Comparative Evaluation of Cyber Migration Factors in the Current Social Media Landscape

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***Abstract*— In the last decade, social media experienced a dramatic increase in terms of quantity and variety of available platforms, in addition to an exponential growth in the number of users. Recent reports show that social media have a total of almost 2.5 billion active users, that is, about 71% of Internet users have at least one account on social media. At the beginning of the social media era, the word "cyber Migration" emerged to represent and describe a new phenomenon: users switching between one social network platform to another. Several studies investigated the different reasons and factors behind cyber migration, and tried to identify patterns.**

In this paper, we analyze how the concept of cyber migration evolved over the last decade, and we evaluate whether the model can still be applied to nowadays' social media landscape. To this end, we use the push-pull-mooring framework, a well-known model in economics domain, to address the technological and human factors that affect switching behavior. Specifically, we investigate the dynamics of cyber migration in relation to the types of social network and digital media platforms (e.g., personal, professional, video sharing, and other categories).

Keywords— social media; cyber migration; push-pull-mooring model; user behavior; social network analysis.

I. INTRODUCTION

Fifteen years have been passed since Friendster was released in United States in 2002, which was the original that allowed friends in real world can communicate with each other online. After since, Myspace created an SNS (Social Network Site)-based online interactable blog platform in 2003, and Facebook appeared in 2004 and continuously growing to be the largest Social Network Site in the world with 2 billion active users. The prevalence of social media usage was reported in a recent study by the Pew Research Center when they compared the usage data between 2005 and 2015. It was believed that the social media industry would keep growing with more and more new forms of social network sites appearing in the market.

It was hard to count how many social network sites were there in the market, but the so-called social-media boom adopted 2.46 billion users active online among different social networks by 2017, which was about 71 percent of internet users around the world. With rapid development of social media market, the rank of the most popular social network sites varied by different measures, such as engagement, countries, number of users, growth rate, classification, etc. However, it was common that users constantly switched among multiple sites in different periods of time and there was no doubt that users would most likely switch to new sites if the driving factors were strong enough. This described phenomenon, named "Cyber Migration", was introduced in 2009 [1]. After since, studies regarding this topic had been developed and applied push-pull-mooring model.

Previous studies evaluated on a good understanding about the intention of the switch behavior using push-pull-mooring model but minimal research had been studied or gave more details about how much possibilities there were a user might migrate to another social media depended on all kinds of affected factors. This paper would fill the gap and develop a new model to make such prediction and testified if push-pull-mooring model was applicable in nowadays. Though this paper is a preliminary research with 121 valid respondents contributed to the data analysis, it is believed that social media service providers can take benefits from this research because the model generated in this study will help define target market, predict users' behavior, and location better market promotions on social network sites.

II. LITERATURE REVIEW

In 2009, a survey study conducted by Cheng, Yang, and Lim as in [1] brought the concept of cyber migration. Relevant researches including user's sustained behavior and switch behavior of post adoptive application use have been developed in different fields of information technology.

A. The Push-Pull-Mooring Model

Applied by the migration theory, a study [2] empirically examines the three categories of antecedents for social network sites switching intention: push (i.e., dissatisfaction and regret), pull (i.e., alternative attractiveness), and mooring (i.e., switching costs) factors. This Push-Pull-Mooring model was commonly used in marketing research to explore user's switch behavior. The results showed that switching does not necessarily occur when push factors were in effect with a moderation of both pull and mooring factors.

In a perspective of the push-pull-mooring framework, the authors of [3] found that mooring forces, trust, privacy and security and switching cost had the strongest effect on

switching intentions. The effects of pull forces such as alternative attractiveness and peer influence on switching intentions were stronger than those of push forces such as inconvenience.

The results of customers' brand-switching behavior research showed that mooring factors included attitude, switching costs and online subjective norms were significant predictors for customers' brand-switching behavior. Also, pull factor included alternative attractiveness and price, as the only one affected factor of push factors, impacted brand-switching behavior, discussed in [4].

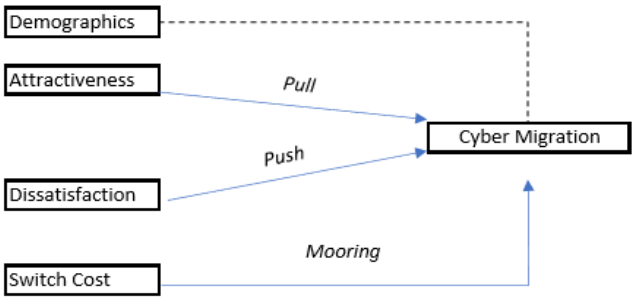

Fig. 1. Theoreotical Model

The concept of cyber migration was further extended in [5], in which the authors use the push-pull-mooring framework to investigate the key factors that influence consumers' switching intention in online shopping and, specifically, on webrooming platforms. The authors surveyed 280 individual samples and revealed that the pull factors have the strongest effect on the webrooming intention rather than the push factors or mooring factors.

B. Attractiveness, Satisfaction, and Dissatisfaction

The authors of [6] described a conceptualization of websites attractiveness in the context of social media and its relevance for potential usage. After testing 237 users, the results of a structural equation model showed that social media website attractiveness was determined by the 2nd-order dimensions interaction orientation, social networking and user-added value.

It was hypothesized that the magnitude of the effects of perceived benefits and costs on the value was contingent on the level of satisfaction in a switching context [7]. By investigating how satisfaction changes individuals' sensitivity toward benefits and costs during switching decision-making, Hsu's study incorporated satisfaction into a value-based decision model and confirmed that the level of satisfaction determines the importance of benefits and costs in switching value determination.

The partial least square (PLS) was used in a different research [8], which showed that both service quality and switching cost indirectly influenced the switching intention of users through the satisfaction and switching barriers, respectively. Moreover, convenience and peer pressure were the top reasons for switching social media platforms, whereas mobile capabilities and real-time access were the top motivations for switching to mobile social media sites.

A research [1] manifested dissatisfaction with member policy and peer influences as the main factors that cause users switching among existence of social network sites. Similarly, in [9], the authors found that four significant factors promote switching: dissatisfaction with socialization support, dissatisfaction with entertainment value, continuity cost, and peer influence.

C. Specific Service Switching

A study [10] researched deeper on current Facebook users and found that both dissatisfaction with the original social network sites and relative attractiveness of the competitive social network sites exerted strong positive impact on users' decision to switch to the competitive social network sites. The results of a study [11] revealed that the perceived relative values of a competing social network (when compared with the user's current social network) positively influence individual's intention to switch while the positive impact of perceived relative values on switching intention was mitigated by the user's perception of his/her salient social identity on the current use of social network sites.

By investigating instant message application preferences in China, the authors of [12] found that networks of obligation and trust transferred from instant message service provider have no significant effect on user's switch intentions but were mediated by functional and monetary deprivations. Another study regarding instant message application use as in [13] employed push-pull-mooring model and discovered that subjective norm had significant positive effects on switching intention, while inertia negatively affected switching intention.

For blog users, satisfaction, attractive alternatives, and sunk costs could significantly affect bloggers' switching intention while dissatisfaction with service stability, attractiveness in functionality, attractiveness in ease of use, and descriptive norms were found to be the most frequently cited reasons for bloggers' switching behavior [14]. The authors of [15] tested on 319 bloggers and confirmed positive influences of push and pull effects, a negative influence of mooring effects, and an interactive effect of push and mooring on switching intentions.

Further, push-pull-mooring migration theory was used to explore the reasons of online game players' switching intentions as well. The results of an early study indicated the mooring factors had a stronger influence on players' switching intentions than the pull factors while the push factors showed no significant influence [16]. Later in 2011, the authors confirmed the initial findings of that the similarities lie in the dominant role played by mooring and pull effects and the push effects was no longer concerns for online gamers [17].

D. Other related previous studies

In [18], the authors introduced the Social Network Sit Adoption model to find that perceived playfulness and perceived critical mass were the strongest indicators of intent

to use social network site while normative pressure was the weakest.

Drawing on the recognition of gratification and distress factors, authors of [19] argued that users made cost-benefit assessments leading to post-adoption decisions on whether to continue or discontinue social networking site use. As discontinuing the use of a social network also takes effort and has costs, a study [20] theorized that switching-stress creators and switching-exhaustion reduce discontinuous usage intentions.

The authors of [21] explained how different causal, intervening, and contextual conditions interact with and how internal and external pressures affect young professionals' decision to join new social media sites while abandoning others. The authors drew that some consequences or negative impact, such as strengthened relationships, frequency and immediacy of use, global reach, and ethical concerns, would become causal conditions to finish process of social media migration.

A fun fact was that current Facebook users will keep actively using Twitter, Snapchat, Instagram, and other social network sites rather than "migrate" with no coming back. Along with highly competitiveness in social media markets, users have adopted a wide range to digital technologies into social network sites. The authors of [22] examined why users adopted multimer forms of online communication instead of substituting one medium for another and what type of need did each of these social media fulfill. The research collected data from undergraduate students based on 77 surveys and 21 interviews to reveal that pastime, affection, fashion, share problems, sociability, and social information were the six key dimensions that Facebook-like users obtained to have fun and to know about social activities occurring in one's social network while Messenger-like feature was geared more toward relationship maintenance and development.

From blogs to social media, users switched to perform social processes like self-presentation and self-disclosure, and social contact on these websites to satisfy their needs [23]. A study of [24] summarized that user utilitarian (rational and goal-oriented) gratifications of immediate access and coordination, hedonic (pleasure-oriented) gratifications of affection and leisure, and website social presence were positive predictors of social network sites usage.

III. Study

The authors of [25] proposed a mathematical model to identify latent features (product features unknown to the public) from social media data based on the survey of innovative consumers (a.k.a. lead users) in order to discover the market needs for next generation product. However, with the large scale of social media users, innovative users' opinions weighted less. The report [26] found that 65% of American adults use social media whereas 90% of young adults (ages 18 to 29) were the most likely to use social media and 35% of all those 65 and older report using social media. Hence, this research targeted and collected data from individuals who were active on multiple social network sites and would like to use social media in the future, and those who escaped from social media. To make this research be more effective and reliable, a random sample of the population was selected from a four-year university and online through social network sites to take a survey.

IBM SPSS 25 was used as the major analysis tool. Based on Push-Pull-Mooring framed model, survey questions will be categorized and determined into push factors, pull factors, and mooring factors. Expected multiple linear function was predicted as

$$P = \beta + \beta_1 x_{pull} + \beta_2 x_{push} + \beta_3 x_{mooring} + e$$

where β were estimates of the population regression coefficients and e was a random error or disturbance.

The main research question about this study was to determine what factors were strongly associated with switching behavior. To achieve the objective, a questionnaire was designed based upon a 5-point Likert scale.

Through the research, it was expected to explore what pull factors, push factors, and mooring factors were. It was also believed that pull factors were positively associated with users' switching behavior while push factors and mooring factors were negatively associated with users' switching behavior. In such, following theoretically model was endorsed as Figure 1 below.

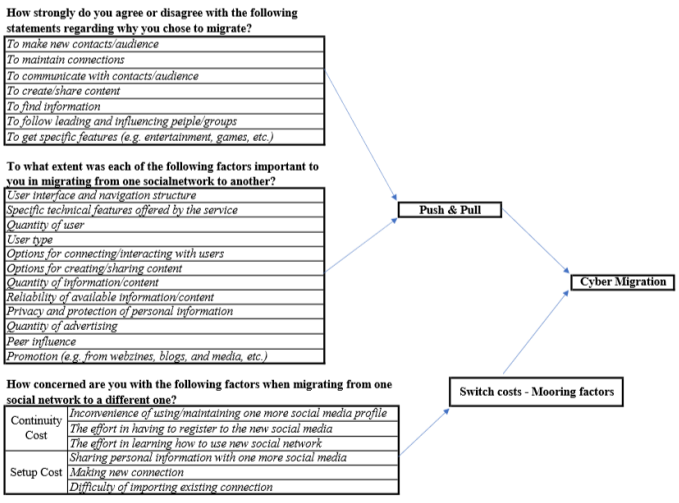

Fig. 2. The model for the study

IV. Results and Discussion

156 responses were collected (46.3% male and 52.1% female): 121 respondents admitted they experienced migration. Main migrated social media users were in age group between 18 and 24 (59%), 42% of migrated users had some college degrees, 27% had a master degree, 19% had a bachelor degree, 43% of users admitted they migrated within personal social. Only 31% of users completely abandon using old social media while 69% of migrated users would still check updates or post/communicate on old ones.

When all variables were included, the overall model was found to be statistically insignificant (p = 0.059, see Table I below) with R2 as 0.457. The adjusted R2 was 0.154, which meant the model as a whole explained 15.4% of the variance in user's choice of migrated categories.

The degrees of freedom for the F statistic, displayed in Table 1 above, were 43 and 77. As F(43, 77) = 0.63 at 95% confidence interval, which is less than 1.506 (F value), it concluded that the 43 independent variables as a group constitute a good predictor of users' social media migration choice. This did not imply that all variables had significant predictive ability; however, at least one of them did.

To determine which variable had no relationship with users' migration behavior, each variable was selected to make analysis with dependent variable in order to test if the variable was fit into simple linear regression model independently. The variables with relative low R2 value and relative high p-value represented the weakness of linear relationship at 95% confidence level. Variables with relative low R square and p > 0.05 were dropped. Table II below represented the variables with moderately significant value.

Therefore, with insignificant variables dropped, the reduced model would be

$$P = \beta_0 + \beta_1\, conn + \beta_2\, ccn1 + \beta_3\, spt1 + \beta_4\, spt2 + \beta_5\, spt6 + e$$

SPSS output was shown in Table 3 below. This model could be explained at 14% of users' migration behavior under 95% confident interval. Estimated multi-linear equation was predicted as

$$P = 5.065 - 0.179\, conn - 0.13\, ccn1 - 0.187\, spt1 - 0.128\, spt2 + 0.301\, spt6$$

Learned from the analysis above, overall, the multi-linear regression model explained that:

- Making new contacts/audience was negatively associated with the reason why users chose to migrate, which meant that the stronger agree to make new contacts/audience the less likelihood migrates to personal social;
- Concerned for inconvenience of using/maintaining one more social media profile was negatively associated with the users' choice of migration, which meant that the less concern the more likelihood migrates to personal social;
- Daily time spent on blogging was negatively associated with the users' choice of migration, which meant that lower frequency daily usage on blogging the more likelihood migrate to personal social;

TABLE I. MODEL SUMMARY

R	R^2	Adj. R^2	F	df1	df2	Sig.
.676	.457	.154	1.506	43	77	.059

- Daily time spent on career network was negatively associated with the users' choice of migration, which meant that higher frequency daily usage on career network the less likelihood migrates to personal social;
- Daily time spent on personal social network was positively associated with the users' choice of migration, which meant that higher frequency daily usage on personal social network the more likelihood migrates to personal social.

However, it was found that the model was insignificantly predicted by users' cyber migration behavior at 95% confidence interval. The researcher would discuss the research questions along with the results of above data analysis in this section below to explore the predictive validity of those variables.

The authors of [1] concluded that the push factor and the pull factor significantly influenced users' intentions to switch while mooring factor did not appear to be an important predictor. Additionally, only dissatisfaction with social media member policy and peer influence were examined to be strong predictors that affect users' migration intentions. In the contrast, in this study, peer influence contributed with R2 = 0.004 and p = 0.504, and privacy and protection of personal information contributed with R2 = 0.001 and p =0.732, which stated that neither above two variables was significant in this model.

In previous study investigating relationships between push-pull-mooring model and cyber migration, the authors defined pull factors as attractiveness, push factors as dissatisfaction, and mooring factors as switch cost. But the researcher in this study believed that the border between pull and push factors were not clear due to users' preferences and be varied by different social media platforms because it was believed that a pull factor of social media A might be a push factor of social media B. For example, the positive peer influence could lead to attractiveness of alternative social media and negative peer influence could lead to dissatisfaction of the social media the users were currently using; to some extent, the more dissatisfaction of current social media using the more attractiveness of alternatives. Besides, as both pull and push factors were assumed to be positively associated with users' migrating choice, the researcher grouped them together in this study and the model should be modified as Figure 2 below.

TABLE II. VARIABLES

Var	R^2	Sig.	Description
conn	.037	.036	To make new contacts/audience
ccn1	.051	.013	Concerned for inconvenience of using/maintaining one more social media profile
spt1	.06	.007	Daily time spent on career network
spt2	.0052	.0012	Daily time spent on discussion forum
spt6	.0065	.005	Daily time spent on personal network

TABLE III. COEFFICIENTS OUTPUT

Var	Coefficients	P	R2	Adj. R2	Sig
(Constant)	5.065	0	0.176	0.14	0
conn	-0.179	0.163			
ccn1	-0.13	0.187			
spt1	-0.187	0.189			
spt2	-0.128	0.331			
spt6	0.301	0.003			

Cross analyzing the data results along with the multi linear regression model generated above, it drew that, in push-pull-mooring frame, concerns for inconvenience of using/maintaining one more social media profile as mooring factor and making new contacts/audience as pull/push factor were only two predictors that highly impacted user's migrating choice.

V. CONCLUSION, LIMITATION AND FUTURE WORK

This study surveyed 156 social media users and collected 121 valid responses to examine factors that might affect their migrating choice and to build a predictive system by applying push-pull-mooring frame. The model explained that users' migrating choice was moderately impacted by concern for inconvenience of using/maintaining one more social media profile as mooring factor and making new contacts/audience as pull/push factor.

Overall, the created multi linear regression equation was approved insignificant to imply a prediction toward users' cyber migration behavior, and push-pull-mooring model was not applicable on cyber migration nowadays. Rather than evaluating attractiveness and dissatisfaction factors, users' migrating choice was greatly affected by usage time distributed daily. The previous studies conducted in [1] might not be suitable in today's social media market because the targeted social media platforms surveyed in the research, such as Myspace, Xiaonei.com, and Friendster, did not exist anymore. As a result, the data collected based on those social media would not be validated applying on current social media market. As the competition in current market is fierce, social media service providers today are trying to build a completed eco system to terminate uses of differentiation among platforms and so to attract and retain users. Current social media users would like to keep their accounts active on multiple platforms even switching behaviors do occur periodically based on connections and timed content flow.

However, it is too early to conclude that cyber migration does not exist in current market though users indeed would like to switch over different platforms. the researchers were precluded from conducting generalizations to a broader population of all major social media users because this preliminary study was limited to 156 observations and specifically 121 respondents. Compared with the huge number of social media users, 156 observations and specifically 121 respondents are quite few to make the prediction analysis and test.

As for this study, no significant indicators are found to influence users' migrating choice. In future study, a much larger population of social media users across multiple social media platforms could be sampled, which might get a different ratio and draw conclusive results. Additionally, with expected solid data, a machine learning algorithm can be applied to run the same test and help validate the research by finding patterns of users' social media selection or exploring the relationship associated with social media users' switching behavior.

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