$). The results show that 56% of the variance in loyalty behavior was accounted for by the moderation model ($R^2 = 0.5600$), with the regression slope being significant ($F(92) = 6.4049$, $p = 0.0131 < 0.05$, $LLCI = -1.0390$, $ULCI = -0.1253$). Therefore, individualism (IDV) does moderate the relationship between persuasive system design and loyalty for respondents in Malaysia. In addition, Figure 5 indicates that loyalty in Malaysia increases when the user simultaneously has high PSD and low individualism. It shows that loyalty is low with low individualism and low PSD. Therefore, users in Malaysia who experience high PSD but have low individualism show better loyalty than users with high individualism. Therefore, H2d was accepted.

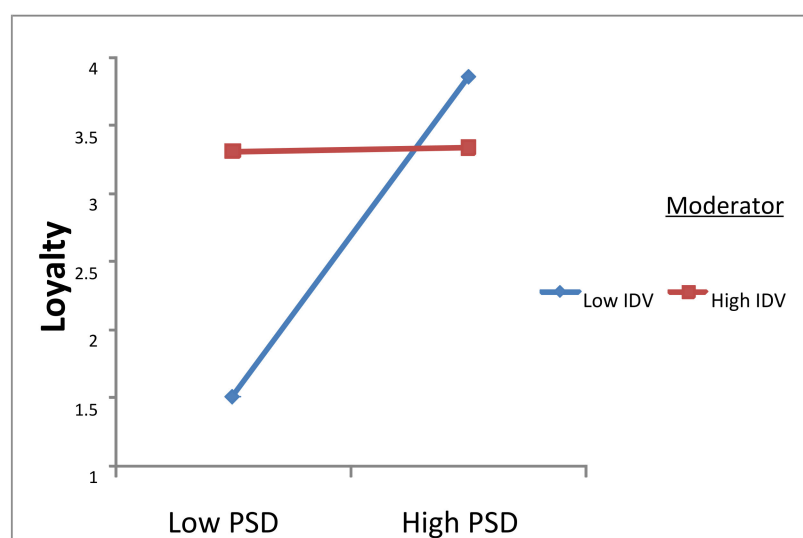


Figure 5. Interaction effect between PSD and IDV on loyalty (Malaysia).

Table 5. Ordinary least squares regression (PSD \times IDV).

	COEFF (b)	t	LLCI	ULCI	R2	R2 Change	F	p
PSD \times IDV (The Netherlands)	−0.3813	−0.6422	−0.7943	0.7912	0.3478	0.0101	0.4124	0.5217
PSD \times IDV (Germany)	−0.3922	−0.5781	−1.7356	0.9511	0.2875	0.0099	0.3342	0.5643
PSD \times IDV (KSA)	−0.5138	−2.2043	−0.9764	−0.0511	0.3478	0.0304	4.8590	0.0299
PSD \times IDV (Malaysia)	−0.5822	−2.5308	−1.0390	−0.1253	0.5600	0.0572	6.4049	0.0131

Overall model: $p < 0.001$.

To assess H3, persuasive system design was entered as the main predictor (PSD), with masculinity as the moderator (MAS), and their interacting effect (PSD \times MAS) as a further predictor [61].

H3a: The results obtained from the Netherlands' respondents' analysis (Table 6) suggested that the interaction (PSD \times MAS) was not significant ($b = 0.38$, $t(163) = 1.69$, $p > 0.05$). Therefore, H3a was not accepted. Masculinity (MAS) does not moderate the relationship between persuasive system design and loyalty for respondents in the Netherlands.

H3b: The results obtained from Germany's respondents' analysis (Table 6) suggested that the interaction (PSD \times MAS) was not significant ($b = 0.68$, $t(121) = 1.13$, $p > 0.05$). Therefore, H3b was not accepted. Masculinity (MAS) does not moderate the relationship between persuasive system design and loyalty for respondents in Germany.

H3c: The results obtained from KSA's respondents' analysis (Table 6) suggested that the interaction (PSD \times MAS) was not significant ($b = -0.17$, $t(96) = -0.69$, $p > 0.05$). Therefore, H3c was not accepted. Masculinity (MAS) does not moderate the relationship between persuasive system design and loyalty for respondents in KSA.

H3d: The results obtained from Malaysia's respondents' analysis (Table 6) suggested that the interaction (PSD \times MAS) was not significant ($b = -0.51$, $t(92) = -1.86$, $p > 0.05$). Therefore, H3d was not accepted. Masculinity (MAS) does not moderate the relationship between persuasive system design and loyalty for respondents in Malaysia.

Table 6. Ordinary least squares regression (PSD \times MAS).

	COEFF (b)	t	LLCI	ULCI	R2	R2 Change	F	p
PSD \times MAS (The Netherlands)	0.6472	1.6889	−0.4817	1.4040	0.359	0.0238	2.8523	0.0932
PSD \times MAS (Germany)	0.6770	1.1338	−0.5052	1.8593	0.2919	0.0139	1.2855	0.2591
PSD \times MAS (KSA)	−0.1691	−0.6895	−0.6559	0.3177	0.5382	0.0029	0.4755	0.4921
PSD \times MAS (Malaysia)	−0.5100	−1.8650	−1.0532	0.0331	0.5434	0.0407	3.4781	0.0654

Overall model: $p < 0.001$.

To assess H4, the persuasive system design was entered as the main predictor (PSD), with uncertainty avoidance as the moderator (UA), and their interacting effect (PSD \times MAS) as a further predictor [61].

H4a: The results obtained from the Netherlands' respondents' analysis (Table 7) suggested that the interaction (PSD \times UA) was not significant ($b = -0.59$, $t(163) = -1.25$, $p > 0.05$). Therefore, H4a was not accepted. Uncertainty avoidance (UA) does not moderate the relationship between persuasive system design and loyalty for respondents in the Netherlands.

H4b: The results obtained from Germany's respondents' analysis (Table 7) suggested that the interaction (PSD \times UA) was not significant ($b = 0.09$, $t(121) = 0.25$, $p > 0.05$). Therefore, H4b was not accepted. Uncertainty avoidance (UA) does not moderate the relationship between persuasive system design and loyalty for respondents in Germany.

H4c: The results obtained from KSA's respondents' analysis (Table 7) suggested that the interaction (PSD \times UA) was not significant ($b = -0.10$, $t(96) = 0.30$, $p > 0.05$). Therefore, H4c was not accepted. Uncertainty avoidance (UA) does not moderate the relationship between persuasive system design and loyalty for respondents in KSA.

H4d: The results obtained from Malaysia's respondents' analysis (Table 7) suggested that the interaction (PSD \times UA) was not significant ($b = -0.17$, $t(92) = -0.65$, $p > 0.05$). Therefore, H4d was not accepted. Uncertainty avoidance (UA) does not moderate the relationship between persuasive system design and loyalty for respondents in Malaysia.

Table 7. Ordinary least squares regression (PSD \times UA).

	COEFF (b)	t	LLCI	ULCI	R2	R2 Change	F	p
PSD \times IDV (The Netherlands)	−0.5943	−1.2555	−1.5291	0.3404	3830	0.0246	1.5764	0.2111
PSD \times IDV (Germany)	0.0927	0.2498	−0.6421	0.8275	3212	0.0008	0.0624	0.8032
PSD \times IDV (KSA)	−0.0986	−0.3030	−0.7447	0.5475	4607	0.0009	0.0918	0.7625
PSD \times IDV (Malaysia)	−0.1690	−0.6492	−0.6860	0.3480	5238	0.0033	0.4215	0.5178

Overall model: $p < 0.001$.

To assess H5, the persuasive system design was entered as the main predictor (PSD), with long-term orientation (LTO) as the moderator, and their interacting effect (PSD \times LTO) as a further predictor (Hayes, 2017).

H5a: The results obtained from the Netherlands' respondents' analysis (Table 8) suggested that the interaction (PSD \times LTO) was not significant ($b = -0.50$, $t(163) = -1.37$, $p > 0.05$). Therefore, H5a was not accepted. Long-term orientation does not moderate the relationship between persuasive system design and loyalty for respondents in the Netherlands.

H5b: The results obtained from Germany's respondents' analysis (Table 8) suggested that the interaction (PSD \times LTO) was not significant ($b = 0.09$, $t(121) = 0.19$, $p > 0.05$). Therefore, H5b was not accepted. Long-term orientation does not moderate the relationship between persuasive system design and loyalty for respondents in Germany.

H5c: The results obtained from KSA's respondents' analysis (Table 8) suggested that the interaction (PSD \times LTO) was not significant ($b = 0.00$, $t(96) = 0.003$, $p > 0.05$). Therefore, H5c was not accepted. Long-term orientation (LTO) does not moderate the relationship between persuasive system design and loyalty for respondents in KSA.

H5d: The results obtained from Malaysia's respondents' analysis (Table 8) suggested that the interaction ($\text{PSD} \times \text{LTO}$) was not significant ($b = -0.23$, $t(92) = -1.00$, $p > 0.05$). Therefore, H5d was not accepted. Long-term orientation does not moderate the relationship between persuasive system design and loyalty for respondents in Malaysia.

Table 8. Ordinary least squares regression ($\text{PSD} \times \text{LTO}$).

	COEFF (b)	t	LLCI	ULCI	R2	R2 Change	F	p
PSD \times LTO (the Netherlands)	−0.5021	−1.3677	−0.4817	0.0819	0.3940	0.0130	2.8823	0.0915
PSD \times LTO (Germany)	0.0899	0.1927	−0.8332	1.0129	0.3406	0.0006	0.0372	0.8475
PSD \times LTO (KSA)	0.0008	0.0027	−0.6064	0.6081	0.5081	0.0000	0.0000	0.9979
PSD \times LTO (Malaysia)	−0.2312	−1.0011	−0.6898	0.2275	0.5716	0.0081	1.0022	0.3194

Overall model: $p < 0.001$.

Figures 6–8 show the hypotheses results for the four countries. As seen in those figures, masculinity, uncertainty avoidance, and long-term orientations do not indicate any significant moderating role in the four countries. According to the findings, only power distance and individualism have a significant moderating role. Power distance was found to have a significant moderating role in Germany, and individualism was found to have a significant moderating role in KSA and Malaysia.

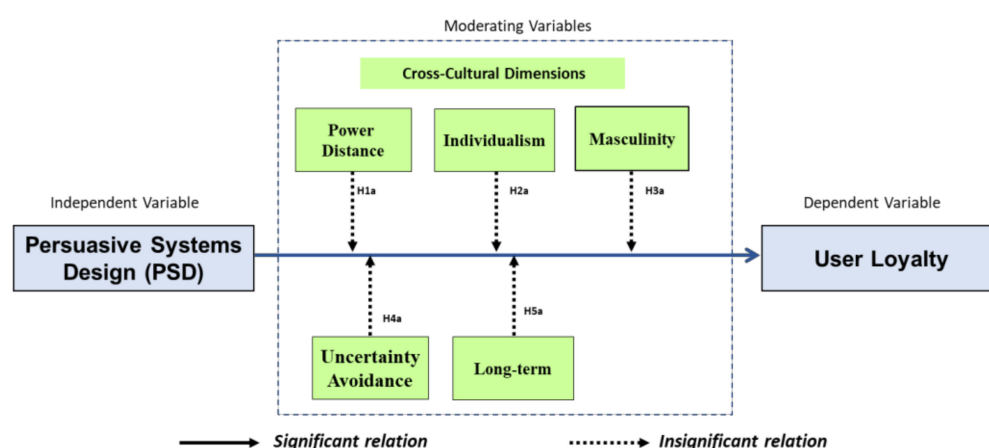


Figure 6. Hypothesis results (the Netherlands).

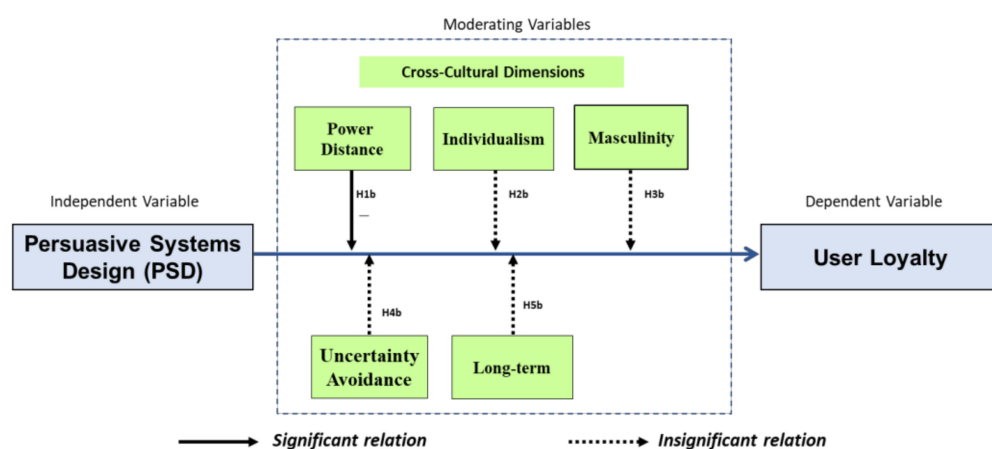


Figure 7. Hypothesis results (Germany).

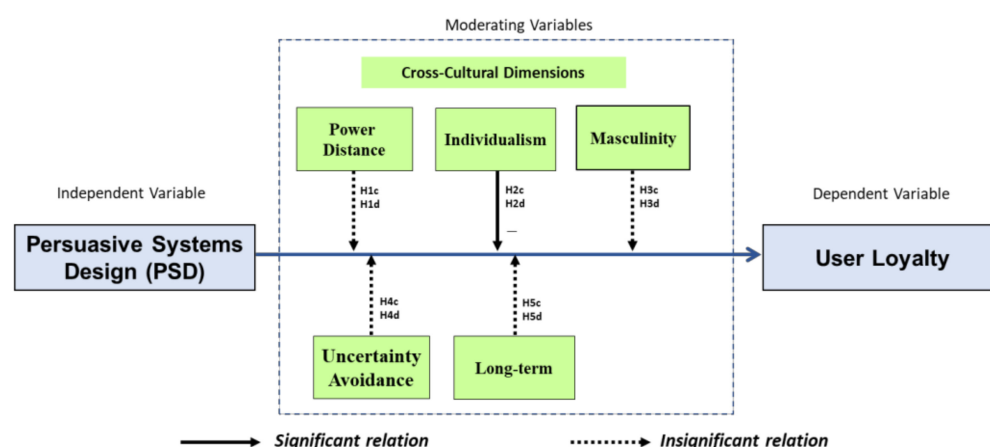


Figure 8. Hypothesis results (KSA and Malaysia).

6. Discussion

The study explores the moderating impact of Hofstede's cultural dimensions on the relationship between PSD and UL in four countries. The findings of the research indicate that only two of Hofstede's dimensions, PD and IDV, have a moderating effect on the PSD and loyalty relationship. Whereas PD has been found to moderate the relationship between PSD and loyalty in Germany, IDV was found to moderate the relationship between PSD and loyalty in both KSA and Malaysia.

In Germany, the findings revealed that only PD had a statistically significant moderating impact on the relationship between PSD and loyalty. That is, German users who experience low or high PSD, but have high power distance, show better loyalty than users with low power distance. However, for users with low power distance, the results showed that those who are highly receptive to the PSD techniques are more likely to be loyal than those who have low receptiveness to the PSD techniques. This means that among lower power distance WhatsApp users in Germany, only those who are receptive to PSD techniques are likely to be loyal to their brand. However, this is not the case for German users with a higher power distance orientation who have high loyalty regardless of their level of receptiveness to the PSD principles.

Additionally, in KSA and Malaysia, IDV was found to have a significant moderating impact on the relationship between PSD and user loyalty. For users with low individualism, the results showed that those who are highly receptive to the PSD techniques are more likely to be loyal than those who are low in receptiveness to the PSD techniques. This means that among the lower individualism of WhatsApp users in KSA and Malaysia, only those who are receptive to PSD techniques are likely to be loyal to their brand. However, this is not the case for KSA and Malaysian users with higher individualism orientation, who have high loyalty regardless of their receptiveness to the PSD techniques. The literature also supports the findings by indicating a relationship between IDV and the use of instant messaging apps [62]. However, whether this moderating effect strengthened or weakened this relation varies between the two countries. Users in KSA who experience low or high PSD, but have high individualism, show better loyalty than users with low individualism. On the other hand, users in Malaysia who experience high PSD, but have low individualism, show better loyalty than users with high individualism.

Uncertainty avoidance (UA) was not a significant moderator for the relationship examined in this paper. People's uncertainty avoidance with a recent smartphone app did not moderate the relationship between PSD and user loyalty in the four researched countries. The insignificant role of UA is aligned with the study of Choi and Hofstede on mobile Twitter [51].

Masculinity (MAS) was not a significant moderating variable for any country in this research. It seems that both logical and emotional societies do not mind starting to use a

different app. This finding contradicts the acceptance and loyalty attitudes of masculine cultures towards new smartphone apps [48,50].

Similarly, LTO was found to have no moderating effect on the relationship of PSD and user loyalty in the four countries. People who continue to use new apps in the long run have a clear idea about the contribution of the app without any significant cultural impact.

Overall, the study shows a significant moderating effect of PD in Germany, and a significant moderating effect of IDV in KSA and Malaysia on the relationship between PSD and user loyalty. In other words, the results of this study suggest that the cross-cultural dimensions may not affect (as the case with the Netherlands) or partially affect (as the case with Germany, KSA, and Malaysia) the relationship between PSD and loyalty. Based on the above findings, for app design, consideration should be given to the PD dimension in Germany, and the IDV dimension in both KSA and Malaysia.

Despite that the results showed no significant moderating role of three of the cultural dimensions (MAS, UA, and LTO), this study makes an important contribution to the literature by indicating that some cultural dimensions continue to have an important role for loyalty in smartphone apps.

In spite of the fact that people increasingly live in a global world, influenced by an evolving global culture, customer decisions and choices are still determined by their own culture in some countries, as argued by Hofstede et al. 27 years ago [20,62]. This implies that managers need to pay attention to PSD, which is critical for app design, as well as to culture. This means that local cultures must not be ignored. Instead, local culture can be an attribute without being a driving force of smartphone app design and development.

7. Conclusions

In any research, there are always limitations that foster future investigation. First, the research sample included participants from four countries located in Europe and Asia. Future researchers may examine other countries located in North and South America and Africa. Second, this study examined PSD as one single variable; therefore, future studies could extend the PSD by examining its four categories as independent variables. Third, this study was limited to the WhatsApp, which gives the opportunity for future research to examine other apps such as Facebook, Instagram, YouTube, and LinkedIn. Fourth, this study was limited to three variables: PSD, loyalty, and national culture. Therefore, future researchers may wish to examine other variables such as the user's age, gender, satisfaction, and perceived value. However, despite these limitations, this study adds a significant contribution to the literature of smartphone apps by empirically validating that a certain culture dimension may affect the PSD–loyalty relationship in a certain country.

To conclude, two decades of research have sought to develop culturally effective products for local markets, since “cultures are different” [20]. This study explored the moderating impact of national culture dimensions on the relationship between the persuasive system design of WhatsApp and user loyalty to evaluate the appropriateness of culture-specific designs. The research findings indicate that the role of culture in this relationship is limited; only two dimensions, power distance (PD) and individualism (IDV), moderated the PSD–loyalty relationship. Therefore, while cultural considerations in the app design partially influence loyalty to an app, the PSD principles are essential in attaining loyal customers in any culture. With the decreasing effect of cultural context, app design with PSD consideration can target global markets, as is the case of the gaming software and most successful social networking platforms like WhatsApp, Twitter, Facebook, Google, and YouTube. However, it is also important to note that the research does not reject the partial influence of culture and the societal norms on sustained user loyalty. Therefore, PSD-driven designs can even achieve better results with feasible cultural attributes.

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