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Leverage Points for Addressing Digital Inequalities: Comparing Under-Privileged Adopters and Non-Adopters of High Speed Internet TV

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ABSTRACT

Digital inequality, or the unequal access and use of information communication technologies, inhibits under-privileged people from opportunities in the digital world. Although government and private organizations have devoted considerable resources to address this inequality, issues remain unsolved. A theory-based investigation of the phenomenon is essential for effective policy-making and intervention. The context of the field study is the "Free Internet TV" initiative in LaGrange, Georgia, which provided high-speed Internet to every household via cable at no cost. This research investigates under-privileged residents' innovation behavior through the lens of Theory of Planned Behavior (TPB). Exposure to Innovation and Trust in Government are included to elaborate the theoretical focus of TPB. The research compares the models that characterize under-privileged adopters and non-adopters' innovation decisions. The results advance the theoretical understanding of digital inequality, enrich the knowledge of adoption of innovation, and identify leverage points for policy-makers devising interventions to address the inequality.

Keywords

Digital Inequality, Digital Divide, Adoption, Diffusion, IT Policy

INTRODUCTION

Digital Inequality

The Internet has been recognized as a strategic building block for a nation's economy. Ironically, the penetration of household high-speed Internet in the U.S. (where the Internet originated) is at 18%, falling behind many nations such as Japan (27%), Canada (36%), and Korea (75%) (Dreazen, 2003). This situation signals a problem that may endanger future U.S. economic development. To fulfill President Bush's goal of connecting every household to high-speed Internet by 2007, policy-makers must obtain an in-depth knowledge of the innovation behavior that drive household adoption and use of information and communication technologies (ICT).

Digital Inequality, or the discrepancy in the access and use of ICT between individuals across income, education, age, race, gender, and geographic locations prevents the under-privileged from exploring digital opportunities (Lenhart, 2002). Within the U.S., the under-privileged people are usually characterized as poorer, lower education attainment, older, black or Hispanic, disabled, and living in inner city or rural areas.

In spite of substantial telecom deregulation and efforts by the government and private organizations to promote ICT, issues remain unsolved. Many tenaciously believe that digital inequality can be answered by focusing on providing technology access. However, research has revealed that other elements may also affect people's ICT innovation behavior (Van Dijk and Hacker, 2003). While some under-privileged may have benefited from technology-focused interventions, many others are still unable to adopt ICT (Lenhart, 2002). Unfortunately, even for those who adopted and started using ICT, factors other than technology access (e.g. knowledge) exist and cause further inequality in ICT usage (DiMaggio, Hargittai, Celeste, and Shafer, 2004). In other words, factors that affect pre-adoption behavior may differ from those that affect post-adoption behavior. Interventions, therefore, should be formulated differently for distinct stages (i.e. pre- and post-adoption), especially for the under-privileged.

Most digital inequality research takes the form of policy documents or project reports that descriptively outline the phenomenon and detail trends and variations in inequality (Kvasny, 2002). However, researchers have suggested the need to explore the antecedents and outcomes of such inequality and to develop a theoretical understanding of the phenomenon (DiMaggio et al., 2004). It would be particularly useful to investigate theoretically the differences in the under-privileged non-adopters and adopters' innovation decisions and the factors that lead to these differences. This theoretical understanding will help policy-makers to design effective interventions for planned outcomes.

The Free Internet TV initiative in LaGrange, Georgia

LaGrange, with a population of 27,000, is a city located 60 miles southwest of Atlanta, Georgia. To spur the diffusion of ICT, in 2001, the city government devised a three-way contract with the cable company and Internet service provider (ISP) to provide a free Internet TV service to every household. The Internet TV is a television-based Internet access device. Subscribers receive a free wireless keyboard and digital set-top-box, which connects the cable and TV. Users can use the keyboard to browse the Internet via their TV at a speed (158 Kbits/sec) three times faster than the typical dial-up service. In addition, subscribers receive a free email service, 5 MB of web space, and access to a technical support hotline 7 days a week (Keil, Meader, and Kvasny, 2003). Training is available in the community center, over cable TV, and through the support hotline. The Internet TV is user-friendly in that users need not install or maintain an operating system or application programs. However, the Internet TV does not allow storing files, printing, and browsing websites that need software plug-ins (e.g. Adobe Acrobat). Users also cannot use the Internet TV and watch TV simultaneously.

This initiative was the first in the world where a city government offered devices that provide free Internet access to each household. Compared to the Internet PC, the Internet TV is easier to use, yet more limited in its capability. Still, the Internet TV represents a chance for the under-privileged to obtain high-speed Internet access and to explore all that it has to offer. Thus, the initiative was aimed at those members of society who might not otherwise be able to afford the technology. This context provides a unique opportunity to study the resultant behavioral patterns in ICT access in response to a government initiative designed to reduce or eliminate economic and technical barriers that are often associated with digital inequality.

TPB as the Theoretical Framework

As digital inequality concerns unequal access and use of ICT, the wealth of existing research on adoption of innovation provides a solid foundation to advance theoretical development of this phenomenon. TPB (Ajzen, 1985), the Theory of Reasoned Action (Fishbein and Ajzen, 1975), and the Technology Acceptance Model (Davis, 1989) are the three most applied theories investigating individual ICT acceptance (Legris, Ingham, and Collerette, 2003). Since social and behavioral control factors have been suggested as critical in understanding digital inequality (Kvasny, 2002), TPB offers a good theoretical lens for its capability to (1) examine a situation where people have no volitional behavioral control, and (2) capture information about social influence and behavioral control in the implementation process (Taylor and Todd, 1995).

Research Questions

The aforementioned discussion leads to the main research questions:

1. For under-privileged people, are there differences in the behavioral models that characterize non-adopters' and adopters' intention to use an ICT innovation? If so, does TPB help explain these differences?
2. Where are the points of leverage for policy-makers to influence intention to use an ICT innovation among under-privileged adopters and non-adopters?

THEORY AND RESEARCH MODEL

TPB suggests that an individual's Behavioral Intention (BI) influences Behavior (B). BI is informed by three belief constructs: Attitude (A), Subjective Norms (SN), and Perceived Behavioral Control (PBC). Since actual usage will not take place before adoption, and TPB suggest BI as the best predictor of Behavior, we focus on Behavioral Intention (i.e. Intention to Use) as the sole dependent variable in order to make meaningful comparisons between under-privileged adopter and non-adopters. Figure 1 presents the research model. TPB is displayed in Block 1.

Decomposing TPB

Taylor and Todd (1995) and Venkatesh and Brown (2001) decomposed the three belief constructs to reflect their multidimensionality and claimed such decomposition could generate managerial insights about specific factors that influence behavior and inform formulation of interventions. Aiming to provide information particularly for policy-making, we followed this notion and decomposed belief constructs to reflect their underlying factors based on a detailed literature review.

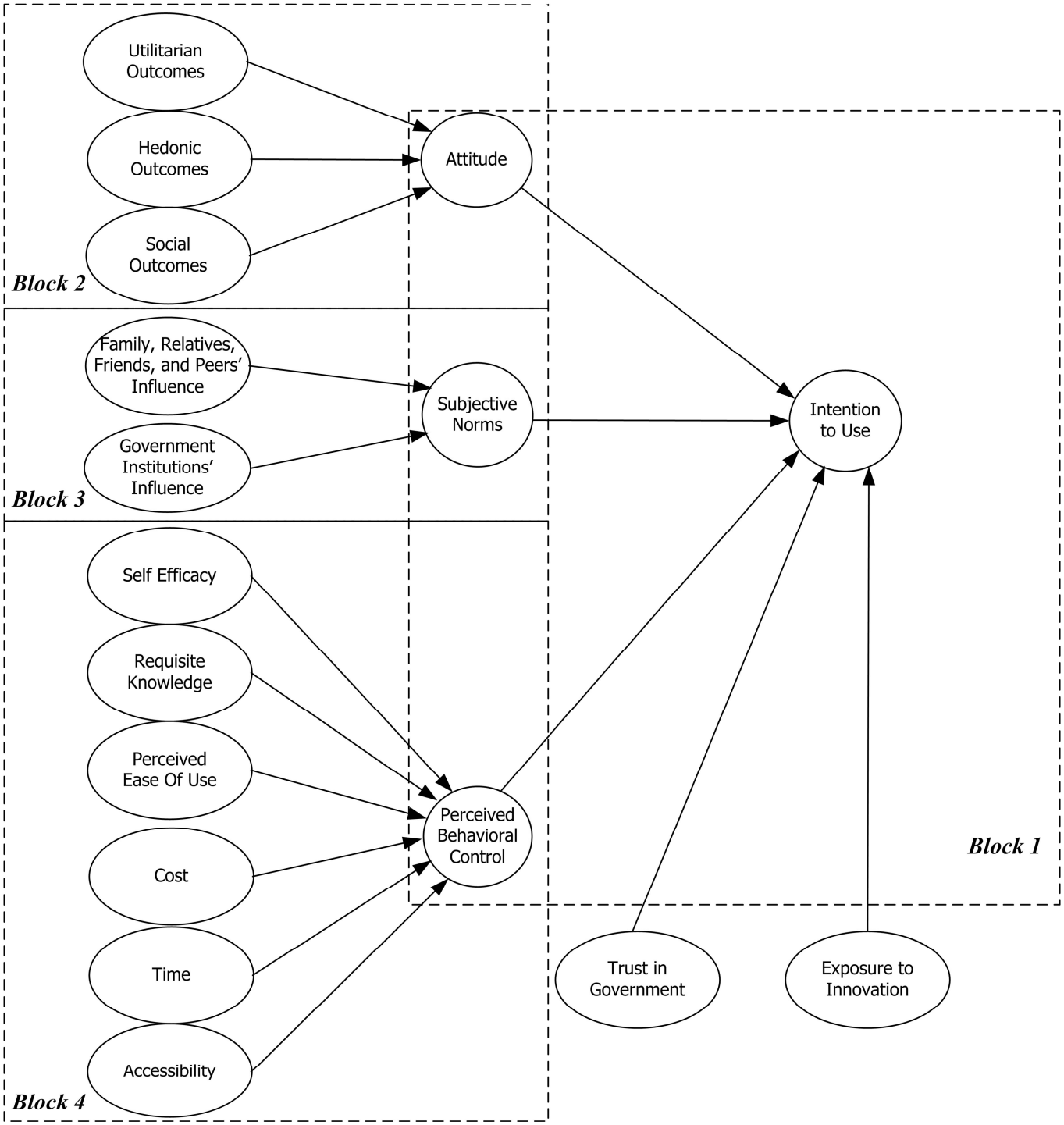

Figure 1: Research Model

The Attitudinal Belief Structure (block 2)

In a study of personal computer adoption at home, Venkatesh and Brown (2001) decomposed attitudinal belief into Utilitarian Outcomes (UO), Hedonic Outcomes (HO), and Social Outcomes (SO). Whereas UO is similar to the concept of Perceived Usefulness, SO approximates the concept of Image (Rogers, 1995). Motivation theory suggests that both extrinsic and intrinsic motivations are important attitudinal determinants (Davis, Bagozzi, and Warshaw, 1992). While UO and SO correspond to extrinsic motivation, HO parallels intrinsic motivation.

The Normative Belief Structure (block 3)

Family and friends are important referents that influence individuals' BI at home (Venkatesh and Brown, 2001). To elaborate influence from one's social network, relatives and peers are also included as referents others. In addition, the government usually plays an important role in addressing digital inequality (DiMaggio et al. 2004). To investigate such institutional effects, we incorporate this factor as Government Institutions' Influence.

The Behavioral Control Belief Structure (block 4)

Perceived behavioral control consists of internal and external control. Internal control concerns individual characteristics that influence volitional control. Self-efficacy (Taylor and Todd, 1995), Requisite Knowledge, and Perceived Ease of Use (PEOU) (Ajzen, 1991) have been suggested as important internal factors. External control refers to the facilitating factors that are external to the individual (Ajzen, 1991). Prior digital inequality studies have suggested that Cost[1], Time, and Accessibility[2] are external obstacles that may prevent people, especially the under-privileged, from successfully using ICT (Kvasny, 2002; Lenhart, 2002).

Exposure to Innovation

In the context of diffusion of innovation, DiMaggio and Powell (1983) proposed the concept of *mimetic pressure* to represent the effect of the cumulative percentage of adopters in shaping a subject's innovation behavior. A similar conceptualization is offered at the individual level by Valente (1995) who suggested that *Exposure to Innovation* through the cumulative proportion of adopters in one's personal network, influences individual adoption behavior. Although Subjective Norms in TPB represent social influence, it does not capture this aggregate mimetic pressure. Subjective Norms focus solely on the "expectation" from "important others", while *Exposure to Innovation* accounts for the "observed" aggregate behavior signals in the overall social network. Therefore, this concept is conceptually distinct from Subjective Norms. The larger the proportion of adopters in an individual's personal network, the more likely the individual will mimic others' behavior (Valente, 1995).

Trust in Government Institutions

Trust has been suggested as an important determinant for ICT adoption (Gefen, Karahanna, and Straub, 2003). Meanwhile, digital inequality studies have shown that under-privileged people tend to be less trusting in general (Lenhart, 2002), have less trust in the government, and are consequently less likely to use ICT (Ervin and Gilmore, 1999). In the Internet TV project, some under-privileged residents questioned if the city government was spying on their personal life via the Internet (Keil et al., 2003). It is possible that Trust in Government will influence individual's intention to use the technology.

Control Variable

Some Internet TV adopters may also possess Internet PC at home. Since the ownership of Internet PC may reduce residents' intention to use the Internet TV, it is specified as a control variable.

Comparison of Factors Affecting Under-Privileged Non-Adopters' and Adopters' Innovation Decisions

Although most relationships in TPB are expected to be true, the relationships from A, SN, and PBC to BI and their antecedents need further elaboration when comparing the behavioral models of the under-privileged adopters and non-adopters. Through the internalization and interpretation of actual usage experience, users may modify their pre-adoption beliefs about behavioral consequences (Karahanna et al., 1999). The influence of SN in BI may attenuate after individuals start using ICT, as their attention shifts more toward other cognitive beliefs (Karahanna et al., 1999). Studies have also suggested that pre-adoption barriers that prevent potential adopters from acquiring and starting to use ICT and post-adoption barriers that inhibit the adopters' continued use of the technology may be different (Lenhart, 2002; Van Dijk and Hacker, 2003). In all, we expect under-privileged non-adopters and adopters will behave differently in terms of the factor influencing their innovation decisions.

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[1] Although the Internet TV service is free, it requires the cable connection. Such connection requires at least the basic cable service ($8.7 per month). We investigated if the cost of cable TV was a financial barrier for the residents.

[2] In the LaGrange Internet initiative, evidence has shown that the location of the technology, whether it is in the living room or bedroom, affects the convenience to access the technology. Also, when other family members are watching TV, users may not use the Internet TV at will.

METHODOLOGY

A survey instrument with items adapted from existing scales was developed for data collection. Following Karahanna et al. (1999), two versions of surveys were developed and pre-tested for residents who already had the Internet TV (adopters) and who did not (non-adopters). Differences of wording between two versions were made only when absolutely needed to avoid confusion.

In summer 2003, a cross-sectional field study was conducted in LaGrange, Georgia. Based on the city's records, among the 9000 eligible households, 3500 had the Internet TV. 3500 copies of surveys were administered to adult members in adopter households. 2500 copies of surveys were mailed to randomly sampled households from the non-adopter population. We received 778 usable surveys, yielding a 19.5% response rate after adjusting for undeliverable mail.

Prior studies have identified that digital inequality is associated with such demographic factors as income, education, age, gender, and race. Among these, income and education have been suggested as the best demographic predictors of ICT non-adoption (Lenhart, 2002). We employed these variables, each of which is measured on a continuous scale, to classify subjects as privileged or under-privileged. Ward's hierarchical cluster analysis was applied to these variables to extract privileged and under-privileged groups (Hair, Anderson, Tatham, and Black, 1998). The procedure classified 482 subjects into the privileged group and 296 into the under-privileged group. Among the under-privileged, 145 were adopters and 151 were non-adopters.

RESULTS AND DISCUSSIONS

Measurement Model

To verify construct validity, using AMOS 5.0, multiple item constructs[3] were subjected to confirmatory factor analysis (CFA) for both groups. Given the model complexity and available sample size, a bootstrapping simulation was adopted to ensure the reliability of statistical results (Agarwal and Prasad 1999; Stine 1989). Two thousand sets of samples were randomly generated with sample sizes set equal to the original sample sizes (151 and 144) and then tested against the measurement model.[4] The resulting CFAs showed acceptable fit for both groups (Table 1).

Goodness of Fit Indices	Under-privileged Non-adopters	Under-privileged Adopters	Desired level
χ^2	3631.58	2173.85	smaller
Degree of Freedom (DF)	1280		
χ^2 / DF	2.837	1.698	< 3
Bollen-Stine P-value	0.159	0.358	>0.05
TLI	0.901	0.906	> 0.9
CFI	0.909	0.919	> 0.9
SRMR	0.048	0.059	< 0.08
RMSEA	0.086	0.057	< 0.1

Table 1: Fit Indices for Measurement Models

Table 2 presents the descriptive statistics, composite reliability, and average variance extracted (AVE) of the constructs. The results indicate good reliability, convergent, and discriminant validity.

Construct(a)	Under-Privileged Non-Adopters			Under-Privileged Adopters		
	Mean (S.D.)	Composite Reliability	AVE	Mean (S.D.)	Composite Reliability	AVE
Attitude (3)	4.64(2.42)	0.98	0.97	5.76(1.74)	0.98	0.96
Utilitarian Outcomes (4)	4.21(2.53)	0.98	0.96	5.37(1.83)	0.98	0.94
Hedonic Outcomes (3)	4.60(2.54)	0.98	0.97	5.69(1.85)	0.98	0.97
Social Outcomes (3)	2.98(2.10)	0.95	0.85	3.53(2.06)	0.95	0.87
Subjective Norms (2)	2.61(2.10)	0.97	0.95	3.83(2.16)	0.97	0.94

[3] Except Cost, Exposure to Innovation, and Internet PC Ownership, all other constructs are operationalized as multiple-item constructs.
[4] We applied the bootstrapping approach in all analyses, including CFA and structural model testing.

Fam., Rel., Fri., & Peers (4)	2.62(2.11)	0.97	0.90	4.01(2.18)	0.97	0.91
Gov. Institutions' Inf. (2)	3.14(2.30)	0.96	0.93	4.23(2.27)	0.96	0.93
Perceived Behavioral Control (3)	4.74(2.46)	0.97	0.91	5.77(1.59)	0.94	0.83
Self-Efficacy (3)	4.76(2.46)	0.97	0.94	5.89(1.68)	0.96	0.88
Requisite Knowledge (4)	5.04(2.52)	0.97	0.96	6.08(1.52)	0.96	0.86
Perceived Ease of Use(4)	4.63(2.46)	0.98	0.96	5.49(1.80)	0.94	0.80
Cost (1)	2.84(2.47)	N.A.	N.A.	3.19(2.40)	N.A.	N.A.
Time(3)	2.79(2.17)	0.93	0.82	2.74(1.94)	0.93	0.83
Accessibility(4)	2.88(1.93)	0.86	0.61	2.80(1.48)	0.80	0.53
Trust (7)	3.99(1.89)	0.97	0.85	4.66(1.61)	0.94	0.72
Exposure to Innovation (1)	0.29(0.28)	N.A.	N.A.	0.47(0.27)	N.A.	N.A.
Intention to Use (3)	2.93(2.27)	0.98	0.94	4.91(2.37)	0.98	0.94
Internet PC Ownership (1)	0.21(0.41)	N.A.	0.94	0.20(0.41)	N.A.	N.A.
a. The number in the parentheses indicates the resulting number of items in the scale.						

Table 2: Descriptive Statistics and Reliabilities of Constructs

Structural Model

The structural model was independently tested against each group, suggesting good model fit (Table 3). Figure 2 and 3 present the structural models for the under-privileged non-adopters and adopters, respectively.

Goodness of Fit Indices	**Under-privileged Non-adopters**	**Under-privileged Adopters**	**Desired level**
χ^2	3736.01	2244.51	smaller
Degree of Freedom (DF)	1325		
χ^2 **/ DF**	2.82	1.694	< 3
B-3ollen-Stine P-value	0.134	0.328	>0.05
TLI	0.901	0.906	> 0.9
CFI	0.905	0.917	> 0.9
SRMR	0.0631	0.065	< 0.08
RMSEA	0.087	0.069	< 0.1

Table 3: Fit Indices for Structural Models

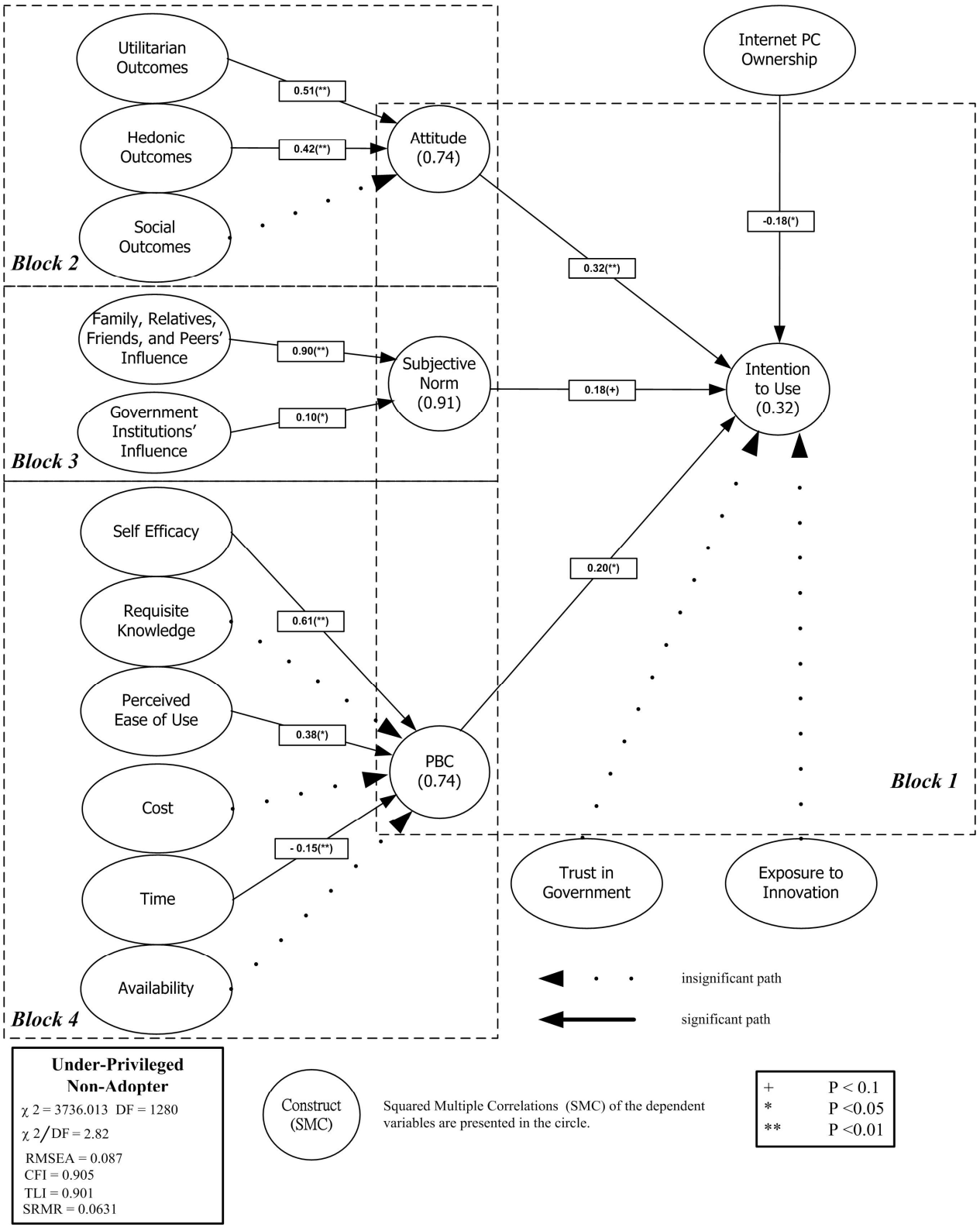

Figure 2: Structural Model for Under-Privileged Non-Adopters

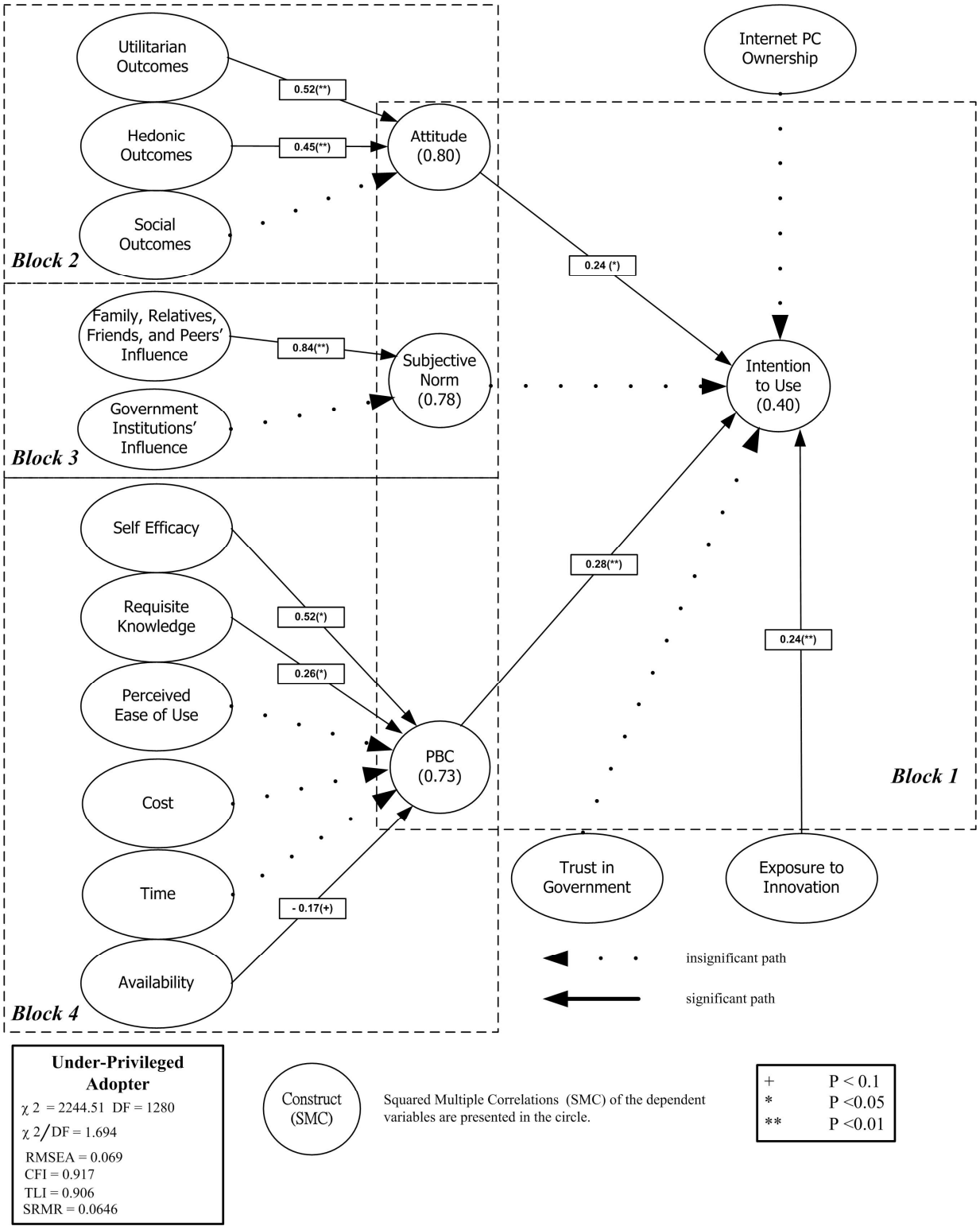

Figure 3: Structural Model for Under-Privileged Adopters

The Comparison of Behavioral Models

The two models were compared by examining whether a path is significant across the two models.[5] The results (Table 4) suggest that factors influencing the under-privilege's ICT innovation decisions are indeed different between groups.

Path	Non-Adopters	Adopters	Different across groups?
Utilitarian Outcomes → Attitude	Significant	Significant	No
Hedonic Outcomes → Attitude	Significant	Significant	No
Social Outcomes → Attitude	Not	Not	No
Family, Relative, Friends, and Peers' Inf → SN	Significant	Significant	No
Government Institutions' Influence → SN	Not	Significant	*Different*
Self-Efficacy → PBC	Significant	Significant	No
Requisite Knowledge → PBC	Not	Significant	*Different*
Perceived Ease of Use → PBC	Significant	Not	*Different*
Cost → PBC	Not	Not	No
Time → PBC	Significant	Not	*Different*
Accessibility → PBC	Not	Significant	*Different*
Attitude → Intention	Significant	Significant	No
SN → Intention	Significant	Not	*Different*
PBC → Intention	Significant	Significant	No
Exposure to Innovation → Intention	Not	Significant	*Different*
Trust in Government → Intention	Not	Not	No
Internet PC Ownership → Intention	Significant	Not	*Different*

Table 4: Path Comparison between Models

Attitudinal Belief

For both groups, Attitude is a common factor determining BI. Consistent with motivation theory, both Utilitarian (extrinsic) and Hedonic (intrinsic) Outcomes are important antecedents. Therefore, emphasizing the usefulness as well as the enjoyment in ICT usage, rather than just the usefulness, may help develop a more positive attitude toward the technology.

Social Influence (Subjective Norms and Exposure to Innovation)

The expectation from individuals' family, relatives, friends, and peers is critical in shaping SN for both groups. For under-privileged non-adopters, the influence of the government on SN is also significant though relatively small (Figure 2). SN, as discussed a priori, is influential in BI for non-adopters, but not for adopters. This may lend support to the notion that the effect of SN on intention attenuates after people start using ICT since their attention focuses more on other cognitive beliefs as direct experience increases.

On the other hand, our results suggest that the social network keeps exerting its power even after ICT adoption, but through a mimetic mechanism (Figure 3). As elaborated earlier, while SN focuses on the "expectation" from "important" others, Exposure to Innovation concerns the "observation" of the aggregate behavior across the overall social network. For adopters, the significant path from Exposure to Innovation, or the cumulative proportion of adopters in one's social network, to BI represents such mimetic effect. However, this path is insignificant for non-adopters, which suggests that they are less sensitive to this mimetic pressure, as compared to adopters. Unfortunately, these non-adopters also have less exposure (29 %) than adopters (47 %), indicating that under-privileged non-adopters are exposed less to signals of aggregate innovation

[5] Although the differences of the wording in the two versions of surveys were kept to a minimum, we must stress that almost every construct is conceptually different between adopters and non-adopters, except Exposure to Innovation, Trust in Government, and Internet PC ownership. Take Intention to Use for example, for non-adopters, it refers to the intention to start using the technology; for adopters, it means the intention to continue using the technology. Consequently, it is not meaningful to compare the latent construct means and path coefficients across groups. We thus only assess the structural difference by examining if a path coefficient is significant or insignificant in both behavioral models.

behavior patterns in the population. From the perspective of Rogers' adopter categorization (1995), these under-privileged non-adopters may fall into the least innovative category.

In all, the distinctive effects of SN and Exposure to Innovation on BI support the idea that these two constructs are conceptually distinct and influence innovation behavior through different mechanisms. Consequently, they should be operationalized and investigated as distinct constructs.

Behavioral Control

PBC is critical in determining BI for both groups. Nonetheless, adopters and non-adopters differ in perceptions of the importance of certain factors that can affect PBC. For non-adopters, Self-Efficacy, PEOU, and Time are important behavioral antecedents; for adopters, Self-Efficacy, Requisite Knowledge, and Accessibility are salient ones.

Internal Control

Consistent with extant literature, Self-Efficacy is the most influential factor in determining PBC for all groups. Presumably, psychological confidence in using ICT is essential for the under-privileged in shaping their behavioral control belief. Bandura (1977) has recommended that repeated experience, vicarious learning, verbal persuasion, and good health condition can boost one's Self-Efficacy. Designing programs that enhance the under-privileged's confidence in using ICT should help increase their behavioral control.

Meanwhile, without direct interaction with the actual technology, non-adopters concern whether the technology is easy-to-use and the effort needed to overcome the technological complexity. However, with actual usage experience, adopters focus on the knowledge required for usage. Such differences may be partially attributed to the user-friendly design of the Internet TV. Thus, policy-makers may address these issues by focusing on 1) communicating the user-friendly design aspect of the technology before adoption, and 2) providing support for knowledge acquisition after adoption.

External Control

The "free" policy seems to have eliminated economic barriers, as Cost is not a significant factor for either groups. However, other external barriers still exist for these under-resourced people.

Lack of time appears to be a constraint that prevents under-privileged non-adopters from using ICT. This echoes findings in prior research that Time is a constraint for ICT non-users (Lenhart, 2002). Some non-adopters in LaGrange reported that they have to work two to three jobs to support their family or to dedicate themselves to childcare, leaving no time for the Internet TV. For some under-privileged people for whom life is a day-to-day struggle, using ICT is simply not a priority for daily living (Crump and Mcllroy, 2003). Further, for adopters, although Time is not an issue, Accessibility emerges as another physical barrier. Potentially, the conflict between household members who want to watch TV and those who want to use the Internet TV, the competition among members to use the Internet TV simultaneously, and the location of the technology (e.g. the living room or the bedroom) could all create accessibility issues, since the devices might not be available when needed. While the "free" policy can deal with the economic barrier, access- and time-related issues are likely hard to be resolved through policy intervention, given the nature of the technology used in this particular case and the reality of life's struggles facing the under-privileged.

Trust

For both groups, Trust in Government does not directly influence the under-privileged's BI. However, it is possible that individuals' trust in other trustees, such as the technology or ISPs, may influence their use intention.

Internet PC Ownership

In the context of TPB-related factors, Exposure to Innovation, and Trust in the nomological network, Internet PC ownership has a dampening effect on BI for the non-adopters, but not the adopters.

Overall, the Internet TV serves as a good introductory technology for people with low knowledge and skill level. However, if users learn skills and expect more sophisticated operations, they may have to advance to personal computers. According to our data, while 27% of the adopters considered acquiring Internet PCs because of this experience, only 59% of them actually converted to Internet PCs. This upgrade implies costs for hardware, software, and charges for Internet connectivity. These costs might again raise the economic hurdle for the under-privileged.

Points of Leverage

To identify effective leverage, a path analysis was conducted to examine and prioritize each antecedent's overall impact on behavioral intention (Table 5). If an antecedent has direct influence on BI, its impact is measured as the path coefficient of

the relationship. Alternatively, if an antecedent influences intention through the mediation of other cognitive factors, its overall impact on intention is calculated as the product of its impact on the cognitive factor and the impact of the factor on BI.

Antecedents	Non-adopters		Adopters	
	Impact	Priority	Impact	Priority
Utilitarian Outcomes	0.163	1	0.125	3
Hedonic Outcomes	0.134	3	0.108	4
Social Outcomes	no		no	
Family, Relatives, Peers, and Friends' Influence	0.162	2	no	
Government Institutions' Influence	0.018		no	
Self-Efficacy	0.122	4	0.146	2
Requisite Knowledge	no		0.073	
Perceived Ease of Use	0.076		no	
Cost	no		no	
Time	0.03		no	
Accessibility	no		0.048	
Exposure to Innovation	no		0.24	1
Trust	no		no	

Table 5: Leverage Points

For under-privileged non-adopters, Utilitarian Outcomes, Family, Relative, Peers, and Friends' Influence, Hedonic Outcomes, and Self-Efficacy offer greater leverage to increase people's intention to start to use the technology. For adopters, Exposure to Innovation, Self-Efficacy, Utilitarian Outcomes, and Hedonic Outcomes provide more influence to encourage continued usage. Note that the impact of Exposure to Innovation on BI is particularly high for adopters. Therefore, to encourage continued ICT usage after adoption, it is critical to develop initiatives that can effectively communicate such aggregate patterns of usage.

LIMITATIONS AND FUTURE RESEARCH

The decomposed TPB approach permits the investigation of the sophisticated attitudinal, social, and behavioral aspects of digital inequality and is especially instrumental for identifying leverage points. However, TPB assumes that human beings are rational information processors and thus it does not explicitly address the unconscious or non-rational aspects of adoption behavior. Meanwhile, the theoretical approach employed is limited in its ability to study the social structural issues embedded in digital inequality. Applying grand social theories from theorists like Giddens, Foucault, Latour, or Bourdieu may lead to more in-depth understanding of the phenomenon.

Although digital inequality exists across different socio-demographic factors, this study focuses on education and income as key dimensions. Future research may study other sub-groups, such as the disabled, to investigate unique factors of their ICT innovation processes, so that interventions can be customized to meet specific needs.

This study represents a cross-sectional snapshot of the digital inequality phenomenon. A longitudinal study tracing the ICT innovation processes of subjects across stages will lead to insights about additional behavioral patterns, barriers, facilitators, and the phenomenon.

CONTRIBUTIONS AND IMPLICATIONS

This study represents a critical effort toward understanding the digital inequality problem through a theoretically grounded approach. It shows that the TPB-based model can explain the innovation decisions for both under-privileged adopters and non-adopters. Meanwhile, important differences in factors and their impacts were observed between groups. Consequently, from the perspective of digital inequality research, this study makes an important contribution to the theoretical development of the phenomenon. The distinctions observed across groups warrant further investigation as they represent promising opportunities for discovering differential behavioral patterns and understanding their causes.

This research has also demonstrated that TPB can be meaningfully elaborated by including Exposure to Innovation, which captures the aggregate mimetic influence and illustrates a critical social mechanism that strongly influences innovation

behavior. As noted by Legris et al. (2003), while current technology acceptance theories are useful, it is necessary to incorporate additional factors to enhance their explanatory power.

For practitioners, public policy-makers and ISPs in particular, this study is important because it transcends the typical descriptive approach and offers insights through a theoretically grounded model. Understanding what variables affect ICT innovation decisions, especially for those under-privileged, is critical to effectively formulate and implement policy interventions like the LaGrange free Internet TV project. This type of initiative usually involves substantial resources from many stakeholders. Unsuccessful initiatives might signal a waste of valuable resources, which could discourage the government, residents, and other stakeholders' from orchestrating similar initiatives in the future. The findings of this study suggest that providing access to easy-to-use ICT alone – even at no cost – is only part of the solution.

The results identify other key factors that can affect ICT use intention for under-privileged adopters and non-adopters. Understanding these factors, particularly important ones for the under-privileged, provides points of leverage for policy-makers and ISPs who hope to deal with digital inequality and stimulate high-speed Internet adoption and use in the household. To devise effective interventions, policy-makers need to incorporate these additional factors as a whole. Usefulness, enjoyment, and confidence in using ICT are common factors that provide strong leverage to increase behavioral intention for both under-privileged adopters and non-adopters. Positive opinions and expectations of using ICT from family, relatives, peers, and friends can be important drivers for the non-adopters to make their first move. Fostering an environment with high exposure to aggregate patterns of ICT usage can encourage continued ICT usage for adopters.

Finally, instead of generic interventions, the findings suggest a "smart strategy" concept that interventions should take a stepwise approach to fit people's unique needs at distinct innovation stages. Potentially, policy-makers may also adopt a segmentation strategy to address different needs of people with different backgrounds, although more comparative research is necessary to study people's different behavioral models. While many questions remain unanswered, this study represents an important step in furthering our understanding of the digital inequality problem and the points of leverage that exist for dealing with it.

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