Research Article

Analysis Model Design of the Intermediary Role of Psychological Expectation in Customer Value Proposition Driven Business Model Innovation against the Background of Big Data

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As the most important strategic resource of enterprises, big data has become the basic background of business model innovation. From the perspective of psychological contract, this paper discusses the mechanism of psychological contract in customer value proposition driven business model innovation and puts forward four research hypotheses. This paper adopts the confirmatory factor analysis method of structural equation to verify these four hypotheses. It is concluded that there is a significant positive relationship between customer value proposition and psychological contract; there is a significant positive correlation between psychological contract and business model innovation; and psychological contract has intermediary effect between value proposition and business model innovation. Furthermore, value proposition has a significant positive correlation with business model innovation, which has not been verified.

1. Introduction

Emerging information technologies and their applications have brought rapid growth in the amount of data, and the era of “big data” has come [1]. Big data is deeply affecting our life, work, and thinking [2, 3]. Big data has become the most important strategic resource for enterprises. Enterprises improve their competitiveness through the acquisition, cleaning, management, and processing of big data. Naturally, big data has also become an important driving force for business model innovation. Big data is affecting the business ecology of enterprises in various ways. It has become the basic background of business model innovation [4].

Big data represents a new way of life, which changes the demand content, demand structure, and demand mode of consumers [5–7]. Big data provides a new resource and capability and provides a new foundation and path for enterprises to discover value, create value, and solve problems. Big data is a new technology that provides basic conditions for the operation of the whole society. Big data is a way of thinking, which leads to the reconstruction of traditional concepts such as resources, value, structure, relationship, and boundary. Big data has the potential to be infinitely close to consumers and can provide accurate value proposition for enterprises [3, 8–10]. The application of big data technology helps us understand the real needs of consumers, accurately segment consumers, and then provide real-time and accurate products. As basic technical conditions and tools, big data resources have the energy to release and amplify the value of other resources. The key business and process innovation based on big data is the big data of enterprise business activities. The whole business process can be reengineered based on big data facilities and technology and data information flow. Big data is changing the resource environment, technology environment, and demand environment on which enterprises rely. Enterprises need to rethink the issues involved in the business model, such as who creates value, what value to be created, how to create value, and how to realize value.
In the era of big data, business enterprises have greatly increased their dependence on data. On the one hand, this will make the business model innovation based on data more convenient. On the other hand, this will also stifle the potential business model innovation without data support and greatly reduce the business model innovation not based on data. It can be seen that big data will bring changes in management rules and business model, thus bringing competitive advantages to enterprises. Big data has the potential to creatively destroy the business model [11].

Big data has become one of the driving forces of enterprise business model innovation. At the enterprise level, big data is used in many aspects of the business model, including customer value proposition innovation, key business and process innovation, revenue model innovation, external relationship network, and value network reconstruction [4]. Big data has the potential of creative destruction and promotes the transformation of the constituent elements and structure of the business model [12]. It is common to analyze the business model from the perspective of constituent elements and their relationship, which is also recognized by most researchers. Osterwalder et al. [13] proposed that enterprises can carry out business model innovation by changing the constituent elements in the business model system. Lindgård et al. [14] proposed that there are two top-level elements of business model, namely, value proposition and operation mode, and believed that enterprises can choose one or several sub-elements to carry out innovation activities. Value proposition is an important component of business model and the starting point of business model innovation. It runs through the whole process of business model innovation and plays an important guiding role. It is very important to find a unique customer value proposition. In order to provide and realize customer value, enterprises must produce products or services with the help of corresponding resource capabilities and value networks, then transfer them to target customers, and obtain certain benefits. As Jiang and Liu [15] pointed out, business model includes value proposition, value creation, and value acquisition, which is the general framework of business model. This framework is systematic and dynamic.

In the context of big data, with the help of big data technology, enterprises can have in-depth insight into customer needs, timely respond to changes in customer needs, adjust the positioning of products or services, reduce transaction costs, reduce information asymmetry, enhance the emotional cognition between enterprises and customers and stakeholders, build psychological contracts, enhance trust relations, cultivate customer loyalty, and realize value creation and acquisition.

Since business model innovation is a systematic and dynamic work, it is a nonlinear process full of uncertainty from the proposition of customer value to the acquisition of customer value and enterprise value. The relationship between business model innovators, innovation teams, and business organizations; the relationship between stakeholders and business organizations; their psychological expectations and disappointments; and the relationship between rights and obligations are also constantly adjusted with the changes of business model innovation cycle. During this period, the formation, violation, and reconstruction of psychological contract will have a lot of impact on the effectiveness of business model innovation. However, there is a lack of research in this area.

Based on the above analysis, this paper intends to explore the intermediary role of psychological contract from the perspective of the general framework of customer value proposition driven business model innovation. Theoretically, it enriches the influence mechanism of psychological contract on business model innovation. In practice, it provides a reference for enterprises to implement business model innovation against the background of big data.

2. Conceptual Background

2.1. Business Model Innovation. Most scholars agree that changing the core elements of the business model or changing the relationship between the elements can realize the innovation of the original business model. Weill and Vitale [16] put forward the concept of atomic business model and believed that changing the combination mode of atomic business model can form a new business model. Yongbo [17] believes that business model innovation is the innovation of business model constituent elements and their combination, especially the innovation of the relationship between core value elements. Value proposition model innovation, value creation model innovation, value transmission model innovation, and value network model innovation are the main aspects of business model innovation. These four aspects play a role, leading to the continuous improvement of enterprise competitive advantage. In order to seek competitive advantage and fully explore the potential value of technological innovation or nontechnical service innovation, a set of continuous and dynamic logic to better realize the value proposition of consumers can be regarded as business model innovation [18].

Based on the above analysis, this paper believes that the business model innovation follows the construction logic, and the source of innovation is the customer value proposition. By establishing relations with different stakeholders, we can reach cognitive agreement and form a psychological contract, so as to obtain resources to create, transfer, and realize value.

2.2. Value Proposition. In the Internet era, against the background of big data, the internal and external environment change too fast, and the nonlinearity, uncertainty, and difficulty of prediction are becoming more and more obvious. Enterprises should constantly put forward new value propositions, constantly reflect, constantly improve, and innovate. The more complex it is, the more it is necessary to clarify the logic of development and find the pain points of customers. Among the components of business model innovation, the core element is customer value proposition. Business model innovation is a creative activity. From conception to formation, it is a continuous trial and
error exploration process. It is also the process from putting forward customer value proposition, perfecting customer value proposition, and implementing customer value proposition to realizing customer value proposition. All ideas and actions should focus on value proposition, constantly meet customer needs, and gradually cultivate customer loyalty. Customer value proposition is the core element of business model [19], the source of business model innovation, and the main line running through business model innovation.

Especially since 2000, with the advent of the Internet era, the development environment faced by enterprises has become more complex and full of uncertainty. The linear hypothesis is not tenable, product upgrading is accelerated, information transmission is convenient, big data plays a huge role, information exchange is almost cost-free, communication between manufacturers and customers is closer, and it is more common for customers to participate in enterprise design, interaction, and innovation. Business model innovation ushered in a new scene.

The emergence of a new customer value proposition is no longer a unilateral act of enterprises. Consumers have become “producers and consumers.” Xiaomi mobile phone has created impressive performance. It is not so much product innovation as customer participation model innovation. It is the innovation of business model against the background of large data. It is a typical example of customer driven business model innovation, but also the deep participation of customers in the formation of customer value proposition, innovation of development, and perfection. Innovative customer value proposition drives the changes of other elements of the business model and changes the combination mode of the relationship between the elements of the business model. In a sense, it is an innovation in the construction of the relationship between the elements of the business model. The premise assumption of traditional value chain theory is that “industry” or “environment” factors are unchanged. However, this assumption obviously fails today. Modern business model innovation is to be good at changing value proposition, so as to reconstruct a microenvironment conducive to itself and create cross-border relationship combination [20]. Business model innovation is to reconstruct a new rule relationship [21]. The essence of business model is to continuously build a relationship combination across enterprise boundaries.

Building a new rule relationship is actually the shaping process of the new business model, which is a process of continuous trial and error, fault tolerance, and iteration. From the blueprint stage of customer value proposition to the conclusion of various cross-border relationships, it involves the cognitive problems of consumers, industries, and stakeholders, which is a process of psychological contract formation, violation, and reconstruction.

2.3. Psychological Contract. Psychological contract, which is also known as psychological contract, is a concept of social psychology. Its predecessor can be traced back to the interpersonal relationship theory in the early 1930s. In 1960, Chris Argyris, a famous American organizational psychologist, published understanding organizational behavior, in which psychological contract was first introduced into the field of management research from the field of social psychology, and the informal expectation relationship between factory employees and foremen was expressed as psychological work contract, which was considered to be the pioneer of psychological contract research in the field of management [22].

Robinson et al. [23] believe that psychological contract is the understanding of mutual obligations between employers and employees in the context of employment relationship, that is, employees’ perception of the exchange relationship between explicit and implicit employee contributions and organizational incentives.

Early scholars tend to regard psychological contract as an invisible contract between organizations and individuals. There are two schools: unilateral psychological contract school and bilateral psychological contract school. The unilateral psychological contract school began in the 1980s, and its research focus is the individual level of the formation of psychological contract. Scholars who hold this view believe that psychological contract is essentially a subjective belief of reciprocal exchange and connection between individuals and organizations. This belief is based on the subjective understanding of commitment, but it is not necessarily realized by the organization or its agents [24].

There are many psychological contract schools on both sides: One is to define psychological contract as the sum of implicit and unwritten mutual expectations existing in the relationship between employees and employers. One view is that the cooperation mechanism exists between personal dedication and the acquisition of organizational desire. However, in essence, it is the mutual expectation relationship between employers and employees. It is the subjective feelings of both parties on each other’s responsibilities and obligations, mainly including two levels: one is the employees’ perception of mutual responsibility; the other is the perception of mutual responsibility, which is also known as the psychological contract school.

This paper holds that psychological contract is the perception of mutual responsibility between the organization and employees, including the stakeholders of employees and the organization. This is because, in the context of big data, the information asymmetry has been reduced unprecedentedly, the dynamic change process between psychological expectation and satisfaction will be more transparent, and the two-way nature of rights, responsibilities, and interests will be more obvious. Secondly, in the Internet era, the boundary of enterprises is blurred, the scope of organizations and employees participating in innovation activities is expanded, and even the organization is only a natural person and employees are not only employees of incumbent enterprises. As long as they contribute to innovation activities, they should be considered.

Li et al. [25] believe that psychological contract is mainly composed of three dimensions: transactional psychological contract, relational psychological contract, and management psychological contract.
Referring to the research of Robinson & Morrison, this paper divides psychological contract into three types: transaction contract, development contract, and relationship contract and discusses its relationship with business model innovation based on cognitive theory.

The formation of business model is a process of trial and error, and it is also a process of rule relationship. In this process, the change of the psychological contract of the business model innovation team is also dynamic, which needs to be transformed through formation, deconstruction, and reconstruction. In the initial stage of team formation, there is mistrust and uncertainty between the members and the team. The psychological contract of cooperation tends to be short-term and limited one. At this time, the model of psychological contract is economical. With the increase of cooperation time and cooperation opportunities among members of the team members expect to have a good space for their own development. The team also hopes to obtain better output benefits with less human and material resources. Therefore, both the team and members have the motivation to promote the transformation of psychological contract to a developmental model. On this basis, the results of win-win cooperation will strengthen this sense of gain. This situation will gradually change to an open and collaborative mode, the organizational relationship will be more harmonious, the employees’ sense of trust in the organization will be enhanced, and the team will have good output benefits. Employees also get a good space for their own development. At this time, a relatively stable relational psychological contract will be formed.

3. Research Hypothesis

Customer value proposition is a clear statement made by the enterprise on who to transfer benefits and what benefits to transfer [26]. Customer value proposition has strong trend and guidance, plays a good role in promoting the development of business model, and is the source of all business model innovation. The value orientation, value creation, and value acquisition in the value chain are realized through the value proposition of customers. For the characteristics of business model, it is an outward looking and creative exploration process, and all designs are based on customer value proposition. Johnson [27] pointed out that enterprises help target customers complete important tasks by providing a product or a service to meet their needs or solve problems. Target customers, supplies, and tasks to be completed are the three elements of value proposition. This concept emphasizes paying attention to the needs of target customers and the problem-solving degree of target customers, so as to provide products or services based on this. It is also the connotation of providing customers with value or service portfolio in the business model. Customer value proposition is the basis and source, the most active factor, and the soul of business model innovation [27, 28]. Reasonable value proposition is the premise of promoting business model innovation and creating value, which is the key for enterprises to obtaining competitiveness.

Based on the above analysis, this paper puts forward the first hypothesis.

\textit{Hypothesis 1.} There is a significant positive correlation between customer value proposition and business model innovation.

Customer value proposition is the basis for customers to realize the delivered value and the starting point of enterprises’ commitment to customers. Kotler [29] expounded customer value from the perspective of customer delivered value and believed that customer delivered value is the difference between total customer value and total customer cost. Gale Bradley [30] believes that customer value is the relative perceived quality of customers after the price of a product changes in the market. Holbrook [31] believes that customer value is created by goods through the process of customer experience. Whether the products or services provided by enterprises meet their needs or not, customers should perceive and evaluate the degree of satisfaction they have obtained. After comparing the expectation of the products provided by the manufacturer with the real gain, trust and satisfaction are generated, forming a psychological contract. It can be seen that customer value proposition is the basis for the formation of psychological contract between manufacturers and customers, and there is a positive correlation between them. Accordingly, this paper puts forward Hypothesis 2.

\textit{Hypothesis 2.} There is a significant positive relationship between customer value proposition and psychological contract.

Most scholars believe that business model can be regarded as a structural template [32]. It can even be regarded as a configuration of measurement relationship [33]. Osterwalder [19] expressed the relationship in the business model as an abstract cooperative relationship between enterprises and stakeholders. Zott et al. [32] pointed out that the relationship between focus enterprises and stakeholders plays an important role in business model value creation. Due to the heterogeneity and dynamics of stakeholder relations and the diversity of value creation structure of business model, it will lead to the differentation of value creation process and mechanism and the uncertainty of value creation results. However, in essence, the stakeholder relationship in the business model is also the subjective perception and comprehensive evaluation of stakeholders. Starting from the basic requirement of depicting the key and core characteristics of subjective perception, satisfaction, trust, and commitment can still be used as the basic dimensions of psychological contract between stakeholders [34]. Accordingly, this paper puts forward Hypothesis 3.

\textit{Hypothesis 3.} There is a significant positive correlation between psychological contract and business model innovation.

The business model gradually realizes its logic of discovering, creating, transmitting, and obtaining value. In the logic of value creation, it involves the key business processes
of enterprises and the correlation mechanism between processes, including the operation mode of enterprises, consumers, upstream suppliers, potential entrants, and substitutes to create value in the competition. In the Internet era, new elements of business model are gradually taking shape. With the help of big data technology, the interaction between people becomes closer, and knowledge spillover and emotional communication become more frequent. The exchange of information between people and between people and organizations makes it easier to form psychological contracts, which promotes the continuous innovation of business models and the acceleration of the replacement of business models. This is also conducive to the effective coordination of value creation and business resources [32].

In this process of value creation, the psychological contract relationship between the individual members and the team in the organization implementing business model innovation reflects the unwritten mutual expectations between individuals and organizations and reflects the commitment and reciprocity of rights and obligations. If the content of organizational commitments and actions made by incumbent enterprises can stimulate the innovation spirit and team cohesion, the psychological contract relationship will be formed. Otherwise, there will be violation of the psychological contract relationship, degradation of innovation spirit, and lax team cohesion, which will inevitably affect the effectiveness of business model innovation. To stimulate the effectiveness of psychological contract in the context of big data, we should pay attention to the collective innovation, cognitive sharing, risk sharing, and cultivation of cooperative and enterprising awareness of business model innovation. Accordingly, this paper puts forward Hypothesis 4.

**Hypothesis 4.** Psychological contract has intermediary effect between value proposition and business model innovation.

### 4. Research Methods

#### 4.1. Structural Equation Research Method

Social phenomena are complex, not as simple as natural phenomena. People and people, people and things, things and things are complex. Compared with general regression models, structural equation models are better for describing or fitting complex relationships and can be closer to objective reality. Structural equation model is mainly used to analyze and study the structural relationship between potential variables. Because potential variables cannot be measured directly, some measurable indicators are needed to reflect potential variables. These variables can be expressed in linear equations. This linear equation system is called structural equation modeling (SEM). SEM is suitable for the analysis of large samples. Generally speaking, the number of samples shall not be less than 100; otherwise, the software analysis is unstable.

SEM deals with the comparison of the overall model, so the indexes referred to mainly consider not a single parameter, but the coefficient of integration. At this time, whether individual indexes have specific statistical significance is not the focus of SEM analysis [35].

#### 4.2. Questionnaire Design and Reliability Analysis

##### 4.2.1. Questionnaire Design

Due to the fierce competition among enterprises, most enterprises pay attention to the confidentiality of their enterprise management information, especially the technological innovation and business knowledge. It is difficult to conduct quantitative analysis in terms of business decision-making, partners, cooperation effect, and social benefits. Therefore, Likert quantitative scoring is often adopted in the study of enterprise business model. Ketokivi and Schroeder’s research found that “although random errors and systematic deviations will cause some variation of measurement items, the perceived measurement of performance can still meet the requirements of reliability and validity.” Whether from theoretical circles or business circles, people recognize the credibility of outsiders’ perception of the organization. Even without consulting financial data, they can have a basic judgment or even profound insight into the operation of the organization.

Based on the above considerations, the questionnaire is designed by Likert quantitative scoring. In order to design a high-quality questionnaire, the first draft of the questionnaire was completed on the basis of a large number of relevant references. After the first draft is completed, I invited colleagues and classmates with vice senior titles and doctorate degrees to help review and put forward suggestions. In addition, I also widely solicited the opinions of middle and senior managers of enterprises with whom I have contacts. In short, the questionnaire design widely mobilized contacts, solicited the opinions of experts and enterprise managers, and generated an open discussion at an academic seminar. Finally, these valuable opinions were classified and analyzed as an important reference for revision. The final questionnaire is targeted, readable, indirect, logical, and operable. In order to make the questionnaire conform to the reality and the purpose of the survey, at the beginning of the survey, the research team also interacted and modified based on the interview and the on-the-spot answers. Once there are questions about the meaning and measurement understanding, they will have in-depth communication and discuss how to improve the presentation together, so as to ensure the accuracy and clarity of the questionnaire. The questionnaire has been implemented for one year. The research team distributed it purposefully, even taking advantage of various opportunities such as business trips and family visits to distribute questionnaires. Through various channels such as training lectures for middle and senior managers of the enterprise, various seminars on economic management, on-site distribution, and interviews in the enterprise, a total of 160 questionnaires were distributed, and 155 were recovered, with a recovery rate of 96%. Excluding incomplete answers and similar and other unreliable questionnaires, the number of effective questionnaires was 150.

The final scale consists of 22 questions. Each option has five numbers: 1, 2, 3, 4, and 5. 1 means “very low,” 2 means
“low,” 3 means “general,” 4 means “high,” and 5 means “very high.” The higher the score, the higher the recognition of the respondent for this option.

4.2.2. Setting of Latent and Measurable Variables of the Structural Equation Model (Table 1).

4.2.3. Reliability Analysis. Reliability is the degree of consistency or stability of measured data. Using SPSS version 22, Cronbach’s test is carried out, and the coefficients obtained are shown in Table 2.

Generally speaking, the consistency of items is related to the measurement content. The larger the Cronbach α coefficient, the stronger the internal consistency. Previous studies have suggested that if Cronbach’s α coefficient is greater than 0.7, it can be considered that the consistency between items is good.

Cronbach’s coefficient value of Q1–Q3 items measuring customer value proposition in this study is 0.674, slightly lower than 0.7, and the values of the other items are more than 0.7, indicating that the corresponding items have high internal consistency. The overall Cronbach α coefficient value for the 12 items is 0.916, which has high consistency.

4.2.4. Model Design. The structural equation model shows [42–44] the standardized model (as shown in Figure 1). See Table 3 for the estimation results and test of business model innovation parameters by psychological contract, and Table 4 for the estimation results of standardization coefficient.

It can be seen from Table 3 that the CR values of all factor loads are much greater than 2. The probability that the parameters in the right column may be 0 P. Three asterisks, *, indicate that the probability of 0 is less than 0.01. Therefore, all load coefficients are significantly nonzero at the significance level of 0.01. As can be seen from Table 4, the CR values of all variances are much greater than 2, so all variances are greater than 0.01 at the significance level of 0.01. It can be seen that the model estimation effect of psychological contract on the mechanism of business model innovation is good except BMI < --- CVP.

4.2.5. Model Matching Analysis. It can be seen from Table 5 that the indexes meet the requirements when rounded, and the model fits well, indicating that the data matches the designed model. There is a significant positive correlation between value proposition and business model innovation, and Hypothesis 1 has not been verified.
Table 3: Parameter estimation results.

|       | Estimate | SE  | CR    | P    |
|-------|----------|-----|-------|------|
| PC    | 0.917    | 0.154 | 5.943 | ***  |
| BMI   | 0.801    | 0.248 | 3.230 | 0.001|
| BMI   | 0.192    | 0.268 | 0.718 | 0.473|
| Q3    | 1.000    |       |       |      |
| Q2    | 0.852    | 0.144 | 5.919 | ***  |
| Q1    | 0.905    | 0.0130 | 6.953 | ***  |
| Q4    | 1.000    |       |       |      |
| Q5    | 1.249    | 0.123 | 10.140| ***  |
| Q6    | 1.167    | 0.123 | 9.451 | ***  |
| Q7    | 1.187    | 0.128 | 9.255 | ***  |
| Q8    | 1.092    | 0.120 | 9.068 | ***  |
| Q12   | 1.000    |       |       |      |
| Q11   | 0.828    | 0.121 | 6.864 | ***  |
| Q10   | 0.844    | 0.120 | 7.009 | ***  |
| Q9    | 1.137    | 0.129 | 8.791 | ***  |

Table 4: Standardized regression weights.

|       | Estimate |
|-------|----------|
| PC    | 0.885    |
| BMI   | 0.784    |
| BMI   | 0.182    |
| Q3    | 0.692    |
| Q2    | 0.605    |
| Q1    | 0.646    |
| Q4    | 0.738    |
| Q5    | 0.845    |
| Q6    | 0.785    |
| Q7    | 0.778    |
| Q8    | 0.741    |
| Q12   | 0.720    |
| Q11   | 0.593    |
| Q10   | 0.613    |
| Q9    | 0.766    |

Figure 1: Structural equation model of the mechanism of psychological contract in business model innovation.
Business model innovation <--- value proposition, \( P = 0.472 > 0.05 \).

Hypotheses 2 and 3 are verified. There is a significant positive relationship between customer value proposition and psychological contract. There is also a significant positive correlation between psychological contract and business model innovation.

The following is to analyze the intermediary role of psychological contract in customer value proposition and promoting business model innovation (see Table 6). The total utility is 0.182\( \times \)0.784 = 0.876. The intermediary effect is 0.885 \( \times \)0.784 = 0.694. The proportion of intermediary utility in the total utility is 0.694/0.876 = 0.79.

It can be seen that psychological contract plays a relatively large intermediary role in customer value proposition and promoting business model innovation, accounting for 79%. Hypothesis 4 is verified.

### 5. Conclusion and Discussion

Only three latent variables are selected in this paper, although there are many factors affecting business model innovation, which is a limitation of this research. In addition, there are only 150 samples, which is also a few number. In the future, in the context of big data, we should take external big data as a latent variable for in-depth research and discuss the impact of big data capability on psychological contract.

The policy enlightenment is that in the context of Internet big data, the implementation of business model innovation should pay attention to the role of relationship change and the research of psychological contract. In practice, we should strengthen the management of the psychological contract of employees and stakeholders; pay attention to the construction of system, culture, commitment, and trust; and constantly build a mood environment.

### Data Availability

The dataset can be obtained from the author upon request.

### Conflicts of Interest

The author declares that there are no conflicts of interest.

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