# Predictors of Diverse Usage Behavior towards Personal Knowledge Management Systems

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## Abstract

**Purpose** – This study argues that individuals' use of personal knowledge management systems (PKMS) significantly differs as a result of their underlying innovativeness and involvement traits. Based on the literature, this study proposes that whilst more-involved users utilize PKMS more frequently, more-innovative users utilize more functions of PKMS. Accordingly, this study informs scholars and managers that using a single approach - that is, only use frequency or the number of functions used - to evaluate the performance of a PKMS may lead to a biased result.

**Design/methodology/approach** – A field survey was conducted to collect data. Correlation techniques and regression analysis were used to test the proposed relationship between constructs.

**Findings** – Findings indicated that whilst both traits were significantly associated with PKMS usage behaviors, users' involvement was the primary predictor of PKMS use frequency, while users' innovativeness predominated in the prediction of the number of PKMS functions they used. That is, although more-involved users may use fewer functions compared with more-innovative users, they are more likely to become long-term supporters of PKMS because their use frequency is significantly higher than that of more-innovative users.

**Originality/value** – After a half-century of development of information technology, this paper addresses the importance of taking a step further and verifying the behaviors related to the use of PKMS with different approaches such as use frequency and the number of functions used. In particular, this study is a pioneering piece of research in the information system discipline, revealing that individuals' underlying innovativeness and involvement contribute to different PKMS use behaviors.

**Paper type** – Research paper



**Keywords** – Personal Knowledge Management System, Web, Involvement, Innovativeness, Use frequency, Number of function used.

# 1. Introduction

Knowledge management (KM), which comprises different procedures for creating, securing, coordinating, combining, retrieving, and distributing knowledge (Lin *et al.*, 2006), has grown to be an essential concept in information technology (Liaw *et al.*, 2008). As more and more organizations invest in building knowledge management systems (KMS) to apply knowledge effectively, both internally within the organizations and externally to the consumers via information technology, KM has quickly diffused within academic circles and practical organizations (Chen and Chen, 2005). In fact, today's knowledge-based economy has not only shaped organizations' increasing demand for KM: individuals' need for KM has also become greater than ever. Leading software companies have thus competed in developing personal knowledge management systems (PKMS) in response to this market request. As the Web provides a convenient and useful platform for information storage and retrieval (Chung *et al.*, 2008), PKMS on the Web has rapidly become the new star of KM fields and attracted the attention of scholars and practitioners.

The goal of PKM is to help individuals to create, organize, and make available important knowledge each time it is needed. PKMS thus is important to individuals' daily life because whenever a person wants to learn something new, or search for potentially useful information, PKMS will help them to achieve these objectives in a more effective and efficient way via information technology. For example, Google Desktop, the first version of which was released by Google in October 2004, is one of the most popular PKMS on the Web. It is a desktop search program allowing text searches of a user's e-mails, computer files, music, photos, chats, Web pages viewed, and other interesting Google tools. Personal wiki is another popular PKMS on the Web. It is a wiki preserved primarily for personal use, which allows individuals to organize information on their desktop or mobile computing devices in the similar way to community wikis. It also provides new functions that are different from traditional wikis, such as dynamic tree views of the wiki, drag and drop support for images, text and video, mathematics and multimedia embedding.

Although the individual factor is argued to be an important feature distinguishing KMS from other information systems (ISs) (Rao and Osei-Bryson, 2007), a large number of past KMS studies have been limited to a technical focus (Chen and Chen, 2005). Further, not much attention has been paid to assessing the actual

effectiveness of KMS (Ong and Lai, 2007), or to metrics that evaluate KMS performance (Chen and Chen, 2005) in the related literature. The importance of understanding user behavior towards PKMS at the individual level cannot be neglected because the anticipated benefits and returns from IS investment will never be realized if the intended users do not accept a particular system. To add value to the PKMS literature, this study aims to explore the usage of PKMS from a personal trait perspective. Whilst past studies have reported that personal innovativeness (e.g., Li *et al*., 2006; Yi *et al.,* 2006) and involvement (e.g., Garfield *et al.,* 2001; Griffith *et al.,* 2001) have significant impacts on the acceptance of information systems, few studies have further revealed the explicit relationships of these traits to acceptance behaviors. According to Igbaria *et al.* (1989), users' acceptance can be examined in terms of the frequency of use of a system and the number of functions used. This study was thus designed to empirically investigate how individuals' innovativeness and involvement may be associated with and predominate over different PKMS usage behaviors in terms of use frequency and the number of functions used. The findings will be valuable for researchers and practitioners in implementing PKMS and evaluating the performance of PKMS on the Web. In the subsequent sections, the relevant theories and hypotheses, methodology used, data analyses and discussion, and conclusions and managerial implications are presented in sequence.

## 2. Theoretical Background and Hypothesis Development

### 2.1. Personal Involvement

Personal involvement has played a significant role in consumer behavior theories (Warrington and Shim, 2000). The involvement trait has been used to explain customers' responses to advertising, products, purchase decisions, brands and even technology (e.g., Bloch *et al.,* 1986). Product involvement is the interest a consumer finds in a product class: that is, the customer's perception of whether the product class meets his/her important values or goals (Mittal and Lee, 1989). Product involvement is a stable characteristic that does not change very much over time (Mittal, 1989), varies between customers (Foxall and Bhate, 1993a; Wang *et al.,* 2006a), and is a key determinant of customers' behavior (Foxall and Bhate, 1991; Wang *et al.*, 2006b). Consumers with higher product involvement are likely to seek more information about brands and products (e.g. Beatty and Smith, 1987; Bloch *et al.,* 1986), use more

criteria when making a purchase decision, and form attitudes towards the product which are more resistant to change (Petty and Cacioppo, 1981).

Bhattacherjee (2001) asserted that to a great extent, information system adoption is a type of customer behavior: users act as customers and the information system is the product. Personal involvement has been confirmed to provide good explanations of users' perceptions and behaviors towards an information system (Doll and Torkzadeh, 1989; Cegarra and Hoc, 2006) and significantly impact on the implementation of organizational IS (Tait and Vessey, 1988). In the Web environment, personal involvement has been found to positively influence consumers' purchase frequency from Websites (Wang *et al.*, 2006b) and how they respond to avatars and sales agents (Holzwarth *et al.,* 2006).

### 2.2. Personal Innovativeness

In the psychology and marketing disciplines, Kirton's adaption-innovation theory (Kirton, 1976) has been widely used to examine the individual's innovation adoption behavior (e.g., Bagozzi and Foxall, 1996; Gallivan, 2003; Tullett, 1995; Wunderley *et al.,* 1998). Kirton contended that individuals characteristically exhibit one of two distinct styles of problem-solving and decision-making and are therefore innovators or adaptors. At the one extreme, adaptors prefer to make decisions in an orderly and precise manner, and they confine their problem-solving actions to the framework within which the problem has arisen. At the other extreme, innovators prefer to think tangentially, challenge rules and break with existing methods, and advocate novel solutions whenever there is a problem. When dealing with familiar tasks, they tend to generate better ways to approach them, and their solutions can be unobtrusively implemented within existing working practices. Everyone, according to the theory, can be placed on a continuum in terms of problem-solving styles, with extreme adaptors at one end and extreme innovators at the other.

Kirton's adaption-innovation theory has further been applied in IS studies to reveal the relationship between individuals' creativity and their behaviors. For example, Nagasundaram and Bostrom (1994) used adaption-innovation theory to investigate idea generation in the context of group support systems so as to help organizations develop and maintain environments that foster workforce creativity. Vandenbosch and Huff (1997) applied this theory to understand how the degree of

innovativeness might affect managers' usage of executive information systems, whilst more recently, Gallivan (2003) employed adaption-innovation theory to reveal how software developers' creative styles might impact on their attitudes to software design performance.

### 2.3. Personal Knowledge Management Systems and System Usage

KM encompasses processes of identifying, gathering, analyzing, constructing, sharing, and applying knowledge into practical activities (Liaw *et al.*, 2008). To support these processes with information technology, KMS were developed. In general, organizations deploy KMS so as to (1) capture, create, and share knowledge assets; (2) locate relevant information knowledge; (3) provide an environment for knowledge exchange; (4) connect people with relevant interests and/or skills; and finally (5) facilitate and/or support intelligent problem solving (e.g., decision making), according to Tsui (2004).

PKM also comprises the aforementioned processes to provide the information needed, but is focused at the individual rather than the organizational level. In practical terms, PKM is about how individuals can find personal sources of information on their own computers or mobile computing devices and leverage this information to create unique values of their intelligence and knowledge, in order to work or live better (Miller, 2005). More specifically, it is about (1) managing all of the information that comes to your computer or smartphone desktop; (2) clarify the source of the knowledge; and (3) understanding that information and make it useful to the user. To achieve these goals, PKMS have been built to facilitate the PKM process using information technology. In fact, as the Internet's tremendous power in tailoring products on the basis of consumers' preferences has been argued to perform outstandingly well in the case of KM (Liang *et al.*, 2006), PKMS on the Web has become crucial to users, researchers and managers. Google desktop is a popular PKMS offering various handy functions to support users in their daily life, such as email, a scratch pad, photos, news, weather, or Web clips. It is not only individual users who have downloaded Google desktop for personal use; companies that cannot afford to develop their own PKMS to support workers have also implemented the Google desktop system.

As individual users play the key role in PKMS implementation, their PKMS

usage behavior has become an appropriate indicator of system performance. In support of this, a small but growing number of studies have revealed that users' behaviors, in terms of use frequency (e.g., DeLone, 1988; Srinivasan, 1985; Davis *et al.*, 1989) and the number of functions used (e.g., Schiffman *et al.*, 1992; Thompson *et al.*, 1991; Igbaria *et al.*, 1989), are good indications of information system performance. More recently, Igbaria *et al.* (1995) empirically tested this assertion and reported that perceived use frequency and the number of software packages used were significant predictors of personal usage behavior with regard to microcomputers.

Consistent with these IS studies, Foxall and Bhate, researchers in the marketing and psychology disciplines, have gone a step further and successfully demonstrated the relationships between users' cognitive traits and their computer usage behavior. They have designed and conducted a series of studies to verify how innovativeness and involvement may impact on individuals' computer usage in term of computer usage frequency and the number of packages used. The first two studies (Foxall and Bhate, 1991, 1993b) examined 107 and 150 current computer users and showed that both involvement and innovativeness significantly influence their use behavior of home computing software applications. Specifically, personal involvement was found to dominate the impact on the frequency of computer use whilst personal innovativeness was reported to have a major influence on the number of packages used. The third study (Foxall and Bhate, 1999) further tested 127 graduate business school students from three different programs (i.e. Business Information Technology Systems, Marketing, and Legal Practice), which may have different levels of demand in terms of using computing software applications. Findings were in support of the first two studies.

Based on these discussions, a research model (see Figure 1) was developed and the following research hypotheses are proposed:

*H1: Both online users'* involvement *and innovativeness are positively related to their PKMS usage* frequency, *but involvement has a greater impact on PKMS usage frequency than does innovativeness.*

*H2: Both online users'* involvement *and innovativeness are positively related to the number of PKMS functions used, but innovativeness has a greater impact on the number of PKMS functions used than does involvement.*

---------- *Insert Figure 1 here* ----------

# 3. Research Methodology

## 3.1. System Platform and Subjects

A Web-based PKMS, Google desktop, was selected and tested in this study for three reasons: (1) it is free and online users can easily gain access to it, (2) it provides a wide variety of functions with high system reliability, and (3) it offers powerful taxonomy processes and desktop search tools which support users in organizing, subscribing to, publishing and finding information that resides on their own desktops. Many organizations and companies have implemented Google desktop to assist employees in their personal content management. As such, studies have regarded Google desktop as a valid example of PKMSs on the Web (e.g., Siebert *et al.* 2006).

The empirical data were collected from 168 postgraduate students studying in business schools. These students were taking modules on management information systems, electronic commence, or Internet marketing in the same semester. At the beginning of the semester, a brief survey was conducted, asking about their intentions to participate in the research and whether they had used Google desktop before. One hundred and forty-two students who volunteered to join and were new to Google desktop were recruited. Every subject was required to undergo a thirty-minute training session, including an introduction to PKM and how to use Google desktop. After the training, each subject was asked to record his/her usage behavior towards Google Desktop in the following month. At the end of that month, each subject was asked to complete a research questionnaire (see Table 1 in the next section). Finally, 107 valid and complete questionnaires were received. Among all the respondents, 64 were males and 43 were females. The average age was 25 years.

## 3.2. Measurements

Four constructs were developed and examined in this study. Domain specific innovativeness, proposed by Goldsmith and Hofacker (1991), was employed to measure personal innovativeness. The measurement of personal involvement was adapted from Zaichkowsky's (1987) revised personal involvement inventory. Further, PKMS usage was measured via two dimensions: number of functions used

and system usage frequency. These two constructs were tested using an open question that subjects could answer according their personal usage experiences. Table 1 provides the scale items for these constructs.

---------- *Insert Table 1 here* ----------

# 4. Research Results

## 4.1. Data Validation

Analyses of all constructs were conducted using SPSS for Windows. Both constructs - i.e., domain-specific innovativeness and the personal involvement inventory - demonstrated adequate reliability and construct validity. Cronbach's alpha values were 0.95 and 0.81 for the revised personal involvement inventory and domain-specific innovativeness, respectively. Furthermore, Table 2 shows that factor loadings on the intended constructs were all above the thresholds (0.70) and cross-loadings were lower than 0.40. Since the data validation results indicated that the constructs were unidimensional, the scores for the items of each construct were aggregated for further analyses.

---------- *Insert Table 2 here* ----------

## 4.2. Hypothesis Testing

Table 3 shows the means, standard deviations and intercorrelations for personal innovativeness towards the PKMS, personal involvement towards the PKMS, PKMS usage frequency and number of PKMS functions used. PKMS usage frequency was positively related to personal innovativeness ($r = 0.37$, $p < 0.01$) and personal involvement ($r = 0.50$, $p < 0.01$). The number of PKMS functions used was positively related to personal innovativeness ($r = 0.51$, $p<0.01$) and personal involvement ($r = 0.30$, $p < 0.01$). These Pearson product-moment correlation coefficients indicate the relative intensity of individuals' cognitive traits in the prediction of PKMS usage. Further, two multiple regression models were developed to examine the research hypotheses proposed in this study:

$$\text{PKMS usage frequency} = \beta_0+\beta_1 * \text{Innovativeness} +\beta_2 * \text{Involvement} \ldots (1)$$

Number of PKMS functions used = $\beta_3+\beta_4$* Innovativeness +$\beta_5$* Involvement...(2)

---------- *Insert Table 3 here* ----------

Model 1 has a high F ratio (F (2, 104) = 24.05, $p < 0.01$), indicating acceptable fit ($R^2 = 0.32$), and is statistically significant in explaining PKMS usage frequency. The Beta coefficients ($\beta_1 = 0.27$, $p < 0.001$ and $\beta_2 = 0.44$, $p = 0.001$ respectively) indicate the relative importance of the independent variables in explaining PKMS usage frequency. In other words, both individuals' innovativeness and involvement toward PKMS are positively related to their PKMS usage frequency, but involvement has a greater impact on PKMS usage frequency than innovativeness. That is, H1 is supported.

Furthermore, Model 2 also indicates an acceptable fit ($R^2 = 0.30$) and has a significant F ratio (F (2, 104) = 22.16, $p < 0.01$). It is statistically significant in explaining the number of PKMS functions used. The Beta coefficients ($\beta_4 = 0.47$, $p < 0.001$ and $\beta_5 = 0.19$, $p = 0.023$ respectively) show that individuals' innovativeness and involvement with PKMS are both positively related to the number of PKMS functions used, but innovativeness has a greater impact on the number of PKMS functions used than involvement. Thus, H2 is supported.

## 5. Conclusions and Managerial Implications

This study's findings have revealed that online users' differences in involvement and innovativeness were associated with significant differences in their PKMS usage behaviors. Whilst both traits were found to be significantly related to usage frequency and the number of functions used, users' involvement was the primary predictor of PKMS use frequency, while on the other hand, users' innovativeness was found to be the main predictor of the number of PKMS functions used. That is, although more-innovative users may use more of the functions offered by PKMS than do more-involved users, their use frequency for specific functions may be much lower than that of more-involved users. More-involved users are therefore more likely to become long-term supporters of the system compared with more-innovative users. In support of this, Wang *et al.* (2006b) indicated that more-involved users tend to be most engaged with decision aids, but their tendency towards novelty seeking is not as

strong as that of more-innovative users.

Figure 2 illustrates the relationship between personal involvement, personal innovativeness, individuals' PKMS usage and aggregated PKMS usage. That is, individuals can be located on a continuum ranging from "more-involved" to "more innovative" and their locations represent their PKMS usage behavior. When users make their individual decisions about how to use PKMS according to their innovativeness and involvement traits, these decisions accumulate to produce the macro patterns of different usage behaviors involving PKMS on the Web. Accordingly, the PKMS usage behavior of more-involved users was found to form a leptokurtic distribution, whilst that of more-innovative users formed a platykurtic distribution (see Figure 2).

---------- *Insert Figure 2 here* ----------

In sum, the theoretical contribution of this paper is two-fold: first, it has broadened the knowledge of PKMS on the Web, from a mainly technical focus to the development of a theoretical basis for understanding how users' diverse personal traits may predict their different use behaviors regarding PKMS on the Web. Second, it has informed scholars and managers that using a single construct to examine users' acceptance of an information system is too fragile an approach. As information technology has been developed over the past half-century and more, it is time to take a step further and verify use behavior with more dimensions to provide a thorough picture of individuals' acceptance of information systems.

In practical terms, this study will help executives to recognize that not every online user benefits from PKMS on the Web to the same extent, as users may differ significantly in terms of use frequency and the number of functions used as a result of their personal traits. Consequently, evaluations of the PKMS acceptance should not limit themselves to examining use intention or use frequency only. Otherwise, an incomplete picture of users' system acceptance, generated via the uni-dimensional approach, may lead to a biased standpoint for managers who are responsible for reviewing PKMS performance after installation.

In fact, individuals' frequency of IS usage has been widely utilized to evaluate the performance of new systems in IS studies and in real-world companies.

However, according to this study's findings, individual users' frequency of use and the number of functions used may differ significantly, due to their underlying innovativeness and involvement traits, so utilizing use frequency alone to evaluate a system's performance may be misleading. That is, if the majority of the knowledge workers within an organization tend to be more-innovative users, as is common in system development companies, although they may use PKMS less frequently, they tend to use a great number of the functions that PKMS offers. In other words, the PKMS's quality and design are still confirmed by these workers. However, this fact will not be revealed in the performance evaluation report if only the use frequency is taken into account. In sum, organizations that implement PKMS should use both indicators to ensure a more accurate performance report. After all, the anticipated benefits and returns from PKMS investment can only be fulfilled if the company can understand and subsequently stimulate the usage behaviors of the intended users.

Future studies examining the diverse usage behavior of different ISs or Web systems are essential. Moreover, as more-innovative users tend to use more system functions and more-involved users tend to use systems more frequently, it may be of interest to practitioners to reveal strategies to enhance individuals' innovativeness and involvement levels or ways to transform less-involved users into more-involved users. Such studies are expected to have fruitful implications for researchers in the implementation of PKMS on the Web.

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Table 1. Constructs and scale items

| Construct | | Scale Items |
|---|---|---|
| Personal innovativeness towards the PKMS | DSI1 | If I heard about a new personal knowledge management system, I would look for ways to experiment with it: 1: Strongly disagree … 7: Strongly agree. |
| | DSI2 | Among my friends, I am usually the first to try out new personal knowledge management systems: 1: Strongly disagree …7: Strongly agree. |
| | DSI3 | In general, I am hesitant to try out new personal knowledge management systems: 1: Strongly disagree…7: Strongly agree. |
| | DSI4 | I like to experiment with new personal knowledge management systems: 1: Strongly disagree …7: Strongly agree. |
| Personal involvement towards the PKMS | To me, the personal knowledge management system is: | |
| | RPII1 | 1: unimportant...7: important. |
| | RPII2 | 1: boring …7: interesting. |
| | RPII3 | 1: irrelevant...7: relevant. |
| | RPII4 | 1: unexciting…7: exciting. |
| | RPII5 | 1: means nothing…7: means a lot. |
| | RPII6 | 1: unappealing…7: appealing. |
| | RPII7 | 1: mundane…7: fascinating. |
| | RPII8 | 1: worthless…7: valuable. |
| | RPII9 | 1: uninvolving…7: Involving |
| | RPII10 | 1: not needed…7: needed. |
| Number of PKMS functions used | How many functions supplied by Google desktop have you used in the past month? (open question) | |
| PKMS usage frequency | Following the answer to the previous question, please list your frequency of use of each function you have indicated above (open question) | |

Table 2. Results of exploratory factor analysis

| Construct | Scale Items | Factor Loadings | |
|---|---|---|---|
| | | Factor1 | Factor2 |
| Personal innovativeness towards the PKMS | DSI1 | 0.06 | 0.72 |
| | DSI2 | 0.13 | 0.82 |
| | DSI3 | -0.05 | 0.83 |
| | DSI4 | 0.10 | 0.73 |
| Personal involvement towards the PKMS | RPII1 | 0.81 | 0.21 |
| | RPII2 | 0.74 | 0.38 |
| | RPII3 | 0.86 | 0.23 |
| | RPII4 | 0.82 | -0.09 |
| | RPII5 | 0.88 | 0.01 |
| | RPII6 | 0.88 | -0.09 |
| | RPII7 | 0.85 | -0.16 |
| | RPII8 | 0.77 | 0.40 |
| | RPII9 | 0.86 | 0.06 |
| | RPII10 | 0.80 | 0.40 |
| Eigenvalue | | 7.2 | 2.7 |
| Percentage of variance | | 51.72 | 70.78 |

Table 3. Summary of descriptive statistics

| Construct | Means (Standard deviation) | Factor correlations[a] | | | |
|---|---|---|---|---|---|
| | | (1) | (2) | (3) | (4) |
| Personal innovativeness toward PKMS (1) | 4.37 (1.14) | 1.00 | | | |
| Personal involvement toward PKMS (2) | 5.36 (0.94) | 0.22* | 1.00 | | |
| Number of PKMS functions used (3) | 8.96 (1.01) | 0.51** | 0.30** | 1.00 | |
| PKMS usage frequency (4) | 22.03 (3.92) | 0.37** | 0.50** | 0.02 | 1.00 |

Note: *$p < 0.05$; **$p < 0.01$

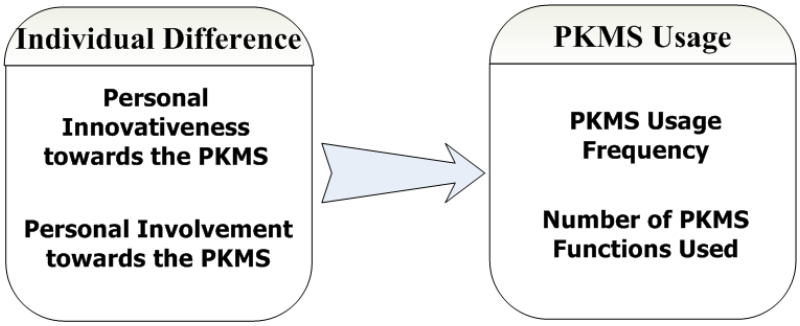


Figure 1. Research model

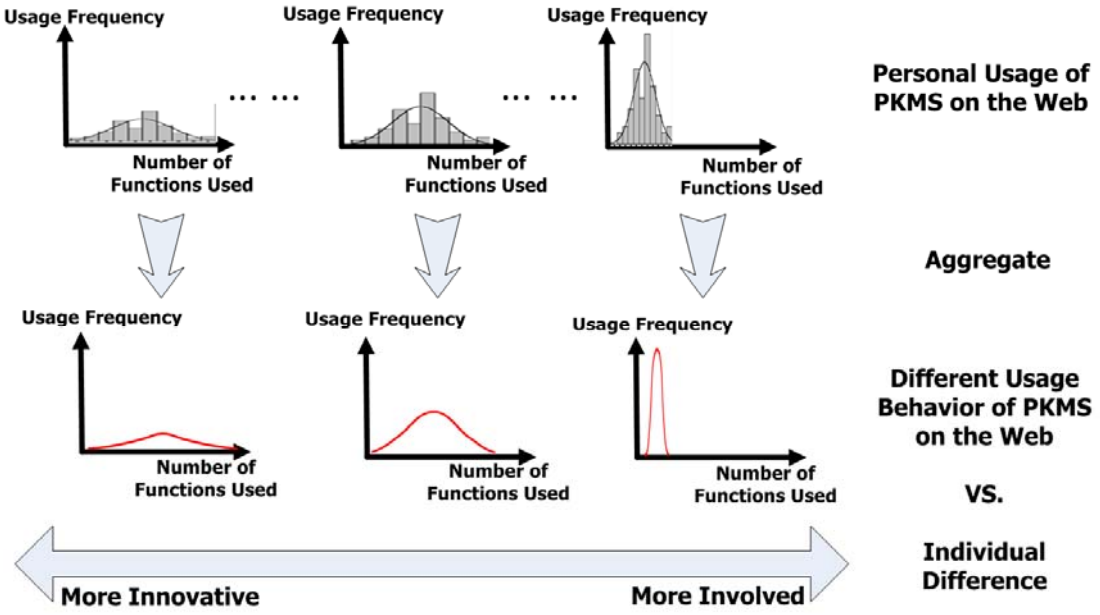


Figure 2. Relationship between PKMS usage behavior and personal traits