A Study on Business Model Evaluation System for Poverty Alleviation by E-commerce

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Keywords: business model canvas, analytic hierarchy process, evaluation of e-commerce, poverty alleviation business model

Abstract. Since the 21st century, after 20 years of rapid development, China's e-commerce has become very mature, bringing great convenience to people's lives, and more importantly, solving the problem of economic development in poor and remote areas with inconvenient transportation. In order to build a well-off society in an all-round way by 2020, China has already incorporated e-commerce into the poverty alleviation strategy system and taken it as an important poverty alleviation strategy. Based on Osterwalder's canvas of business model, this paper combs the literature, analyses the connotation of e-commerce poverty alleviation, business model and its evaluation, and constructs the evaluation system model of e-commerce poverty alleviation business model by AHP and fuzzy comprehensive evaluation, and studies the construction and application of the evaluation system of e-commerce poverty alleviation business model. The representative W county is selected as the application object, and its business model of e-commerce poverty alleviation is evaluated. The conclusion is that the score of the business model of e-commerce poverty alleviation in W county is 82.68. Through the analysis of the evaluation results, seven suggestions for development and improvement are put forward for the indicators with lower scores.

1. Introduction

Since the "e-commerce poverty alleviation" plan was put forward and vigorously promoted in 2015, the circulation of characteristic agricultural products in many remote poverty-stricken areas is no longer a problem, and the efficiency of transforming characteristic agricultural products into market commodities has improved rapidly. The Internet has brought new opportunities for precise poverty alleviation, as well as new business models. The advantages and disadvantages of the business model of e-commerce poverty alleviation directly determine the rate and effect of poverty alleviation. It has high value and practical significance to study the business model of e-commerce poverty alleviation.

The research on the business model of e-commerce poverty alleviation is of great significance to the work of e-commerce poverty alleviation. A good business model can reduce risks, increase security, enhance efficiency and income for the poverty-stricken areas' e-commerce poverty alleviation work, and help the poor areas and local population change their ideas, change their understanding and consciousness, help to establish quality awareness and brand awareness, thus impelling industrial transformation, changing production mode, adjusting industrial structure, and realizing supply-side structural reform. Enhancing the development ability of poverty-stricken areas and empowering individuals and market participants in poverty-stricken areas to acquire information and use e-commerce can break down information barriers and reduce information asymmetry. By means of electronic information technology and the business model road of poverty alleviation for local businesses with regional characteristics, production development can be

  DOI: 10.25236/icsm.2019.058

realized and poverty alleviation can be achieved as soon as possible.

Based on Osterwalders theory of business canvas, this paper constructs four first-level indicators and nine second-level indicators, extracts three-level indicators of business model through literature research, constructs an evaluation system of business model of e-commerce poverty alleviation by using analytic hierarchy process, and applies fuzzy comprehensive evaluation method to W county.

2. Literatures Overview

The business model canvas was invented by Alexander Osterwalder of Stanford University Entrepreneurship Center and Yves Pigneur, a Swiss scholar. There are nine elements in the business model canvas: Customer Segments, Value Propositions, Channels, Customer relationships, Revenue Streams, Key Resources, Key Activities, Key Partners and Cost Structure.[1]

Analytic Hierarchy Process (AHP) is an analytical method proposed by Saaty, a professor of Pittsburgh University, a well-known American operational research scientist. Analytic hierarchy process allows inconsistency because people are more likely to be essentially inconsistent than essentially consistent in judgment because they cannot accurately estimate measurements. The analytic hierarchy process (AHP) also uses the principle of hierarchical composition to derive the composite priority of alternatives of multiple standards from the priority of each standard. Therefore, in practical application, qualitative and quantitative analysis can be combined, with strong practicability and effectiveness.[2]

According to the related literature on poverty alleviation by e-commerce, there are relatively many studies by Chinese scholars. The concept of e-commerce poverty alleviation is not the literal comparison between e-commerce and poverty alleviation, but the organic combination of the two. Some scholars have carried out research on the purpose and function of e-commerce poverty alleviation, such as Wang Quanchun (2017), who believes that foreign research on rural e-commerce poverty alleviation mainly focuses on the role of information and communication technology in poverty alleviation. Some scholars have also discussed the mode and guarantee conditions of e-commerce poverty alleviation, such as Wang Xiangdong (2015), who believes that with the introduction of relevant national policies and the mainstreaming of e-commerce, the conditions for e-commerce poverty alleviation work have become more mature. Poverty alleviation by e-commerce is a newly emerging concept accompanied by the development of e-commerce in recent years. At present, it is in the exploratory stage of development, and the future direction of development remains to be discussed.[3]

Scholars' research on business model evaluation mainly focuses on the evaluation system of business model. Some scholars have studied business model evaluation from the perspective of value chain, such as: Leixiong (2017) and Dong Feng (2016) have established business model evaluation system to evaluate business model; others have carried out business model evaluation from the perspective of life cycle, such as Zhao Lixin (2011) on the analysis and evaluation of business model of Internet enterprises; In this way, many scholars, based on Ostwald's nine elements theory of business model canvas, use the analytic hierarchy process to establish the evaluation system of business model, such as Ge Xuan (2016), Chang Siyuan (2018), Dai Wenwen (2016).[5] [6] [7] [8] [9] [10]

Therefore, in view of the existing research experience of many scholars, this paper chooses the mature business model theory as the basis and uses the analytic hierarchy process to construct the evaluation system of the business model of e-commerce poverty alleviation.

3. Research Process

3.1. Selective Evaluation Dimension

This paper chooses the evaluation dimension of e-commerce poverty alleviation business model based on the mature business model canvas theory of the existing basic theory. Firstly, the evaluation of business model for poverty alleviation is divided into four perspectives: infrastructure

perspective, product and service perspective, customer perspective and financial perspective; secondly, from the above four perspectives, the nine basic dimensions of business model canvas are studied, which are: important cooperation, key business, core resources, value proposition, cooperation barrier. Department, channel, customer segmentation, cost structure and revenue sources. Finally, nine elements of business model canvas are taken as nine evaluation dimensions to subdivide the evaluation indicators in each dimension.

3.2. Determining the Evaluation Index

Based on the analytic hierarchy process (AHP) theory, this paper establishes an evaluation system of the business model of e-commerce poverty alleviation. Four first-level indicators and nine second-level indicators are constructed by referring to Ostwald's business model canvas theory. As for the screening of the three-level indicators of the evaluation system, firstly, 95 academic papers were retrieved by using the keyword "business model" as the title precise search and the keyword "evaluation/evaluation/measurement/evaluation/evaluation/evaluation" as the keyword fuzzy search in the "China Academic Journal Network Database" and "China Excellent Doctoral Dissertation Full-text Database" under the How Net platform, respectively. After reading the same literature in the two databases, 74 references were obtained; secondly, through reading each bibliography, 32 references unrelated to the evaluation system and evaluation indicators were excluded, and 42 references were finally extracted with effective indicators; finally, the indicators of business model evaluation in the effective literature were extracted, and the first 50 indicators of frequency were obtained by mathematical statistics. Finally, 40 indicators (as shown in Table 1 below) are selected as the three-level indicators of the evaluation system in this paper. Secondary indicators are used as classification criteria to construct a three-level indicator structure and form a three-level evaluation architecture model.

Table 1: Three-level Indicators of the Evaluation System of Business Model for Poverty Alleviation in E-commerce.

Cooperation Mode	Cooperative Partner	Cooperation Satisfaction	Relational Stability	Resource Complementarity
Government Cooperation	Customer Service	Marketing Promotion	Public Relations	Human Team
Material Resources	Financial	Brand Value	Technology	Core Competence
Product Category	Product Quality	Product Price	Innovation Ability	Product Differentiation
Customer Satisfaction	Customer Loyalty	Product Channel	Marketing Channel	User Channel
Direct Channel	Indirect Channel	Customer Type	Customer Cale	Potential Customers
Target Customers	Cost Control	Cost Composition	Price Strategy	Active Customers
Profitability	Market share	Sustainability	Revenue Structure	Customer Consumption Ability

3.3. Analytic Hierarchy Process

3.3.1. The Model

According to the analytic hierarchy process, the hierarchical structure model is constructed, as shown in Figure 1 below.

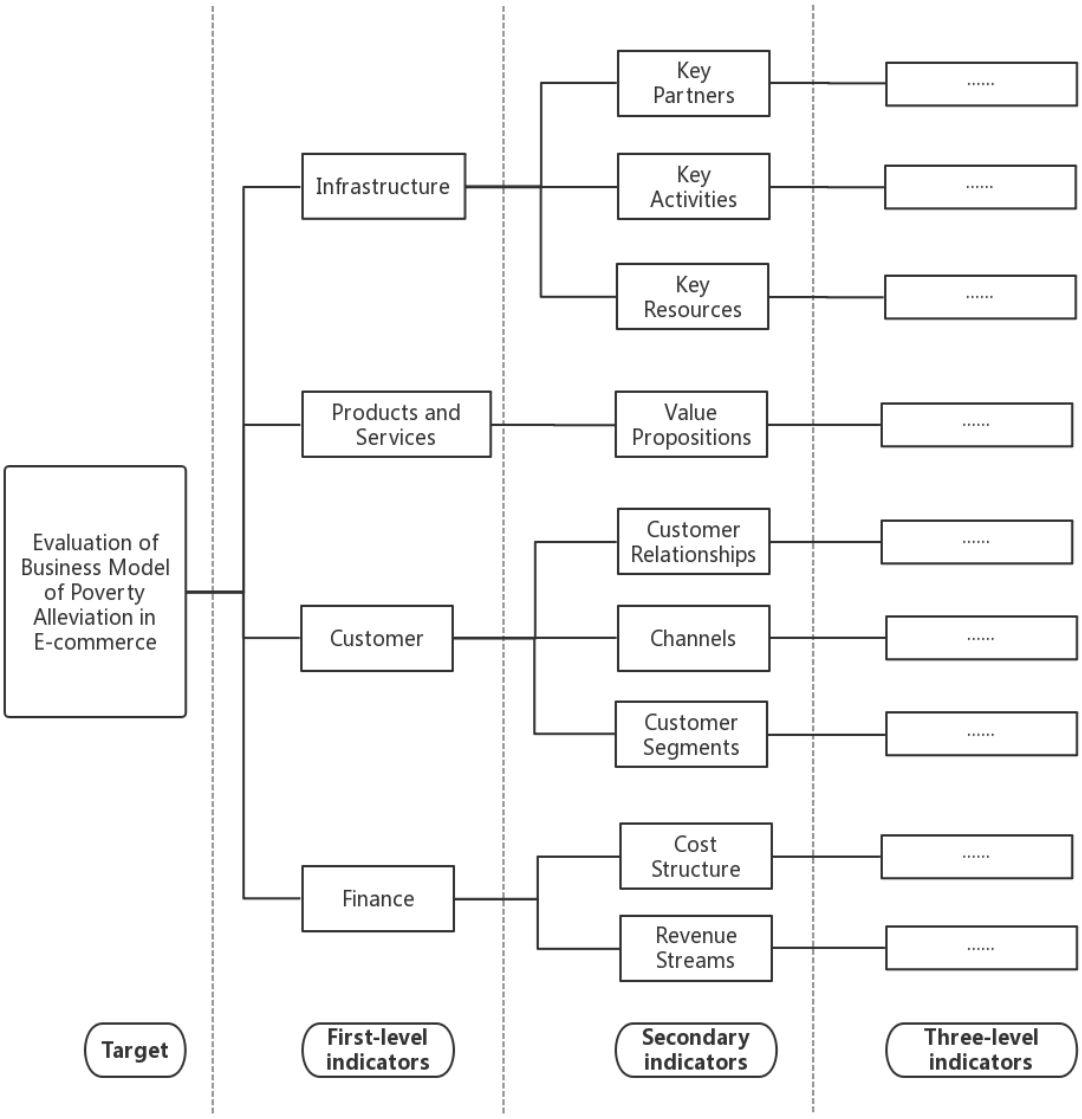

Figure 1: Evaluation System of Business Model for Poverty Alleviation by E-commerce.

3.3.2. The Weight

The weight calculation is based on the data of the judgment matrix. In this paper, the judgment matrix of all levels of indicators is constructed according to the model and a questionnaire is formed. The relevant calculation and analysis are carried out according to the data. For example, first-level indicators (as shown in Table 2 blow):

Table 2：Calculating the Weight of First-level Indicators

Ranks	Infrastructure	Products and Services	Customer	Finance
Infrastructure	1	2.379	1.319	1.722
Products and Services	/	1	2.361	3.056
Customer	/	/	1	2.556
Finance	/	/	/	1

Analytic Hierarchy Process				
Feature vector	1.405	1.227	0.881	0.487
Weight	0.35	0.31	0.22	0.12
λ_{max}	4.047			
CI	0.0157			
Consistency test	CR = 0.017 < 0.1 passed the test			

Finally, a complete evaluation system is obtained (as shown in Table 3 below).

Table 3：Weight of Indicators at All Levels

Target Layer	Criterion Level				Index Level	
	First Level index	Weight	Two Level Index	Weight	Three Level Index	Weight
Evaluation of Business Model of Poverty Alleviation in E-commerce	Infrastructure	0.35	Key Partners	0.41	Cooperation Mode	0.28
					Cooperative Partner	0.15
					Cooperation Satisfaction	0.17
					Relational Stability	0.14
					Resource Complementarity	0.15
					Government Cooperation	0.11
			Key Activities	0.38	Customer Service	0.39
					Marketing Promotion	0.38
					Public Relations	0.23
			Key Resources	0.21	Human Team	0.26
					Material Resources	0.11
					Financial	0.17
					Brand Value	0.23
					Technology	0.13
					Core Competence	0.10
	Products and Services	0.31	Value propositions	1	Product Category	0.23
					Product Quality	0.25
					Product Price	0.17
					Innovation Ability	0.22
					Differentiation of Products or Services	0.13
	Customer	0.22	Customer Relationships	0.64	Customer Satisfaction	0.28
					Customer Loyalty	0.72
			Channels	0.22	Product Channel	0.26
					Marketing Channel	0.19
					User Channel	0.27

					Direct Channel	0.18
					Indirect Channel	0.10
			Customer Segments	0.14	Customer Type	0.31
					Customer Scale	0.32
					Potential Customers	0.21
					Target Customers	0.16
	Finance	0.12	Cost Structure	0.28	Cost Control	0.29
					Cost Composition	0.71
			Revenue Streams	0.72	Price Strategy	0.17
					Active Customers	0.20
					Market Share	0.16
					Profitability	0.20
					Sustainability	0.13
					Revenue Structure	0.08
					Customer Consumption Ability	0.06

3.4. Fuzzy Comprehensive Evaluation Process

The data in this section mainly come from the questionnaire survey. According to the evaluation model, the evaluation questionnaire is compiled, and the data are collected and analysed in time.

3.4.1. Setting Up a Commentary Set

According to the evaluation system of the business model of e-commerce poverty alleviation established in the previous part, this part makes a fuzzy comprehensive evaluation of the 40 indicators at the lowest level, and establishes a set of comments with reference to the Richter scale as shown in formula 1 below:[11]

$$V = \{\text{Good, Better, Average, Bad, Worse}\} = \{100, 90, 80, 70, 60\} \quad (1)$$

At the same time, in order to truly reflect the local business model of E-commerce poverty alleviation in W County, a field survey was conducted in W County.

3.4.2. Membership Calculation

(as shown in Table 4 below)

Table 4：Membership Degree of Three Level Indicators

Membership Degree of Three Level Indicators

Grade Index	Good	Preferably	Commonly	Poor	Difference
Cooperation Mode	0.1042	0.5625	0.2917	0.0417	0
Cooperative Partner	0.0625	0.2917	0.5833	0.0625	0
Cooperation Satisfaction	0.0833	0.4375	0.4375	0.0417	0
Relational Stability	0.500	0.3542	0.1458	0	0
Resource Complementarity	0.1042	0.1875	0.3125	0.2917	0.1042
Government Cooperation	0.2292	0.5208	0.2500	0	0

Customer Service	0.1250	0.2292	0.4375	0.1875	0.0208
Marketing Promotion	0.0208	0.2292	0.2292	0.4176	0.1042
Public Relations	0.1042	0.4583	0.4167	0.0208	0
Human Team	0.0417	0.1667	0.3750	0.3958	0.0208
Material Resources	0.0417	0.4167	0.2917	0.2500	0
Financial	0.0208	0.1667	0.1458	0.4167	0.2500
Brand Value	0.1042	0.1875	0.2292	0.3125	0.1667
Technology	0.0625	0.2708	0.5208	0.1458	0
Core Competence	0.0833	0.2292	0.1667	0.4167	0.1042
Product Category	0.1042	0.4375	0.3750	0.0833	0
Product Quality	0.5625	0.3333	0.0833	0.0208	0
Product Price	0.1042	0.2500	0.4167	0.2292	0
Innovation Ability	0.0625	0.1875	0.2083	0.3333	0.2083
Differentiation of Products or Services	0.0833	0.1458	0.2708	0.3125	0.1875
Customer Satisfaction	0.1667	0.6458	0.1667	0.0208	0
Customer Loyalty	0.1875	0.5208	0.2500	0.0417	0
Product Channel	0.1042	0.1250	0.4167	0.3333	0.0208
Marketing Channel	0.0417	0.2708	0.2292	0.3958	0.0625
User Channel	0.0833	0.1458	0.3958	0.3333	0.0417
Direct Channel	0.0417	0.1667	0.4167	0.2917	0.0833
Indirect Channel	0.0417	0.1458	0.5208	0.2500	0.0417
Customer Type	0.0833	0.2708	0.5417	0.1042	0
Customer Scale	0.0417	0.3542	0.4792	0.1250	0
Potential Customers	0.1667	0.5833	0.2500	0	0
Target Customers	0.0833	0.2917	0.5833	0.0417	0
Cost Control	0.0833	0.2500	0.2292	0.3750	0.6250
Cost Composition	0.1042	0.2292	0.2083	0.3750	0.0833
Price Strategy	0.6250	0.2708	0.4792	0.1875	0
Active Customers	0.1042	0.2292	0.5833	0.0833	0
Market Share	0.0833	0.1458	0.3958	0.3542	0.0208

Profitability	0.0833	0.1458	0.4792	0.2500	0.0417
Sustainability	0.1250	0.2292	0.2083	0.3958	0.0417
Revenue Structure	0.0833	0.2917	0.2500	0.3152	0.0625
Customer Consumption Ability	0.1667	0.3750	0.4583	0	0

3.4.3. Computation of Comprehensive Evaluation Results

(as shown in Table 5 below)

Table 5：Indicator scores at all levels

Target Layer	Score	Criterion Level				Index Level	
		First Level Index	Score	Two Level Index	Score	Three Level Index	Score
Evaluation of Business Model of Poverty Alleviation in E-commerce	82.68	Infrastructure	82.63	Key Partners	86.35	Cooperation Mode	87.29
						Cooperative Partner	83.54
						Cooperation Satisfaction	85.63
						Relational Stability	93.54
						Resource Complementarity	78.96
						Government Cooperation	89.79
				Key Activities	81.12	Customer Service	82.5
						Marketing Promotion	76.46
						Public Relations	86.46
				Key Resources	78.11	Human Team	78.13
						Material Resources	82.5
						Financial	72.92
						Brand Value	77.5
						Technology	82.5
						Core Competence	77.71
		Products and Services	83.83	Value propositions	83.83	Product Category	85.63
						Product Quality	94.38
						Product Price	82.29
						Innovation Ability	75.63
						Differentiation of Products or Services	76.25
		Customer	82.84	Customer Relationships	88.83	Customer Satisfaction	89.58

						Customer Loyalty	88.54
				Channels	78.81	Product Channel	79.58
						Marketing Channel	78.33
						User Channel	78.96
						Direct Channel	77.92
						Indirect Channel	78.96
				Customer Segments	84.63	Customer Type	83.33
						Customer Scale	83.13
						Potential Customers	89.17
						Target Customers	84.17
		Finance	80.68	Cost Structure	79.02	Cost Control	79.17
						Cost Composition	78.96
				Revenue Streams	81.33	Price Strategy	82.08
						Active Customers	83.54
						Market Share	79.17
						Profitability	79.79
						Sustainability	80
						Revenue Structure	80.21
						Customer Consumption Ability	87.08

3.5. Result Analysis

According to the scores of each index, we can know some deficiencies of the business model of poverty alleviation by e-commerce in W county.

1. Although there are a large number of partners, their comprehensive capacity is insufficient, and the complementary capacity of resources between the two sides needs to be improved.
2. In the examination and approval of relevant documents, the government's work process is complex and inefficient, and there is no green channel open.
3. The marketing promotion is insufficient and the brand propaganda is not in place.
4. Lack of professionals and limited operational ability of the team as a whole.
5. Lack of funds, unable to effectively marketing and expand the scale, difficult to form a scale effect.
6. The lack of innovation ability, can't always keep pace with the market rhythm and direction, it is difficult to form a differentiated operation.
7. The channel is not smooth and the construction needs to be promoted urgently.
8. The cost is high and the cost control ability is insufficient.
9. Market share and profitability are deficient, and sustainable development ability is general.

Based on the evaluation results and analysis of the business model of E-commerce poverty alleviation in W County, the following suggestions are put forward to optimize the business model of E-commerce poverty alleviation in W County.

1. Transforming traditional e-commerce thinking and introducing innovative talents
2. Strengthen the implementation of e-commerce financial poverty alleviation

3. Establishment of a new type of cooperation system between government and enterprises and between schools and enterprises

4. Developing New Industries, Layout E-commerce Poverty Alleviation Omni-directional Ecosystem Construction

5. Abandon the typical driving, demonstration and promotion of out-of-shape

6. Pay attention to strengthening leadership

7. Upgrading operation mechanism and service support system

4. Conclusion

Through the study of relevant literature, this paper explores the connotation of e-commerce poverty alleviation, business model and business model of e-commerce poverty alleviation, as well as the concept of business model evaluation and other related research, and draws the following conclusions:

Firstly, using AHP analytic hierarchy process, the evaluation system of e-commerce poverty alleviation business model is constructed.

Secondly, combined with the fuzzy comprehensive evaluation method to evaluate the poverty alleviation of E-commerce in W County, using the evaluation model, it is concluded that the business model of poverty alleviation of E-commerce in W County finally gets 82.68 points, which is generally on the upper level. Based on the analysis of the evaluation results, this paper summarizes the experience and shortcomings of the business model of E-commerce poverty alleviation in W County.

Acknowledgements

This research is funded by China National Social Science Fund Project(16BGL011).

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