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THE EFFECT OF WEB 2.0 ON INNOVATIVE WORK BEHAVIOUR AMONG ACADEMIA IN MALAYSIAN RESEARCH UNIVERSITIES

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ABSTRACT

Previous study indicates the user's degree of Web 2.0-ness is positively associated with his or her behavior. However, there is a paucity in examine the effect of Web 2.0 especially on innovative work behavior among academia in research universities even though it is imperative to be identified due to it demanding research nature. Web 2.0 are technologically driven and designed to allow people to communicate, share information and create online communities. Meanwhile, innovative work behavior refers to the creativity and involvement in bringing changes and new ideas in duties or in solving problems especially among academia in research universities which become the focus in this study. Innovative work behavior consists of generation, promotion, and realization of new ideas. Therefore, this study aims to identify the effect of Web 2.0 on innovative work behavior among academia in research universities. In our endeavor to this matter, we view the issue in a positivist paradigm with quantitative approach. This approach used surveys as research strategy by adapting questionnaires technique. The data collection has been conducted among 393 lecturers in five research universities and emphasize on the lecturer's research and development. Accordingly, data collected were analyzed using SPSS and SEM AMOS by looking at the exploratory factor analysis (EFA), confirmatory factor analysis (CFA), model fit, and path analysis. The result of this study indicates that the Web 2.0 has positive and significant relationship with the idea generation, idea promotion and idea realization of innovative work behavior.

Keywords: Web 2.0, innovative work behavior, academia.

INTRODUCTION

Nowadays, the lecturers' roles are more demanding to fulfill the need of the workforce especially in facing the research universities challenges. Research and development requirements create the situations on proliferation of academic demands. According to Zaini Ujang (Zaini Ujang, 2010), innovations need to be develop among lecturers through at least several approach such as the creation of innovative community and individuals that have spirit to go advanced in ways of thinking, approach and action in various fields. These indeed demands tremendous lecturers' innovative work behavior in fulfilling their roles for research and development, especially at a time when these new ecosystem require much of their development on innovation. Therefore, in order to improve the development of innovations, an understanding of employees' innovative work behavior is necessary (Messmann et al., 2012).

Nevertheless, along the way, the use of Internet has become an inescapable need for institution of higher education (Thanuskodi, 2011). Since the growing access of the Internet throughout the country including in education systems, lecturers have utilize various technologies on the Internet such as Web 2.0. Nowadays, Web 2.0 has become an evitable necessity for lecturers as the Web 2.0 continues to grow in popularity with educational institutions.

Therefore, the effects of Web 2.0 on innovative work behavior would like to be identified in this study. As according to Chiang et al (2009), this Web 2.0 heterogeneity, if well studied, not only will provide relevant managerial insights into the design and management of Web sites but also shed new light into information researchers' understanding of human information behavior. Chiang et al (2009) agree that the study in understanding this Web 2.0 phenomenon is crucial but has seen little discussion on it.

Therefore, this study on Web 2.0 has illustrated the association. In similar, this study would like to identify the effects of Web 2.0 on innovative work behavior. As supported by Ensher et al. (2003) that the internet has aided globalization and created a wide range of innovative work practices and positions.

In response to this matter, this study would identify the effect of Web 2.0 on innovative work behavior among academia in the context of Malaysian research universities. This study would identify the effect of Web 2.0 on innovative work behavior among academia in research and development activities. Therefore, it is hope that emphasis can be given to encourage the utilization of Web 2.0 that have effect on innovative work behavior experienced by academia especially in research universities.

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LITERATURE REVIEW

Innovative work behavior can be defined as the sum of all physical or cognitive work activities employees' carry out solitarily or in a social setting in order to generate, promote and realize ideas that are new and applicable to their specific work context (Messmann et al., 2010). Drawing from Kanter (1988) works and describing West and Farr (1989), Scott and Bruce (1994) assessed three dimensions of idea generation, idea promotion and idea realization to build the conception of innovative work behavior. Idea generation refer to creating new ideas for difficult issues; searching out new working methods, techniques or instruments; and generating original solutions for problems. Meanwhile, idea promotion refers to mobilizing support for innovative ideas; acquiring approval for innovative ideas; and making important organizational members enthusiastic for innovative ideas. Accordingly, idea realization refers to transforming innovative ideas into useful applications; introducing innovative ideas into the work environment in a systematic way; and evaluating the utility of innovative ideas (Rahman et al., 2014). In a word, this study implies the three dimensions of idea generation, idea promotion and idea realization that been distinguish from Kanter (1988), West and Farr (1989), and Scott and Bruce (1994) as it extensiveness to reflects the conception of innovative work behavior in the intended work role.

Meanwhile, Hester (2010) define Web 2.0 as the model for second generation Internet-based computing, that made the transition from static web pages to more dynamic and interactive web applications. In other words, Web 2.0 are technologically driven and designed to allow people to communicate, share information and create online communities (Garaba, 2012). Web 2.0 covers wide range of technologies and open standards that underpin the Internet. For example, technologies such as story boards, graphic aids, podcast/vodcat, web-based shared calendar, blog, document and multimedia sharing, wiki, web conferencing, virtual learning environment, forum, and office online. Other examples are technologies such as social search, social bookmarking, social network, e-portfolio, web syndication, polling, word clouds/ tag clouds, prediction markets, instant messaging and news groups.

Figure 1 shows the conceptual framework for this study that focusing on Web 2.0 and innovative work behavior.
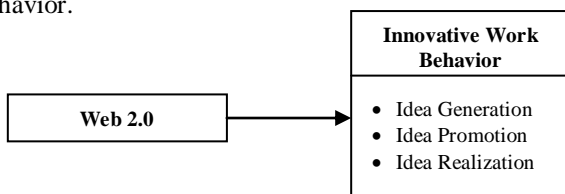

Figure-1. Conceptual Framework

As in Figure 1, the conceptual framework illustrates the variables and dimensions for this study based on the literature discussed in previous sub section.

In the context of this study, Web 2.0 is the predictor variable, while innovative work behavior is the outcome variable with the dimensions of idea generation, promotion and realization.

METHODOLOGY

This study was carried out in a positivist paradigm with quantitative approach. This study used surveys as research strategy by adapting questionnaires technique. A total number of 440 questionnaires were distributed and 393 questionnaires were returned, hence the response rate was 89%. The respondents were academia from five research universities. These five universities are Universiti Malaya, Universiti Sains Malaysia, Universiti Teknologi Malaysia, Universiti Putra Malaysia, and Universiti Kebangsaan Malaysia.

The respondents' age profile indicates that 7.9% or 31 respondents are at the age categories between 20-30 years old. Meanwhile, almost half of the respondents (55.2% or 217 respondents) are at the age categories between 31 to 40 years old. Subsequently, 28.2% or 111 respondents are at the age categories between 41 to 50 years old. Lastly, 8.7% or 34 respondents are at the age categories between 31 to 40 years old. As for the respondents' gender profile, it indicates that 45.5 % or 179 respondents are male and 54.5% or 214 respondents are female.

Web 2.0 was measured using newly constructed questionnaire instrument based from Krumova (2012) model of Web 2.0. It consist of twenty one items that assessed user's degree of Web 2.0-ness. Accordingly, innovative work behavior was measured by adapting the instruments by Scott and Bruce (1994). It consists of nine items where three items each were designed to measure the generation, promotion and realization of new ideas. The 7-points scale of Likert scale ranging from ''strongly disagree (1)'' to ''strongly agree (7)'' has been used to measure the items in the questionnaire of this study. The reason for 7-points scale was to allow the respondents of this questionnaire to have a wider choice to rightly express their agreeableness or disagreeableness on the statement in the questionnaire.

As for the data collection methods, both face-to-face survey and drop-off survey were utilized. A face-to-face survey is suitable for this study as it helps to hand respondents lists of choices from which they are to select an answer. It is also helpful when the researcher might need to give the respondents other types of visual aids such as tables/appendix to help formulate answers (Czaja et al., 2005). As highlight by Salant and Dillman (1994), face-to-face survey is best suited to may be complex questionnaires. This is accommodating especially in Web 2.0 section of the survey in this study. Web 2.0 section contain questionnaires that might be complex as it contains technology terms and may need further clarification from the researcher to the respondents. However, there are also respondents that prefer the drop-off survey method as it is more convenient for them to give the feedback at their own suitable time.

Data collected in this study were analyzed using SPSS and SEM AMOS. The data collected were analyzed through preliminary data analysis, the psychometric analysis of research instruments, and the hypotheses testing.

In the preliminary data analysis of research instruments, it looks at the normality analysis and the multicollinearity analysis. Initially, normality test was conducted as an early step in examining the data collected. Through normality analysis, data collected were investigated whether it is approximately being normally distributed. In details, the information of Skewness and Kurtosis statistics and also Normal Quantile-Quantile plot (Q-Q plot) were gathered to access the normality assumption. Meanwhile, multicollinearity analysis was conducted to avoid the cause of strange results when attempting to study how well individual independent variables contribute to an understanding of the dependent variable.

As for the psychometric analysis of research instruments, it looks at the exploratory factor analysis (EFA) for Web 2.0 variable and confirmatory factor analysis (CFA) for the innovative work behavior variable. In this study, the measurement items for Web 2.0 variable were newly developed based on Krumova (2012) model of Web 2.0 items. Therefore, this study has taken the effort to conduct the exploratory factor analysis (EFA) to examine the newly developed questionnaires for Web 2.0. For the newly developed measurement, EFA can be executed in the early stages of scale development to determine the number of latent constructs underlying a set of items (Wegener & Fabrigar 2000). Accordingly, the confirmatory factor analysis (CFA) was employed to test the measure of variables by testing the extent to which, observed items are linked to their underlying latent factors (Bryne, 2010).

Meanwhile, in the hypotheses testing, it looks at the model fit and path analysis. Model fit were measured to estimate how well a model fits the data. Accordingly, this study conducted path analysis to test the Standardized Path Estimated (* $p < .05$) for the effect of Web 2.0 on innovative work behavior. Path analysis provides estimates of the magnitude and significance of hypothesized causal connections between sets of variables.

FINDINGS

The findings of normality test on preliminary data analysis as in Table 2 showed that the variable seems to be approximately normally distributed when the of Skewness statistics was in the range of -1.00 to +1.00 and Kurtosis statistics was in the range of -2.00 to +2.00 (Coakes, 2011).

Table-1. Normality Analysis on Skewness and Kurtosis

Variable	Dimension	Skewness	Kurtosis
Web 2.0	Web 2.0	-.078	-.606
Innovative Work Behavior	Generation	-.687	1.576
	Promotion	-.253	.208
	Realization	-.557	.658

As in Figure 2, normal Q-Q plot was also one of the tools to measure the normality of the variable. If majority observed values (smaller dots) lies on the straight line in this plots, this variable is approximately normally distributed. In this study, it can be concluded that all variables were normally distributed. As for the multicollinearity test, the result showed the tolerance value ≥ 0.2 and the variance inflation factor (VIF) ≤ 5.
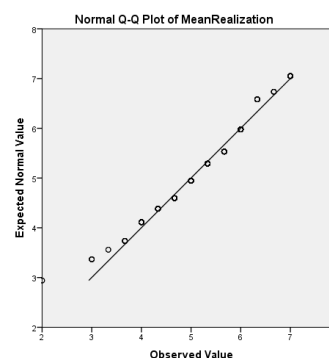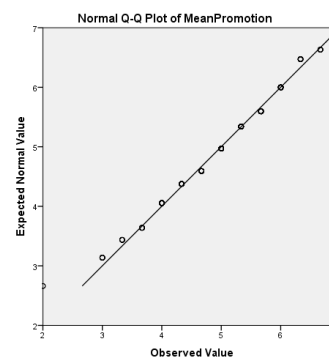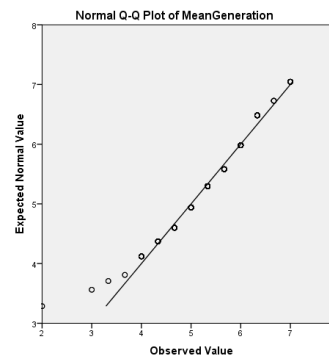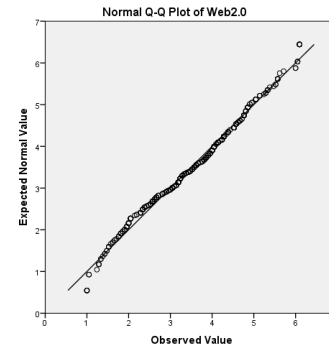

Figure-2. Q-Q Plot for Web 2.0 and Innovative Work Behavior

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Table-2. CFA for Innovative Work Behavior

Dimension	Item	Internal Reliability Cronbach's Alpha	Validity			
			Factor Loading	Communalities	AVE	Composite Reliability
Generation	I have the ability to generate original solutions for problems	0.87	0.877	0.769	0.69	0.87
	I have the ability to search out new working methods, techniques or instruments		0.821	0.674		
	I have the ability to create new ideas for difficult issues		0.799	0.638		
Promotion	I have the ability to make important research groups members enthusiastic for innovative ideas	0.90	0.836	0.699	0.75	0.90
	I have the ability to acquire approval for innovative ideas from important research group's members.		0.864	0.746		
	I have the ability to mobilize support for innovative ideas from important research group's members.		0.890	0.792		
Realization	I have the ability to evaluate the utility of innovative ideas	0.91	0.901	0.812	0.78	0.91
	I have the ability to introduce innovative ideas into the research in a systematic way		0.911	0.830		
	I have the ability to transform innovative ideas into useful applications		0.839	0.704		

Table-3. EFA for Web 2.0

Web 2.0 Items Included	Factor Loading
Most of the time, I use collaborative story boards* for collaboration purposes in my research	.876
Most of the time, I use collaborative graphic aids* for collaboration purposes in my research	.787
Most of the time, I use podcast/vodcast* for communication purposes in my research	.736
Most of the time, I use web-based shared calendar* for collaboration purposes in my research	.680
Most of the time, I use blog* for communication purposes in my research	.671
Most of the time, I use document and multimedia sharing* for collaboration purposes in my research	.663
Most of the time, I use wiki* for collaboration purposes in my research	.660
Most of the time, I use web conferencing* for collaboration purposes in my research	.594
Most of the time, I use virtual learning environment* for collaboration purposes in my research	.580
Most of the time, I use forum* for collaboration purposes in my research	.535
Most of the time, I use office online* for collaboration purposes in my research	.518
Most of the time, I use social search* for metadata creation purposes in my research	-.835
Most of the time, I use social bookmarking* for metadata creation purposes in my research	-.762
Most of the time, I use social network* for social graphing purposes in my research	-.757
Most of the time, I use e-portfolio* regularly for social graphing purposes in my research	-.718
Most of the time, I use web syndication* for metadata creation purposes in my research	-.678
Most of the time, I use polling* for collective estimation purposes in my research	-.609
Most of the time, I use word clouds/ tag clouds* for metadata creation purposes in my research	-.577
Most of the time, I use prediction markets* for collective estimation purposes in my research	-.421
Most of the time, I use instant messaging* for collaboration purposes in my research	-.335
Most of the time, I use news groups* for collaboration purposes in my research	-.326

Note: Cronbach's alphs = .905, % variance explained=6.15, Eigenvalue =1.747

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As for the psychometric analysis findings of exploratory factor analysis (EFA) for Web 2.0, it confirm that all the item factor loadings exceed the recommendation cut-off value of 0.3 item load, hence statistical significant.

As for the confirmatory factor analysis (CFA) for innovative work behavior variable, it confirm that all the item loadings and communalities value exceed the recommendation cut-off value of 0.5 item load and 0.3 communalities value, hence statistical significant (Hair, et. al., 2010). The Composite Reliabilities (CRs) for each constructs were also exceeding the minimum cut-off value of 0.7 (Hair, et. al, 2010). On other hand, the Average Variance Extracted (AVEs) of this model was exceeding the minimum cut-off 0.5 as suggested by Hair, et. al. (2010), Tabachnick and Fidell, (2007). The internal consistency reliability to test unidimensionality was assessed by Cronbach's Alpha test. The acceptable threshold of this analysis was 0.70 suggested by Nunnally and Bernstein (1994) and the structures pass the minimum requirement of this test.

As for the result of model fit for this study, the comparative fit index (CFI), goodness of fit index (GFI), incremental fit indices (IFI) and normed fit index (NFI) index value exceeding the threshold recommended value of 0.90. These results indicating acceptable model fit. However, the RMSEA index was below the cut-off level 0.10 and x²/df value is over identified and these required further warrant and investigation.

Even so, the hypothesis testing through path analysis shows the positive and significant relationship of Web 2.0 on innovative work behavior. Accordingly, Table 3 shows the result of path analysis model.

Table-4. Path Analysis of the Model Structure

Variable/ Dimension	Idea Generation		Idea Promotion		Idea Realization	
	$\beta < 1.00$	$p < 0.05$	$\beta < 1.00$	$p < 0.05$	$\beta < 1.00$	$p < 0.05$
Web 2.0	0.124	0.014	0.127	0.011	0.245	***
R²	0.015		0.016		0.060	

*** P ≤ 0.001

Based on Table 3 above, the result of the structural model indicated that Web 2.0 ($\beta = 0.124$, $p = 0.014$) was positively and significantly related to idea generation. The squared multiple correlations or R² interpreted that the utilization of Web 2.0 explained only 1.5% towards idea generation.

Whereas, the result of the structural model also showed that Web 2.0 ($\beta = 0.127$, $p = 0.011$) was positively and significantly related towards idea promotion. The utilization of Web 2.0 explained only 1.6% ($R^2 = 0.016$) towards idea promotion.

It is also indicated the similar result where Web 2.0 ($\beta = 0.245$, $p = ***$) was positively and significantly related to idea realization. The utilization of Web 2.0 explained 6% ($R^2 = 0.007$) towards idea realization.

Therefore, Figure 3 show the overall model structure. It is on the Web 2.0 effect on innovative work behavior that consists of idea generation, promotion, and realization.
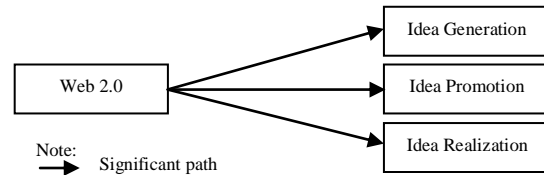

Figure-3. Overall Model Structure

This study found that the Web 2.0 has effect on the idea generation, idea promotion and idea realization dimensions of innovative work behavior among academia in research universities.

DISCUSSION AND CONCLUSION

The result of the structural model indicated that Web 2.0 was positively and significantly related to idea generation of innovative work behavior. Relatively, as been highlighted by Senderovitz (2009), some companies in industry have already been using the web for idea generation (e.g., Procter & Gamble's Connect & Develop and InnoCentive). Identically, it also adds value to other organization, including among the academia in research universities as in this study. As showed by the result of this study, Web 2.0 was positively and significantly related to idea generation among academia in research universities.

Fundamentally, as stressed by Masseti et al. (1999), one apparent benefit Web 2.0 provides to academia in research universities were the opportunity to seek and find vast amounts of information on virtually any subject. Accordingly, by having more information available, it is reasonable to believe that the academia would be able to generate more ideas than he/she would without Web support. Therefore, given that the Web 2.0 is being used more frequently for information and research purposes in research universities, Web 2.0 use can enhanced the idea generation among academia in research universities as in this study.

Web 2.0 was positively and significantly towards idea generation such as creating new ideas for difficult issues. It involved searching out new working methods, techniques or instruments. It also involved generating original solutions for problems. Hertogh et al. (2011) highlighted that Web 2.0 could periodically synthesized the outcomes of the continuously evolving idea generation processes by creating rankings on the portfolio of ideas discussed on the platform at any given moment, based on page views, votes, tags, among others.

However, even though Web 2.0 was positively and significantly related to idea generation among academia in research universities, the squared multiple correlation or R² showed that Web 2.0 explained only 1.5% towards idea generation. Thus, the research management of the research universities must introduce and promote the Web 2.0 technologies to encourage the

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usage of Web 2.0 among academia in their research activities. The academia also must get themselves well informed on how to utilize the useful Web 2.0 items for their research activities. This can be learned through mentoring with senior researcher or other experienced researcher on how to use Web 2.0 for idea generation.

The result of the structural model also indicated that Web 2.0 was positively and significantly related to idea promotion of innovative work behavior. Web 2.0 was positively and significantly towards idea promotion such as mobilizing support for innovative ideas. Web 2.0 also helps for acquiring approval for the innovative ideas. Web 2.0 also contributes in making important organizational members enthusiastic for the innovative ideas.

As highlighted by Greenhow et al. (2009), these Web 2.0 technologies are opening up educative outlets among communities of academia where academia can choose to build an online network of resources, colleagues, and authorship. In the process, academia can promote their new ideas through building new identities and connections, and promoting research ideas with a wider audience than imaginable with traditional relationship.

For example, academia could gather data from individuals' social networks, such as Facebook, MySpace, or others. Access to status updates, wall postings, photos, and other information might be of interest to investigators across many disciplines. Gathering such data is possible if academia provide investigators with access (i.e., add the investigator as a friend or show the profile to the investigator) (Greenhow, et al., 2009). This could lead to the use of Web 2.0 for idea promotion.

Although Web 2.0 was positively and significantly related to idea promotion among academia in research universities, the squared multiple correlation or R^2 showed that Web 2.0 explained only 1.6% towards idea promotion. Therefore, it would be best if idea promotion occurs when academia, other researchers, companies, government and nongovernmental organizations were on certain Web 2.0 networks together to ensure that the promotion of new ideas reach the public, but are appropriately regulated and efficiently delivered to those who enthusiastic for the innovative ideas. Thus, as been stressed by Nik Azida Abd Ghani et al., (2009b), among the effort that can be taken into consideration by leaders are implementing training session; providing open and transparent channel of communication, supporting collaboration or teamwork; and encouraging collegiality among academia. The research management in research universities can also encourage and facilitate networking among institutions so that Web 2.0 use to promote new ideas can be improved.

Lastly, the result of the structural model also indicated that Web 2.0 was positively and significantly related to idea realization of innovative work behavior. Web 2.0 was positively and significantly towards idea realization such as transforming innovative ideas into useful applications. It also involved introducing innovative ideas into the work environment in a systematic way.

Accordingly, it also engaged in evaluating the utility of innovative ideas.

For example, with Web 2.0 technologies such as document and multimedia sharing, office online, web-based shared calendar, web conferencing, research activities for small or large, heavily funded university projects now become possible across all groups, faculty and with the other institutions. Google's suite of Web-based applications (e.g., Google Docs, Google spreadsheets, Google calendar) helps academia to plan remotely or work together online, leading them to develop new idea realization practices.

As the squared multiple correlation or R^2 showed that Web 2.0 explained only 6% towards idea realization, the academia might be interested to attend professional course on utilizing these Web 2.0 technologies for idea realization of their research activities.

In conclusion, we believed that these emergent Web 2.0 technologies hold great promise and challenges for transforming innovative work behavior among academia in research universities. We need to pursue understanding of those opportunities with Web 2.0 use and challenge existing barriers that prevent academia from taking a step toward discovery of the possibilities on their innovative work behavior. Further investigation could be conduct to explore more to answer our inquiry about manifestations of Web 2.0 use on innovative work behavior beyond what we currently know.

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