State of Art of the Persuasive Technology using Social Media for Behaviour Change in Malaysia

Mohammad Syukran Kamalruzzaman[1], Sharkawi Che Din[2], Anuar Mohd Yusof[3], Nik Atilla Atasha Shamsuddin[4]

[1] Faculty of Art & Design, Universiti Teknologi MARA, Shah Alam 40450 Selangor, Malaysia
[2] Universiti Malaysia Kelantan, Locked Bag Number 1, Bachok 16300 Kelantan, Malaysia

syukran@umk.edu.my, sharkawi237@uitm.edu.my, anuarmy@umk.edu.my, nikatillaatasha@uitm.edu.my
Tel: +60 19 983 3814

Abstract

Persuasive technology is an evolving form of behaviour change agent that is becoming more popular with the emergence of social media. In 2020, 81% of Malaysians are active social media users who contribute to the escalation of behavioural changes using online platforms. This paper provides a verifiable review of 10 years of persuasive technology using social media for Malaysian healthcare and behavioural changes with the concern to (1) reviewing the effectiveness of persuasive technology using social media to behaviour changes, (2) outlining the technology methods, research methods, strategies, theories and targeted behaviour (3) stating the issues regarding the studied persuasive technologies and (4) highlighting the future research recommendation.

Keywords: Persuasive technology, behavioural change, social media

1.0 Introduction

Persuasive technology (PT) is a system that is designed and developed using the principle of persuasive design, which aims to modify a certain attitude of behaviour using social theories such as persuasion, social influence and not through physical force. In the last ten years, PT has been used in various fields impacting one or more aspects of health and behaviour change. Researchers have summarized two main areas of PT, which are (1) health management and prevention (Almonani, Husain, San, Almomani, & Al-Betar, 2014) and (2) disease management (Aziz, Salleh, Yusof, & Roseli, 2017).

PT for health prevention and promotion are focused on behaviours by individuals for the motivation of avoiding illness, detecting pre-illness symptoms, and supporting general wellbeing (Orji, Vassileva, & Mandryk, 2014). This includes healthy behaviours such as nutritional food intake (Salim, Ali, & Noah, 2017), obesity prevention (Yahaya & Hashim, 2018), environmental issues awareness (W. N. W. Ahmad & Ali, 2018), sex education (Oyibo, Orji, & Vassileva, 2017) and children dental health (Puad, Rahim, Firdaus, Sayedi, & Mohadis, 2019). PT for disease management targets individuals to improve self-management healthcare skills such as guiding them to manage specific illnesses, teaching them to get proper treatment and medical appointments, as well as helping them to make a certain decision in their healthcare treatment (Qasim, Ahmad, Omar, Zulkifli and Bakar, 2017).

There were trends of increasing health awareness among Malaysian social media (SM) users. Stakeholders, government agencies, ministries, designers, practitioners, and developers have introduced persuasive technology to trigger targeted behaviours among patients and individuals. Consequently, an empirical review reveals the trends, research gap, best practices, and future direction in research in PT

used. This paper will be highlighting a review of 10 years of empirical review of 10 years of persuasive technology using social media for Malaysian healthcare and behavioural changes. This paper will be discussing essential aspects such as (1) the effectiveness.

Nomenclature	
PT	Persuasive technology
SM	Social media
ICT	Information and communication technology

2.0 Literature Review

2.1 Persuasive Technology
Persuasive Technology (PT) uses three persuasion factors: motivation, ability, and trigger (Brian J Fogg, 2002). A persuasive system must offer a proper motivational manner, ease of use and stimuli which initiate the behaviour incentive to the users to To influence the positive behaviour (Brain J Fogg, 2009).

A PT is successful when it can persuade people to change from one state to a more well-known state (Wan Ahmad and Ali, 2018). Previous research has shown that social influence or social factor is a strong motivator of healthy behaviour change (Oyibo et al., 2017). Researchers are also aware that information and communication technology (ICT) plays a crucial role in affecting an individual's thinking, behaviour and decision making (Aziz et al., 2017). Therefore, researchers intend to use SM as the main medium of PT to influence as many people while exploiting the effectiveness of social influence.

2.2 Social Media as Persuasive Technology
In various fields, PT in social media (SM) is used to influence certain behaviours which will benefit the stakeholders, such as in business (Hassan, Shiratuddin, & Ab Salam, 2015), education (Z. Ahmad, Ab Rahim, & Ya'acob, 2019), higher education, e-commerce (Hamid, Cheun, Abdullah, Ahmad, & Ngadiman, 2019), informal learning (Al-Sabaawi & Dahlan, 2019), pro-environmental behaviour (Taha, Wu, Emeakaroha, Krabicka, & Lee, 2017), public relation (Z. A. Ahmad, 2019), productivity (Ishak, Khairuddin, & Aziz, 2020), politics (Butt, Saleem, Siddiqui, Saleem, & Awang, 2021) and healthcare (Z. Ahmad et al., 2019). With the emergence of social sites like Facebook, WhatsApp, Instagram, and many others, 81% of Malaysians have become active SM users (Miller, 2021). We also identified persuasive design frameworks which will be giving positive behaviour effects towards various demographic groups, especially in global smartphone applications (Faisal, Nor and Abdullah, 2019), virtual reality (Çakiroğlu and Gökoğlu, 2019), and social media engagement (Muhamad & Shahrom, 2020). The vast development of social activities in the ICT platform allows PT to become more dominant as a social influencer for positive behaviour change.

3.0 Methodology
We use quantitative content analysis of PT in SM in the Malaysian context to systematically analyze the state-pf-art of the studied field. This method allows comparing, contrasting, and categorizing the data according to different themes and concepts (Stinson, 2021). For the literature search, we used a few journal databases to ensure appropriate coverage of technological intervention of PT in behavioural change in various fields such as education, healthcare, health management, productivity, business and other related areas. Those databases include Google Scholars, Elsevier, PubMed, IEEE Xplore and Springer. We have narrowed down the search in the Malaysian context to ensure the achievement of the research objectives. Our search key terms are "Persuasive Technology in Malaysia", "Persuasive Technology in Malaysian Social Media", "Social Media Behavioural Change in Malaysia", and "Malaysian Behaviour Change using Persuasive Technology". After obtaining the number of unique articles, we applied the two-stage filtering process for the title and abstract of each article, as shown in Figure 1. The coding schemes are as shown in Table 1.

Fig. 1. Articles Identification Process

Table 1. Persuasive technology classification and analysis coding scheme

S/N	Codes	Items
1	Trends	Categories of PT using SM for behavioural changes
2	Effectiveness	A positive, partially positive or negative study
3	Strategies	Motivational strategies used.
4	Behaviour Theories	Theory of planned behaviour, dual coding theory etc.
5	Behaviour Outcomes	Weight loss, physical activity, heart problems etc.
6	Target group	Older, adult, young adult, children etc.
7	Evaluation	Qualitative, quantitative and mixed-method

4.0 Findings

In this stage, we identified ten (10) research papers that indicate the state-of-art of persuasive technology using social media studies in Malaysia. To simplify the findings, we presented the data in a detailed summary of all unique research reviewed. We use categories which include the author) names, PT projects, targeted behaviour domains, the technology used, motivational strategies, behaviour theories applied, and the result obtained as shown in Table 2/

4.1 Trends of Persuasive Technology using Social Media

Table 2. Effectiveness of PT using social media in Malaysia

Arthur	PT Project	Behaviour Domain	Technology	Strategy	Behaviour Theory	Result
(Almonani et al., 2014)	MACO Online Game	Healthy lifestyle	Mobile game	Tracking, monitoring and reminder	Not specified	Partially positive
(Hamid et al., 2019)	Acceptance of e-Commerce site	Product purchase	E-commerce	Social support and social influence	User acceptance	Positive
(Hassan et al., 2015)	Social media business survey	Product purchase	Social network	Not specified	Perceived impact of social media as a PT	Positive
(Ishak et al., 2020)	Social media survey	Social media usage	Social network	Feedback	Not specified	Partially positive
(Mohamad, Yahaya, & Wahid, 2018)	Mobile assistive technology	Healthy lifestyle	Mobile apps	Tracking and monitoring	Not specified	Positive
(Muhamad & Shahrom, 2020)	Social media survey	Social media engagement	Social network	Social influence and feedback	Social media engagement behaviour	Positive
(Nawi, Nasir, & Al Mamun, 2016)	Social media survey	Choosing business platform	Social network	Social influence and feedback	Unified Theory of Acceptance and Use of Technology	Positive
(Noor & Shahrom, 2021)	Social media survey	Job performance	Social network	Feedback	Employee job Performance	Positive
(Rahman, 2016)	Charity Video	Charity	Social network	Feedback	Not specified	Positive
(Salim et al., 2017)	Nutrihealth Mobile Apps	Healthy lifestyle	Mobile game	Tracking and monitoring	Unified Theory of Acceptance and Use of Technology	Positive

4.2 Effectiveness of Persuasive Technology using Social Media

Table 3. Effectiveness of PT using social media in Malaysia

Outcome	Study	Total	Overall (%)
Positive	(Hassan et al., 2015), (Hamid et al., 2019), (Rahman, 2016), (Muhamad & Shahrom, 2020), (Mohamad et al., 2018), Nawi, Nasir, & Al Mamun, 2016), (Noor & Shahrom, 2021), (Salim et al., 2017)	8	80
Partially positive	(Ishak et al., 2020), (Almonani et al., 2014)	2	20
Negative		0	0

80% of the reviewed papers appear to be positively affecting the targeted behaviour. 20% of the research did not show an entirely positive effect towards the aimed behaviour. However, all reviewed papers do not represent the negative effect of social media, which acts as persuasive technology for behavioural change in Malaysia.

4.3 Persuasive Technology Strategies

Table 4. Persuasive, motivational strategies

Strategies	Studies with a positive result	Studies with a partially positive result	Studies with Negative Results	Total	Overall (%)
Feedback	(Rahman, 2016), (Noor & Shahrom, 2021)	Ishak et al., 2020	0		30
Social support and social influence	(Hamid et al., 2019)		0		10
Social influence and feedback	(Muhamad & Shahrom, 2020), (Nawi et al., 2016),		0		20
Tracking and monitoring	(Salim et al., 2017), (Mohamad et al., 2018)		0		20
Tracking, monitoring and reminder.		(Almonani et al., 2014)	0		10
Not specified	(Hassan et al., 2015)		0		10

Data in Table 4 showed that feedback has the highest percentage with 30%, followed by social influence and feedbacks and tracking and monitoring at 20%. The rest of the strategies has 10% coverage, respectively.

4.4 Persuasive Technology Behaviour Theories

Table 5. Persuasive behaviour theories

Behaviour Theory	Studies with a positive result	Studies with a partially positive result	Studies with Negative Results	Total	Overall (%)
Employee job Performance	(Noor & Shahrom, 2021)		0	1	10
Perceive impact of SM	(Hassan et al., 2015)		0	1	10
User acceptance	(Hamid et al., 2019)		0	1	10
Social media engagement behaviour	(Muhamad & Shahrom, 2020)		0	1	10
Unified Theory of Acceptance and Use of Technology	(Nawi et al., 2016), (Salim et al., 2017)		0	2	20
Not Specified	(Rahman, 2016), (Ishak et al., 2020), (Mohamad et al., 2018)	Ishak et al., 2020), (Almonani et al., 2014)	0	4	40

Most studies of PT using SM in Malaysia does not specify the behavioural theories used. However, the remaining 60% have specified with the highest percentage is the Unified Theory of Acceptance and Use of Technology.

4.5 Persuasive Technology Behaviour Outcomes

Table 6. Persuasive behaviour outcome

Behaviour Outcome	Studies with a positive result	Studies with a partially positive result	Studies with Negative Results	Total	Overall (%)
Charity	(Rahman, 2016)		0	1	10
Choosing business platform	(Nawi et al., 2016)		0	1	10
Healthy lifestyle	(Salim et al., 2017), (Mohamad et al., 2018)	(Almonani et al., 2014)	0	3	30
Job performance	(Noor & Shahrom, 2021)		0	1	10
Product Purchase	(Hassan et al., 2015), (Hamid et al., 2019)		0	2	20
Social media engagement	(Muhamad & Shahrom, 2020)		0	1	10
Social media usage		(Ishak et al., 2020),	0	1	1O

Behaviour outcome is the final target or objective of a persuasive system. Researchers' most frequent behaviour is a healthy lifestyle with 30%, followed by product purchase behaviour with 20%. The rest of the behaviour outcomes are a charity, choosing a business platform, job performance, social media engagement and social media usage.

4.6 Persuasive Technology Target Group

Table 7: Persuasive behaviour outcome

Target group	Studies with a positive result	Studies with a partially positive result	Studies with Negative Results	Total	Overall (%)

Children		(Almonani et al., 2014)	0	1	10
E-commerce users	(Hamid et al., 2019)		0	1	10
Elderly	(Salim et al., 2017)		0	1	10
Social media users	(Hassan et al., 2015), (Rahman, 2016), (Muhamad & Shahrom, 2020) , (Noor & Shahrom, 2021)	(Ishak et al., 2020)	0	5	50
Entrepreneur students	(Nawi et al., 2016)		0	1	10
Visually impaired children	(Mohamad et al., 2018)		0	1	10

In Table 7, we recorded that half of the research targets social media users. The other target respectively presents 10% of all PT using SM in Malaysia.

4.7 Persuasive Technology Evaluation Methodologies

Table 8: Persuasive Methodologies

Methodologies	Studies with a positive result	Studies with a partially positive result	Studies with Negative Results	Total	Overall (%)
Quantitative	(Hassan et al., 2015), (Hamid et al., 2019), (Rahman, 2016), (Nawi et al., 2016) (Muhamad & Shahrom, 2020), (Noor & Shahrom, 2021), (Salim et al., 2017)	(Ishak et al., 2020), (Almonani et al., 2014)	0	9	90
Qualitative	(Mohamad et al., 2018)		0	1	10
Mixed			0	0	

The quantitative method seems to be the chosen methodology by the researchers with a total of 80%. While qualitative methods cover 20%, none of the mixed methods is found in Malaysia for PT using SM for behavioural change.

5.0 Discussion

From the findings, PT using SM for behavioural change is effective in the Malaysian context. Malaysia since we found that 80% of the research is effective. Malaysia has the highest number of active social media users, 81% of the population by 2020. The social influence will significantly have a higher tendency to occur with that frequency, thus promoting the positive behaviour change.

However, in the local context, a study that includes social media persuasion is minimal. Most researchers, stakeholders and developers only focused on the PT in other ICT platforms such as e-learning, general healthcare, website, computer programs, and other electronic media. With a considerable number of active SM users nationwide, we would explore more in-depth PT.

While we managed to use creative motivation strategies such as user feedback, social supports, tracking, monitoring and reminders, worldwide researchers have been practising many other persuasive strategies such as competition and leaderboards, video-based persuasion, persuasive text messages, achievement sharing, social learning, virtual rehearsal, self-monitoring, social facilitation, cooperation and collaboration, positive feedbacks and objective reward.

PT is a technological platform with the main focus to generate effective behavioural outcomes. In the body of knowledge of PT using SM in the Malaysian context, we also want to highlight some future research directions such as (1) relationship between persuasion strategies and PT outcome, (2) relationship between target health behaviour to PT outcome and (3) the relationship between behaviour theory and PT outcome.

6.0 Conclusion

This paper revised the trends, latest research, and effectiveness of persuasive technology (PT) using social media (SM) in Malaysia from 2011 to 2021. We found that PT has a favourable approach for promoting positive behaviour change in various fields such as healthy lifestyle, business, charity, and other forms of social engagement. However, the research is still limited very small amount of study in Malaysia despite the enormous numbers of SM users.

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