# Construction of Mobile Internet Value Proposition Model: An Empirical Study Based on Cases and Structural Equation Modeling(SEM)

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**Abstract.** The pervasive influence of mobile internet is fundamentally reshaping both professional and everyday life, resulting in significant alterations to customer value creation models. Grounded in an extensive literature review, this article employs a causal case study methodology, incorporating in-depth interviews with 57 Chinese mobile internet users, along with observational data. The study aims at illuminate the core essence of mobile internet value propositions, proposing a comprehensive measurement model for assessing these propositions. The empirical validation of this model is achieved through exploratory factor analysis of 87 preliminary questionnaires and confirmatory factor analysis of 902 final questionnaires. This empirical inquiry culminates in the development of a model delineating mobile internet value propositions, which encompasses the following key dimensions: ubiquity (accessibility anytime, anywhere, accommodating fragmented time), convenience (quick access, handy availability, easy operation), individualization (automatic recognition, personalized services, security), and localization (location-based, sending location, and acquiring location).

## 1 Introduction

Mobile internet, situated at the intersection of information technology and electronic commerce, has instigated a profound metamorphosis in the customer value creation model, introducing unprecedented challenges and opportunities for both governmental bodies and enterprises. Contemporary scholarship recognizes the existence of distinctive value propositions within the realm of mobile internet, often elucidated through case analyses. Nonetheless, there is a conspicuous research gap concerning the core nature of mobile internet value propositions, and quantitative empirical investigations are conspicuously scarce. This study endeavors to bridge these gaps by conducting case studies that delve into the inherent characteristics and business models of mobile internet. Additionally, structural equation validation is employed to formulate a comprehensive value proposition model for mobile internet.

## 2 Literature Review

This study defines mobile internet as a versatile realm of commercial activities, wherein organizations and individuals leverage mobile communication technology for flexible access to information and services, anytime and anywhere. This encompasses a wide spectrum of functions, spanning operations, management, transactions, and entertainment. In academic circles, prominent characteristics of mobile internet, such as 'ubiquity,' 'convenience,' and 'easy accessibility,' have been recognized by scholars like A. D. Nigatu et al.[1], who describes it as 'ubiquitous interaction' and a 'powerful conduit for marketing information.' Wong et al.[2] emphasize 'convenience' and 'easy accessibility' through extensive case studies, while M. Simanjuntak et al.[3] delve into the 'ubiquitous' nature of U-commerce (Ubiquitous, Universal, Unique, Unison). Additionally, I. Clarke III[4] condenses these attribute into 'ubiquity,' 'localization,' 'personalization,' and 'convenience.' It is these unique value propositions of mobile internet that profoundly impacts business models and the value creation process. Mobile internet, offering personalized, location-based, and ever-available services, presents its distinctive 'value proposition,' expected to surpass traditional e-commerce across all domains[5]. This study aims to explore the intricacies of mobile internet characteristics within the context of mobile internet value propositions[6].

A value proposition is a clear commitment made by a company to its customers, assuring the delivery of a specific set of value-creating benefits.' A value proposition consists of two tiers of content: first, it specifies the elements or combinations thereof that generate value, and then it articulates how value is derived from these elements or combinations. In the era of mobile internet, the business model exhibits new features characterized by deep integration with mobile social commerce[1].

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In summary, scholars like A. D. Nigatu[1] underscore safety, location responsiveness, and instant value as three value-driving factors of mobile internet, introducing new freedoms and fostering more valuable relationships. Irvine Clarke III, in his paper 'Mobile Business Value Proposition' published in the Journal of Business Strategies, outlines four value propositions of mobile internet: 'ubiquity,' 'convenience,' 'localization,' and 'personalization.' However, I. Clarke III's research relies on case studies to illustrate mobile internet value propositions. Value propositions are recognized for their uniqueness, measurability, and sustainability. Challenges persist, such as the absence of empirical evidence, a standardized value proposition scale, and the complexities associated with linking various applications with different value propositions. This study is rooted in Clarke III's theory of the four-factor mobile internet value proposition and aims atempirically investigate mobile internet value propositions, with the goal of constructing a model for mobile internet value propositions.

# 3 Research Method and Model Construction

This study is structured into two principal parts. The first part focuses on the construction of a measurement model for the mobile internet value proposition, while the second part is dedicated to the validation and determination of this model and the associated scale.

## 3.1 Research Method

In constructing the mobile internet value proposition measurement model, this study employs a causal multiple case research approach. It integrates multiple evidence sources, including secondary data and interviews, to ensure evidence coherence and construct validity. Through scrutiny of research outcomes against empirical theory and case data, adjustments are recommended enhancing internal validity. A comprehensive examination of mainstream mobile internet applications optimizes research effectiveness and external validity. By establishing a mobile internet application case database and precise research methods, this study aims to enhance research reliability and reproducibility. This ensures overall research trustworthiness, meeting validity and reliability requirements.

In the second part, the study aims to validate the mobile internet value proposition measurement model and scale. Following standard scale construction in management research, a measurement scale is developed for the four elements. With 87 collected samples, exploratory factor analysis and reliability analysis refine the measurement scale. Using a larger sample (902 samples), exploratory factor analysis identifies the scale structure, validated by confirmatory factor analysis. The resulting measurement model comprises 12 items, three for each element.

## 3.2 Model Construction Process

### *3.2.1 Constructing Mobile Internet Value Proposition Connotation through case studies.*

The realm of mobile internet encompasses a diverse array of application forms and content. In order to attain a comprehensive understanding of these applications and facilitate in-depth research on specific categories, it is imperative to establish a robust scientific classification framework. To ensure that our case studies encompass a majority of mobile internet service applications, thereby enhancing research effectiveness, mobile internet applications are categorized into three principal domains based on varying information application realms: Information Media, Social Entertainment, and Transaction Authentication. Within these categories, we selected cases representing the most popular applications.

This study meticulously compiled and summarized applications offered by various mobile operators, mobile internet service providers, and software manufacturers to identify the primary mobile internet applications. These encompass:

**Information Media:** Such as mobile newspapers, mobile web browsing, mobile email, mobile music, mobile reading, and mobile videos.

**Social Entertainment:** Encompassing mobile instant messaging, mobile social networks, and mobile games.

**Transaction Authentication:** Including mobile shopping, mobile payments, mobile banking, mobile securities, and mobile location services.

To ensure the comprehensiveness and relevance of our case studies, we diligently selected 1-2 representative cases within each primary application category, considering factors like a substantial customer base and high visibility. The chosen cases were characterized by their extended usage period (over a year) and continued active usage. We thus amassed a total of 24 cases representing the three categories of mobile internet applications: Information Media, Social Entertainment, and Transaction Authentication, as the focal subjects for our case studies.

The data collected from each application case underwent an initial analysis. Qualitative data analysis was employed to provide descriptions and insights into the ubiquity, convenience, personalization, and localization of value propositions within each case. The data were subsequently structured and coded for more profound and thorough analysis of the four value proposition variables.

**Table 1.** Data Analysis of Value Proposition within the Case of Mobile Internet (Using Mobile Web Browsing as an Example)

| Case | Case Description |
|---|---|
| Mobile Internet Usage | Users of mobile web browsing can use handheld mobile devices to interact with the internet, utilizing their spare time or accessing information anytime and anywhere. |

| Value Proposition | Data Collection | Data Analysis |
|---|---|---|
| Ubiquity: Value Generated Anytime, Anywhere | Due to the ubiquitous nature of mobile communication networks, users can connect to the internet using their mobile phones at any time and place. This allows users to access the internet and obtain or send information whenever needed. It enables users to make full use of their spare time to access the internet and manage various tasks. | 1. Real-time access to internet information<br>2. The ability to go online anytime to obtain or send information<br>3.Efficient utilization of spare time |
| Convenience: Value Arising from Handy Mobile Devices | Mobile devices are easily accessible and do not require a boot-up process. When users need to connect to the internet, they can quickly do so by merely using their mobile devices, without the need to find or boot up a desktop computer. Additionally, specific mobile applications are optimized for easy and convenient use. | 1. Mobile devices are readily at hand<br>2. No need to turn on a computer; quick internet access<br>3. User-friendly mobile applications for efficient operation |
| Personalization: Value Arising from Individual Mobile Devices | Since mobile phones are personalized and dedicated to individual users, logging into relevant web pages does not require complex login procedures. Web pages or application interfaces can automatically identify users, making mobile web browsing a personalized experience. Users can configure their browsing preferences and receive content and services tailored to their personal needs. | 1. Personalized mobile web browsing without the need for repeated logins<br>2. The ability to customize browsing preferences |
| Localization: Value Generated Through Location-Based Services | Mobile users' mobility and location information allow for location-based services. When searching the internet, users can receive information related to their current location, pushing relevant content based on their geographical context. | 1. Realization of location-based services for internet content<br>2. The ability to search for information specific to the user's city, region, or nearby location |

Building upon the initial data analysis from the 24 cases, this study embarked on both single-case and cross-case analyses within the three core application categories. The objective was to transcend the initial insights confined to individual cases and instead concentrate on the observation, analysis, and consolidation of causal relationships and the implications of value propositions within each case. This process was undertaken to facilitate the preliminary development of theoretical foundations.

Subsequently, further case analysis was conducted for the three principal application categories. The research consistently reviewed, refined, and synthesized the elements concerning the implications of value proposition variables across the 24 applications. Following a more in-depth examination of value proposition categorizations, this study presented a comprehensive breakdown of value proposition metrics tailored to each major application category. This culminated in the creation of a value proposition model, as illustrated in Table 2.

**Table 2.** Mobile Internet Value Proposition Connotation and Measurement Model

| Elements | Connotation and Measurement |
|---|---|
| Ubiquity - Value Generated by the Ubiquity of Mobile Communication Networks Send and receive | information and handle affairs anytime and anywhere<br>Send and receive information and handle affairs at any time<br>Fully utilize fragmented time and idle time |
| Convenience - Value Generated by the Convenience of Mobile Terminals Mobile devices can quickly | access corresponding mobile internet services<br>Mobile devices are always within reach<br>Mobile devices are easier and more efficient to operate than other tools |
| Individuality - Value Generated by the Individuality of Mobile Terminal Owners | The system can automatically identify the login account when logging in to the corresponding mobile internet service<br>Mobile internet services can provide personalized information and services to customers<br>Using mobile internet services on personal mobile phones (mobile devices) is safer than other means |
| Location - Value Generated by Location-based Services | Mobile internet services provide appropriate information and services based on customer location<br>Customers (or mobile devices) do not need to actively provide their location information<br>Mobile internet services allow customers to obtain location information and activity paths of others (things) |

### *3.2.2 Constructing a Measurement Scale of the Measurement Model and Testing*

Adhering to established protocols for scale construction[8], a comprehensive measurement scale was formulated for the measurement model, featuring four distinct elements. Subsequently, an 87-sample

dataset was assembled, and rigorous exploratory factor analysis and reliability assessments were executed to enhance the precision of the measurement scale. This meticulous process resulted in a structured scale comprising 12 items, with each of the four elements within the value proposition comprising three items, as detailed in Table 3.

Employing the structural equation modeling (SEM) approach, we established a comprehensive measurement model for evaluating the mobile internet value proposition. Through the collection of a substantial sample (902 respondents in total), we conducted confirmatory factor analysis and reliability testing using the structural equation measurement method on the mobile internet value proposition scale generated through exploratory factor analysis. The goodness-of-fit results(as depicted in Table 4&5) from the measurement equation demonstrate a strong fit of the mobile internet value proposition measurement scale, thus validating the four elements and connotations proposed in the case study.As a result, a measurement model for the mobile internet value proposition was obtained.

**Table 3.** Pre-measurement Scale of Mobile Internet Value Proposition

| Measurement Variable | Measurement Items |
|---|---|
| Mobile Internet Value Proposition - Ubiquity | This service allows me to send and receive messages and handle business transactions at **anywhere**.<br>This service allows me to send and receive messages and handle business transactions at **anytime**.<br>This service allows me to fully utilize my fragmented time. |
| Mobile Internet Value Proposition - Convenience | Mobile phones (mobile devices) can quickly access this service.<br>Mobile phones (mobile devices) are always within reach.<br>Operating mobile phones (mobile devices) are more convenient than other tools. |
| Mobile Internet Value Proposition - Individuality | The system can automatically identify me when I log in to this service.<br>This service provides me with personalized information and services.<br>Using this service on my personal mobile phone (mobile device) makes me feel more secure. |
| Mobile Internet Value Proposition - Localization | This service provides me with appropriate information and services based on my location.<br>I do not need to actively provide information about my location.<br>This service allows me to obtain location information and activity paths of myself or others (things). |

**Table 4.** Exploratory Factor Analysis Results of Mobile Internet Value Propositions (N=87)

| Items (Abbr.) | Factor Loadings | | | |
|---|---|---|---|---|
| | Ubiquity | Convenience | Individuality | Localization |
| Ubiquity-Anywhere | 0.892 | 0.223 | 0.198 | 0.162 |
| Ubiquity-Anytime | 0.905 | 0.160 | 0.217 | 0.186 |
| Ubiquity-Fragmented Time | 0.527 | 0.565 | 0.240 | 0.031 |
| Convenience - Quick Access | 0.457 | 0.683 | 0.200 | -0.046 |
| Convenience - Handy Availability | 0.623 | 0.583 | 0.138 | 0.208 |
| Convenience - Easy Operation | 0.121 | 0.741 | 0.352 | 0.116 |
| Individuality -Automatic Identification | 0.199 | 0.295 | 0.759 | 0.210 |
| Individuality - Personalized | 0.296 | 0.126 | 0.765 | 0.339 |
| Individuality -Security | 0.155 | 0.404 | 0.709 | 0.261 |
| Localization - Location-Based | 0.215 | .017 | 0.372 | 0.795 |
| Localization - Sending Location | 0.094 | 0.552 | 0.004 | 0.714 |
| Localization - Acquiring Location | 0.120 | -0.045 | 0.422 | 0.715 |

Note: The KMO value is 0.858, and Bartlett's test statistic is significant at P<0.001. The cumulative explained variance of the four factors is 77.957%.

**Table 5.** Reliability Test of Mobile Internet Value Proposition Variables (N=87)

| Item (Abbr.) | Item-Total Correlation | Cronbach's α after Deleting the Item | Cronbach s α |
|---|---|---|---|
| Ubiquity | | | |
| -Anywhere | 0.6972 | 0.8951 | 0.9055 |
| -Anytime | 0.6942 | 0.8955 | |
| -Fragmented Time | 0.6239 | 0.8986 | |
| Convenience | | | |
| Quick Access | 0.5905 | 0.8997 | 0.8137 |
| Handy Availability | 0.7301 | 0.8936 | |
| Easy Operation | 0.5991 | 0.8994 | |
| Individuality | | | |
| Auto Identification | 0.6862 | 0.8950 | 0.8526 |
| Personalized | 0.7178 | 0.8936 | |
| Security | 0.7201 | 0.8940 | |
| Localization | | | |
| Location-Based | 0.5961 | 0.9001 | 0.7595 |
| Sending Location | 0.5587 | 0.9020 | |

| | | | |
|---|---|---|---|
| Acquiring Location | 0.4939 | 0.9069 | |

Subsequently, utilizing data gathered from the final scale, constructed post exploratory factor analysis and reliability testing, we performed confirmatory factor analysis on the four variables: ubiquity, convenience, individuality, and location of the mobile internet value proposition, employing LISREL software. The confirmatory factor analysis sample encompassed 902 valid questionnaires, which were entirely distinct from the earlier exploratory factor analysis dataset. This effort culminated in the realization of the mobile internet value proposition model (Table 6).

**Table 6.** Measurement Model Fit Results for Mobile Internet Value Propositions (N=902)

| **Path Standardized** | | **Path Coefficient** | **T-value** | **P** |
|---|---|---|---|---|
| Anywhere | ←Ubiquity | 0.89 | 32.82 | *** |
| Anytime | ←Ubiquity | 0.92 | 34.85 | *** |
| Fragmented Time | ←Ubiquity | 0.69 | 23.03 | *** |
| Quick Access | ← Convenience | 0.85 | 30.67 | *** |
| Handy Availability | ← Convenience | 0.84 | 29.90 | *** |
| Easy Operation | ← Convenience | 0.77 | 26.31 | *** |
| Automatic Recognition | ← Individualization | 0.72 | 23.57 | *** |
| Personalization | ← Individualization | 0.81 | 28.16 | *** |
| Security | ← Individualization | 0.76 | 25.61 | *** |
| Location-Based | ← Localization | 0.82 | 27.65 | *** |
| Location Retrieval | ← Localization | 0.71 | 22.65 | *** |
| Path Retrieval | ← Localization | 0.72 | 23.09 | *** |
| $x^2$ | 411.98 | NFI | | 0.97 |
| df | 48 | NNFI | | 0.96 |
| $x^2$ / df | 8.58 | GFI | | 0.93 |
| RMSEA | 0.092 | AGFI | | 0.88 |
| SRMR | 0.056 | CFI | | 0.97 |

Note: For t-values greater than 1.96, * denotes significance level of P<0.05; for t-values greater than 2.58, ** denotes significance level of P<0.01; for t-values greater than 3.29, *** denotes significance level of P<0.001.

## 4 Results and finding

The essence of Mobile Internet value propositions comprises four key dimensions: Ubiquity, Convenience, Individualization and Localization, as illustrated in Figure 1.

**Ubiquity** represents the value derived from the pervasive nature of mobile communication networks, enabling information exchange and transaction processing from any location at any time, including the effective utilization of fragmented and idle time.

**Convenience** signifies the value arising from the ease of use of mobile devices. This is prominently characterized by rapid access to services, the seamless availability of mobile terminals, and the user-friendly operation of these devices.

**Individualization** pertains to the value attributed to the unique characteristics of mobile terminal owners. This is primarily demonstrated through the system's automatic recognition of individuals, the provision of personalized information and services, and the assurance of security for personal terminals.

**Localization** encompasses the value stemming from location-based services, prominently exemplified by delivering information and services tailored to the user's current location, without necessitating active location and path provisioning, and the capability to access the location and path of other users or objects.

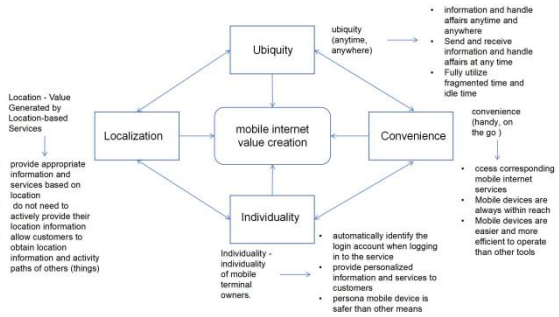


**Fig. 1.** Mobile Internet Value Proposition Model

This research offers vital theoretical support to enterprises seeking to implement effective mobile internet strategies and carve out new market opportunities. In the formulation of these strategies, a fundamental first step involves the identification and capture of valuable prospects. Enterprises have two main avenues for introducing mobile internet strategies. The first avenue entails expanding market space through innovative business models during stages of strategic and value innovation. The second involves leveraging mobile technology to enhance services and product delivery, achieved through mobile internet-based product and service innovation or business model innovation. Two examination pathways are presented here: one examines novel business possibilities that mobile internet can bring, with a focus on areas capable of creating customer value and leveraging mobile internet advantages (e.g., mobile social networking services). The second pathway analyzes information processing elements within the enterprise's value activities (e.g., mobile customer relationship management). This study also sheds light on the role and essence of mobile internet value propositions. When integrating mobile internet strategies, enterprises must recognize and deepen their understanding of mobile internet value propositions within their products,

services, and business models, with a goal to maximize the impact of these value propositions.

This study still possesses certain limitations. First, the empirical research adopted a convenience sampling method, which demanded substantial time and effort for both questionnaire distribution and retrieval. Although the sample size met the requirements, the over representation of younger individuals in the business community implies a non-random sample selection. Second, the study employed interviews and questionnaires to examine mobile internet value propositions, leaving room for enhanced rigor through the utilization of text mining methods in future research. Finally, a more extensive investigation into mobile internet value propositions within the context of mobile internet customer value creation mechanisms could offer valuable insights to organizations shaping their mobile internet strategies.

## 5 Conclusion

Building upon existing theoretical research on mobile internet and value propositions, this study delved into the concept of mobile internet value propositions. Utilizing case studies, it aimed to define and measure the essence of mobile business value propositions. By conducting a large-scale empirical investigation, a comprehensive measurement scale, consisting of 12 items, was developed for mobile business value propositions. This transitioned the focus of research on mobile business value propositions from theoretical analysis to practical application, thereby unveiling the core significance of these propositions. The study effectively bridged the gap from conceptualization to variable establishment, culminating in a well-defined measurement framework. This research not only advances the theoretical understanding of mobile internet value creation but also holds considerable practical relevance for organizations implementing mobile internet applications and creating value for their customers. Furthermore, it provides a solid foundation for future theoretical investigations in this area.

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