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Article

Factors Influencing the Intentions of Young People to Develop Image with Intellectual Property in Residence: A Case Study of Green City Development

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Abstract: In China, green industries have been developed under an important policy for promoting economic restructuring. Various regions have successively developed green cities. This study was conducted to develop a green marketing model to introduce an intellectual property (*IP*) of the image into green and sustainable development. A literature review result revealed that the behavioral intentions (*BI*) of popular groups and grasping the needs of core consumer groups were essential. The unified theory of acceptance and use of technology (*UTAUT*) and the model of comprehensive encouragement were combined to formulate a new model for examining young people's willingness to use urban images with IP. The new model was then used to design a questionnaire, collect data, test research hypotheses, and the effects of relevant factors on the perceptions of urban IP image by young people was explored. The findings presented that (1) intrinsic reward (*IR*) and extrinsic reward (*ER*) positively and significantly affected the BI of young people and (2) BI played a mediating role between IR/ER and behavior (*B*). Recommendations were proposed regarding the direction of the development of urban IP images for green cities.

Keywords: Unified theory of acceptance and use of technology (UTAUT); Model of comprehensive encouragement; Urban IP image; Green city

1. Introduction

Green development, a breakthrough in achieving sustainable economic, social, and environmental development, is gradually becoming a consensus in the realization of global sustainable development goals (SDGs) and the development of mankind (Zhou Liang, 2019). The development of green industries is mandatory for economic growth and is influenced by environments and cultural constructions, which are important sources of strength and major forces driving a new round of economic growth to overcome economic downturns in China. While culture is an essential soft power, green development is necessary for sustainable development. Only a combination of the two brings strategic focus and confidence and provides a lasting and profound spiritual motivation for communities with a shared future for mankind (Li, 2021; Liu, Zheng, & Yu, 2023). The term, "intellectual property (IP)", was not a common one in most legal systems around the world until the late 20th century. Urban IP image represents the combination of intangible cultural assets and tangible characteristic images (Riyue, 2022). It is a presentation of the spiritual core that differs from material accumulation and a form of creativity that enhances the specific values of a city. To some extent, urban IP image gains popularity, raises urban visibility, and enhances cultural and social cohesion (Zihang & Gang, 2020) to create identity of a city.

In China, IP image still has problems such as insufficient dissemination, poor long-term vitality, and limited derivatives of cultural and creative products. The revitalization of high-quality culture and the injection of intangible assets into a city has posed a new problem for urban green development (Xinzhong, 2020). For the sake of better economic and social benefits, the IP image of a city must not be defined by a minority, as everyone living in the city is both a beneficiary and a creator. Generation Z as the trendsetters of the present era, is a major force driving the development of the current society and a backbone of future productivity. Therefore, young people's needs and willingness to support affect the future construction of urban IP image and are closely related to the direction of urban green development. By combining local green industries and industrial synergy in the construction of urban IP images, the vitality of IP image-related spiritual and cultural products can boost the integrated development of green cities.

This study, therefore, was conducted (1) to identify the factors influencing the behaviors (B) of consumers (mainly young people) and (2) to present a new path for the development of green cities concerning the exploration, definition, and design of IP images.

2. Materials and Methods

The theoretical bases of this study included the unified theory of acceptance and use of technology (UTAUT) and the model of comprehensive encouragement.

2.1. UTAUT

Venkatesh et al. proposed UTAUT based on innovation diffusion theory, the technology acceptance model, the theory of reasoned action, the theory of planned behavior, the dynamic model, and the social cognitive theory. Behavioral intention (BI) and technology with the extended structure in UTAUT have been improved (V. T. Venkatesh, L., & Xu, 2012) and applied in many fields (Huang, Wu, & Han, 2021; Mensah, 2019) as shown in Fig. 1.

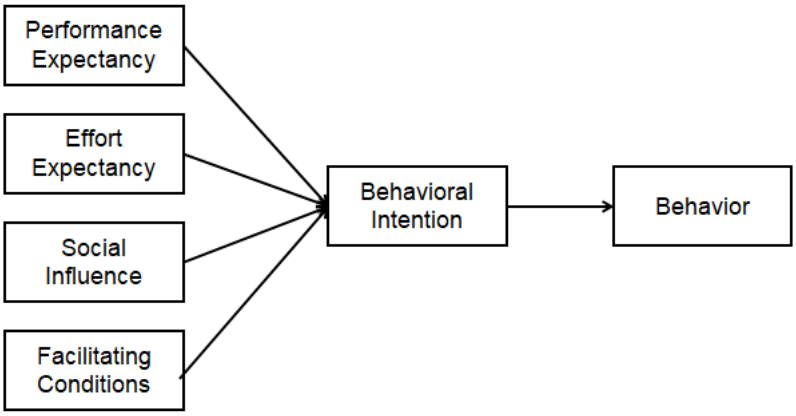

Fig. 1. Illustration of UTAUT model.

The Porter-Lawler model of comprehensive encouragement was proposed by Porter and. Lawler in the framework of Victor H. Vroom's expectancy theory. The concepts of intrinsic reward (IR) and extrinsic reward (ER) were based on Fredrick Herzberg's motivation-hygiene dual-factor theory as shown in Fig. 2.

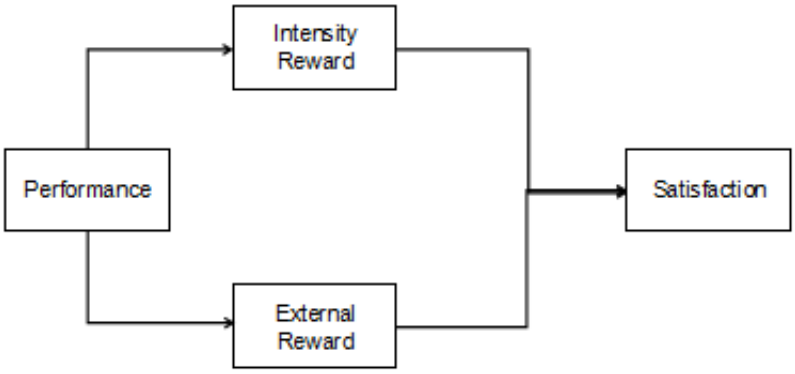

Fig. 2. Illustration of Porter-Lawler model of comprehensive encouragement.

The UTAUT and comprehensive encouragement model were integrated in this study. A new explanatory mechanism was created as the criteria of a "good model" (Wacker, 1998). The relationships among "IR/ER → BI → B" were explored, thus extending the theoretical boundaries of UTAUT in its application to cities.

The terms in the UTAUT model of this study were defined as follows.

1. Intrinsic reward (IR): the reward given by a person for good subjective perception of a chosen object is related to a certain level of satisfaction and an affirmation of personal ability and the meaning of existence. After conducting in-depth research on the model of comprehensive encouragement, Zhao et al. concluded that managers must raise the IR level (Feng & Yue, 2013).
2. Extrinsic reward (ER): According to Maslow's hierarchy of needs, ER covers salary, status, and a sense of security are manifested as low-level needs. Zhao et al. argued that managers also must raise the ER level (Feng & Yue, 2013).
3. Behavioral intention (BI): According to the findings on the reasoned action model by Ajzen et al., BI refers to the willingness of people to obtain corresponding expected performance when performing a specific action in a given situation. Numerous studies have shown that the reasoned action model can satisfactorily predict BI (Ajzen, Fishbein, & Psychology, 1973).
4. Behavior (B): In a review of behavioral science theories by Liu et al., BI was divided into four aspects(Jiyun, 2005). Individual behavior research is conducted to examine psychological factors influencing human behavior at the individual level including human ways of thinking, attribution processes, motivation, personality, attitudes, emotions, abilities, and values.

2.2 Research Hypotheses

1. IR is divided into performance expectancy (PE) and effort expectancy (EE).
   PE is the degree to which people believe that using information systems improves performance. In this study, PE was defined as an individual's perception of the system model for urban IP images and the degree to which the individual believes it is helpful for their work and life. Based on 37 selected empirical studies, Ayankunle et al. presented a strong relationship between PE and BI (Taiwo & Downe, 2013). Han demonstrated through calculations that PE had the greatest effect value on BI in the model (Xiao, 2017). EE refers to the degree of effort required of an individual to use a system. EE includes perceived ease of use, system complexity, and operational simplicity, as well as affects people's use of IP images. Kung-Teck concluded that EE was positively correlated with BI (OSMAN, CHOO, & Rahmat, 2013). Khechine et al. found that EE had a positive effect on users' BI (Khechine, Lakhal, & Ndjambou, 2016). Hence, we proposed Hypotheses H1 and H2.
   - H1: The IR of urban IP image has a positive effect on B.
   - H2: The IR of urban IP image has a positive effect on BI.
2. ER: a person's choice based on a comprehensive consideration of multiple factors (such as remuneration) in terms of facilitating conditions (FC) and social influence (SI).
3. SI: An individual with a stronger perception of SI is more inclined to support the use of IP image and more likely to feel that IP image improves the cultural temperature and level of economic construction of society as a cultural tool. After a meta-analysis of the UTAUT model, Han concluded that the relationship between SI and BI is moderate [15].
4. FC: An individual who believes that the IP image offers better unified technical content and higher service levels is more inclined to choose this model. Li et al. maintained that the provision of more FC meant that users more easily completed their work using this model and technology (Ting & Kan fang, 2005). By investigating the technology acceptance model, Sun et al. found that FC had a positive effect on consumer mobile services (Quan, 2009). Accordingly, we proposed Hypotheses H5 and H6.
   - H5: The ER of urban IP image has a positive effect on B.
   - H6: The ER of urban IP image has a positive effect on BI.
5. According to the theory of reasoned action, an individual's behavior is usually determined by BI. In contrast, the theory of planned behavior regards an individual's intentions as an important predictor of his or her behavior. IR and ER, which are two independent variables, have positive effects on BI. According to Venkatesh et al., an individual's willingness to use affects use behaviors (V. Venkatesh, Morris, Davis, & Davis, 2003). Thus, we proposed Hypotheses H3 and H7.
   - H3: The IR of urban IP image has a positive effect on B.
   - H7: The ER of urban IP image has a positive effect on B.
6. According to the research findings of Lan and Zhu, consumers' willingness to use a service positively affects their actual use behaviors (Lan & Zhu, 2016). Thus, the next step of this study was to determine if BI plays a mediating role between IR/ER and B. Hence, we proposed Hypotheses H4 and H8.
   - H4: The BI of urban IP image plays a mediating role between IR and B.
   - H8: The BI of urban IP image plays a mediating role between ER and B.

2.3. Research Framework

Based on the UTAUT model and the model of comprehensive encouragement, we constructed the research framework (Fig. 3) to determine the extent of an individual's support for IP image integration. We explored the relationships between IR/ER and BI and analyzed the relationship between BI and B. The final step was taken to examine the mediating role played by BI as an intermediate variable between the four independent variables and B. An in-depth study was conducted on young people in their places of residence as the research objects. The UTAUT and comprehensive encouragement models were combined to design a survey questionnaire. The data from the survey was analyzed according to the research object.

2.4. Questionnaire

Referring to Zheng et al. and Morris et al., a questionnaire was created with the following three parts (Jixing, Jing, Wei, & Aipin, 2021; Morris, Venkatesh, & Ackerman, 2005): introduction and explanations of the purposes and main contents of the survey to the respondents, basic personal information of the respondents and determinations of the basic statuses of the urban IP images of their places of residence, and inquiries about the respondents' feelings regarding the urban IP images and their views regarding the building of green cities. A total of 415 questionnaires were sent out and 407 valid responses were recovered with an effective recovery rate of 98.07%, as shown as Table 1.

Table 1. Questionnaire design and scale basis.

Variable type	Name	Number of questions	Summary of operational definition	Literature reference
Independent variables	IR-PE	7	Individual's perception of the degree to which IP image is helpful to urban green development	(Taiwo & Downe, 2013)
	IR-EE	6	Individual's perception of the efforts a city must put into using IP image	(OSMAN et al., 2013)
	ER-SI	6	Effects of the attitudes of surrounding communities on an individual's choices to purchase IP image-related products and services	(Khechine et al., 2016)
	ER-FC	6	Effects of the FC provided by the country or city for IP image	(Morris et al., 2005; Quan, 2009)
Dependent variable	B (BI)	6	Tendency of an individual to purchase IP image-related products and services after developing a favorable impression of the city's IP image	(V. Venkatesh, Brown, & Bala, 2013)
Mediating variable	BI (B)	6	Individual's support for the construction of urban IP image	(Lan & Zhu, 2016; V. Venkatesh et al., 2013)

3. Results

3.1. Descriptive Statistics

58.2% of the respondents to the questionnaire survey were female while 41.8% were male. The respondents studied economics (56%), science and engineering (22.6%), liberal education (13%), arts (2.9%), and other subjects (5.4%) in university. Middle-school students, civil servants/enterprise employees/employees of public institutions, freelancers, entrepreneurs, and other occupations accounted for 86.2, 7.4, 2.71.5and 2.2%, respectively. The respondents lived in first-tier cities (28.3%), second-tier cities (18.2%), third-tier cities (23.6%), and fourth-tier cities or others (30%,). The respondents living in cities with urban IP images accounted for 56.8%. SPSS23.0 was used to determine the internal consistency of the collected responses. The overall Cronbach's α coefficient was 0.963. As the internal consistency coefficients were higher than 0.7 sufficient reliability was verified.

3.2. Difference Analysis

There were significant differences in the level of agreement on BI between males (M = 13.2353, SD = 4.32455) and females (M = 12.3924, SD = 3.94802). However, there were no significant differences by gender in IR, ER, or B at t = 2.041 and p = 0.045. IN the urban IP image, there were significant differences in the level of agreement on IR by residence areas with the IP image (M = 27.5455, SD = 7.26135) and without it (M = 29.1023, SD = 8.27394) at t = -1.982 and p = 0.048. There were significant differences in the level of agreement on ER by residence areas with the urban IP image (M = 26.2814, SD = 7.41172) and without it (M = 28.8636, SD=7.96016) at t=-3.340 and p=0.001. There were significant differences in the level of agreement on BI with the urban IP image (M=12.2468, SD=3.91482) and without it (M=13.3977, SD=4.31089) at t = -2.776 and p = 0.006. Significant differences

in the level of agreement on B were also found between the respondents living in the area with the urban IP image (M = 12.5801, SD = 4.14323) and without it (M = 13.5398, SD = 4.21814) at t = -2.297 and p = 0.022.

3.3. Pearson's Correlation Analysis

The results of Pearson's correlation analysis are shown in Table 2. IR, ER, BI, and B were positively correlated at $p < 0.001$, while ER, BI, and B were positively correlated at $p < 0.001$. BI and B were also positively correlated at $p < 0.001$.

Table 2. Correlation matrix of four variables.

	IR	ER	BI	B
IR	1			
ER	0.805**	1		
BI	0.749**	0.781**	1	
B	0.748**	0.814**	0.861**	1

*Note: * $p < 0.05$,** $p < 0.01$,*** $p < 0.001$*

3.4. Linear Regression Analysis

The results of the linear regression are presented in Table 3. There was a significant relationship between IR and B (β = 0.340 and p = 0.000) and between ER and B (β = 0.507, p = 0.000). The variance inflation factor (VIF) was then used to perform a collinearity test on the relationships between the main variables. The VIF value of IR for B was 3.195, and that of ER for B was 3.195. The VIF values were less than 10 so there was collinearity for the regression model. The regression equation of the research model was as follows.

$$BI = 0.039 + 0.392\ IR + 0.54\ ER \quad (1)$$

$$B = 0.007 + 0.308\ IR + 0.652ER \quad (2)$$

Table 3. Linear regression analysis results of IR, ER, and B.

	B	SE B	β	p	VIF
IR	0.392	0.57	0.340	0.000	3.195
ER	0.540	0.53	0.507	0.000	3.195
R2	0.687				
Adj R2	0.649				
F	376.459				
df	406				

3.5. Regression Mediation Analysis

The results of the regression mediation analysis are presented in Tables 4 and 5. IR had significant explanatory power for BI (β = 0.749, p < 0.001) and B (β = 0.748, p < 0.001) while BI had significant explanatory power for B (β = 0.86, p < 0.001). However, when the explanatory power of IR for B and that of BI for B were considered, the explanatory power of IR (β = 0.234, p < 0.001) and BI (β = 0.686, p < 0.001) was significant. According to Baron and Kenny's evaluations, a partial mediating effect was established. Finally, the partial mediating effects were determined by Sobel tests.

Table 4. Regression mediation analyses of BI and IR.

	BI		B	
	Model 1	Model 2	Model 3	Model 4
IR	0.749***	0.748***		0.234***
BI M			0.861***	0.686***
R2	0.56	0.559	0.742	0.766
Adj R2	0.559	0.558	0.741	0.765
F	516.25***	513.49***	1165.264***	661.76***
DOF	(1,405)	(1,405)	(1,405)	(2,404)

*Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$*

Table 5. Regression mediation analyses of BI and ER.

	BI		B	
	Model 1	**Model 2**	**Model 3**	**Model 4**
ER	0.781***	0.814***		0.361***
BI			0.861***	0.579***
R2	0.61	0.662	0.742	0.793
Adj R2	0.609	0.661	0.741	0.792
F	633.966***	794.258***	1165.264***	773.9***
DOF	(1,405)	(1,405)	(1,405)	(2,404)

*Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$*

Based on the data analysis result of the hypotheses, we integrated non-standardized coefficients, significance, standard errors, and standardized values to calculate the path coefficient analysis as shown in Fig. 3.

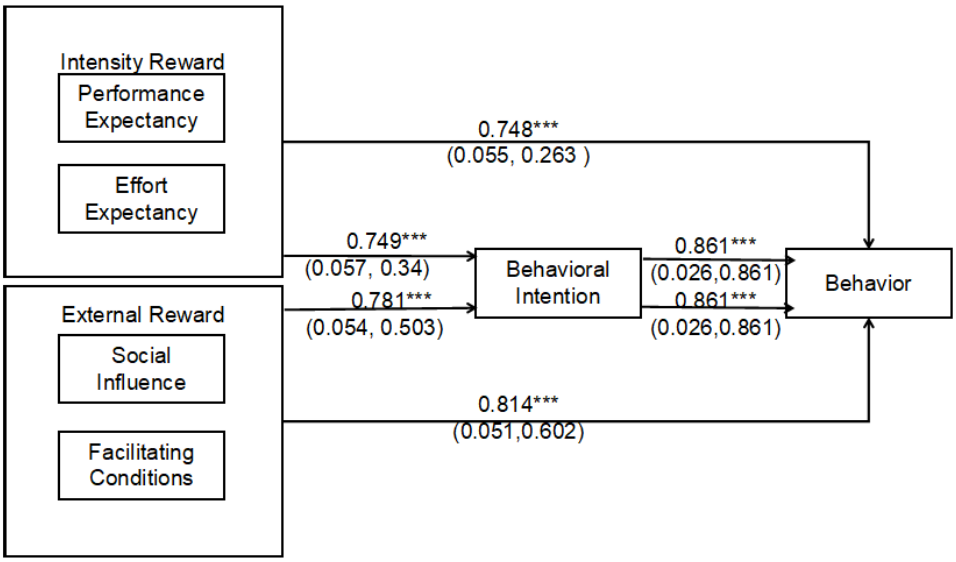

Fig. 3. Model path coefficient analysis.

4. Discussion

The analysis results validated the research hypotheses as shown in Table 6. The eight hypotheses were supported by a theoretical model combining the UTAUT and comprehensive encouragement model and confirmed by the factors for the development of the urban IP image in cities with more young people. It was found that young people perceived the intrinsic and extrinsic changes due to the IP images of their cities in four dimensions (PE, EE, SI, and FC). Their supportive behaviors such as careers, cultural identity, and willingness to promote were affected according to social, economic, and cultural effects. IR showed positive effects on their supportive behaviors. Studies have demonstrated that IR is derived from PE and EE. Factors such as the inherent characteristics of the urban IP image, the prices of derivatives, difficulties in understanding, cultural connotations, design concepts, and purchasing channels also affected the choices of young people. Venkatesh et al. found that PE could predict individuals' willingness to use information systems. Kung-Teck concluded that EE was positively correlated with BI. The key to an excellent urban IP image is to improve the efficiency of green development and combine efficiency with the concepts of "cyclic", "low carbon", and "sustainability" to increase the employment of young people and urban GDP. Cultural inheritance and dissemination are also enhanced to narrow the distance between the B-end and C-end, promote products, and enhance brand awareness. The ER of the urban IP image to young people positively affected their supportive behaviors. ER is derived from SI and FC. To some extent, the urban IP image affected young people's willingness to support. After a meta-analysis of the UTAUT model, Han concluded that the relationship between SI and BI was moderate (Xiao, 2017). Wang found that FC had a positive effect on the willingness to use library electronic resources (Weiyun & Maowen, 2015). In the community, those who were important to young people were also supportive of the high-quality IP image, the integration of green cities, and the green consumption of IP image-related peripheral products. For FC, the tier of a city, the importance attached by the city to green development, and its policy conditions promoted

the spread and development of its green urban IP image to varying extents. BI played a partial mediating role between IR and supportive behaviors, which indicated that IR affected BI but indirectly affected B. This finding was consistent with the previous findings and suggested that young people, driven by IR, were willing to support the development of the urban IP image. The higher the willingness to support, the more likely they took actions to support the development of urban IP image. BI played a partial mediating role between ER and supportive behaviors, which indicated that ER affected BI but indirectly affected B. Han found that BI played a mediating role for independent and dependent variables. A moderate effect of use behavior suggested that young people, driven by ER supported the development of urban IP image. The higher the willingness of young people to support the development of the urban IP image, the more likely they supported the development of the urban IP image (Xiao, 2017). BI also played a partial mediating role between ER and B.

Table 6. Validation of research hypotheses regarding the factors influencing young people's willingness to develop urban IP images in their places of residence.

No.	Hypothesis	Result
H1	IR of the urban IP image has a positive effect on B.	Supported
H2	IR of the urban IP image has a positive effect on BI.	Supported
H3	IR of the urban IP image has a positive effect on B.	Supported
H4	BI of the urban IP image plays a mediating role between IR and B.	Supported
H5	ER of the urban IP image has a positive effect on B.	Supported
H6	ER of the urban IP image has a positive effect on BI.	Supported
H7	ER of the urban IP image has a positive effect on B.	Supported
H8	BI of the urban IP image plays a mediating role between ER and B.	Supported

5. Conclusions

We determined factors influencing young people's willingness to develop the urban IP image in their areas to propose guidance to cities on the development of their IP images in terms of economic, cultural, and social levels. A theoretical model was constructed by using the UTAUT and comprehensive encouragement models. This model was used to explain the positive support given by young people to the development of urban IP images. IR and ER positively affected BI which had a positive effect on B. BI showed a mediating effect between IR, ER, and B. IR and ER positively affected the behaviors supporting the development of the urban IP image. The results of a linear regression analysis showed that ER was the most critical factor influencing young people's support for the development of the urban IP image. The higher the ER, the stronger the young people's willingness to support but the weaker the effects of subjective norms.

Young people as the trendsetters of the present era are a major force driving the development of current society, the backbone of future productivity, the inheritors and innovators of traditional Chinese culture, and the promoters of potential needs. The relevant needs of young people are closely related to the direction of the development of green industries in cities. The IP image of a city is a crucial intangible asset. To better adapt and develop cities, constant inheritance and innovation are required. Efforts must be made to create green urban IP images, continue the cities' heritage, disseminate cultural effects, and generate SI. With multiple factors, the urban economy can be revitalized and boosted for green development. Humanistic methodology is composed of logic, perception, functions, and realization. The humanistic methodology extends and enriches IP images from the perspective of language, image, personality, value, credit, and influence. IP images need to be endowed with characteristics to provide a preliminary understanding of different industries with concerted efforts for the integrated development of green cities.

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