Exploring the Role of Entrepreneurship and Business Models in Technology Diffusion: A Case Study of the Market Diffusion of an Enabling Technology for Sustainable Consumption and Production

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Abstract

Entrepreneurial activities and business models describe ways to start and maintain a business. Empirical data show that they play an important role in bringing technology-based products or services to market. However, the role of entrepreneurial activities and business models in the diffusion process has not been specifically and systematically explored and discussed in the adoption and diffusion literature, and there is a scarcity of simulation models that have examined technology adoption and diffusion phenomena from an entrepreneurship and business-model perspective. The purpose of our study is to contribute to this area by exploring the role of entrepreneurship and business models in the diffusion process through a System Dynamics modeling and simulation approach. We built a simulation model based on technology-diffusion-related literature and empirical data collected through the process of implementing a sustainable consumption and production initiative called I-Choose over three years. Our analysis of simulation experiment results shows different entrepreneurial activities and business models leads to different diffusion paths and associated market behaviors.

1. Introduction

Technology adoption and diffusion is an extensively studied topic in economics, marketing, sociology and information systems. Researchers are interested in factors that would influence technology adoption, and how products based on a technological innovation would spread in the market and change the market structure. Entrepreneuring is a purposeful activity to seek the opportunity, initiate, maintain and enlarge a profit business, and make impacts on the market by innovatively mobilizing resources (Cole, 1949; Wiklund, 1998). Business models generally

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emphasize systemic explanations about how firms are doing business. Empirical data show entrepreneurial activities and business models play an important role in bringing technology-based products or services to market. Using different business models to take products or services based on the same technology to market yields different economic and market outcomes (Chesbrough, 2010; Chesbrough & Rosenbloom, 2002; Schumpeter; 1947). However, the role of entrepreneurial activities and business models has not been specifically and systematically explored and discussed in the adoption and diffusion literature. In addition, there is a scarcity of diffusion simulation models that have studied technology adoption and diffusion from an entrepreneurship and business model perspective. Therefore, the purpose of our study is to contribute to this area by exploring the role of entrepreneurship and business models in the diffusion process.

The paper is divided into six sections, including this introduction. The second section provides a review of adoption and diffusion theories and models, definitions of entrepreneurship and business models, and the role of entrepreneurship and business models in technology diffusion and related research. The third section of the paper describes our research methods, and introduces the case (I-Choose Project) that we used to build our simulation model and design simulation experiments. The fourth section describes our simulation model. The fifth section presents the main results from the simulation. Finally, the concluding part of the paper summarizes our findings and proposes future study steps.

2. The Role of Entrepreneurship and Business Models in Technology Adoption and Diffusion

Technology adoption and diffusion is an extensively studied topic in economics, marketing, sociology and information systems. Researchers are interested in factors that would influence technology adoption, and how products based on a technological innovation would spread in the market and change the market structure. In the current era characterized by the rapid evolution of information and web technologies, there are many studies that have examined how products based on information and web technologies were adopted and spread in the market, e.g., products based on mobile technologies (Bruner, II & Kumar, 2005; Chen, Yen & Chen, 2009; Harno, 2010; Hung, Ku, & Chang, 2003), e-commerce (Eastin, 2002; Knutsen & Lyytinen, 2008; Liao, Chen & Yen, 2007; Pavlou & Fygenson, 2006; Ruyter, Wetzels, & Kleijnen, 2001; Vijayasarathy, 2004), information systems, and social media (Gruhl et al., 2004; Yi & Hwang, 2003). Empirical data show entrepreneurial activities and business models play an important role in bringing technology-based products or services to market. However, our review of the existing adoption and diffusion literature has found few studies that have investigated technology adoption and diffusion from an entrepreneurship and business model perspective. Therefore, the purpose of our study is to contribute to this literature by exploring the role of entrepreneurship and business models in the diffusion process.

2.1 Adoption and Diffusion Theories and Models

As a well-explored area, adoption and diffusion research provides a variety of theories and models to explain adoption and diffusion phenomena. A popular typology by Brown has divided these theories and models into four categories (Brown, 1981; Miller & Garnsey, 2000). Theories and models in the first category explain adoption and diffusion phenomena from a communication perspective. From this perspective, the adoption and diffusion process can be explained as an imitation behavior triggered by social interactions and communications. The majority of potential adopters are risk-averse human beings, and they make adoption decisions under uncertainty through the evaluation of risks and benefits of adoption. The left small portion of potential adopters who are adventurous and innovative becomes pioneers and early adopters. Through communications and social interactions, the early adopters' behavior influences the risk-benefit evaluations of other potential adopters. As a result, more and more potential adopters start accepting the technology under influences such as the word of mouth or marketing.

The second category of adoption and diffusion theories and models explain the adoption and diffusion phenomena as the result of potential adopters' rational economic considerations. From this perspective, potential adopters are rational economic agents, who make their adoption decisions based on the cost-benefit evaluation. If the consumption benefit exceeds the price, the product will be adopted, while the consumption benefit is determined by the product's utility and performance. Many popular theories and models in adoption and diffusion research can be classified under both the first and second categories, for example, the diffusion of innovation theory (Rogers, 1995), the technology acceptance model (Davis, Bagozzi & Warshaw, 1989), the theory of planned behavior (Ajzen, 1991), and the expectation-confirmation theory (Oliver 1993). These theories and models suggest the adoption decision is influenced by the consumer's intention of use. The intention of use is influenced by the consumer's attitude towards the product, which, in turn, is influenced by a range of internal and external factors. Internal factors refer to the consumer's and product's characteristics, such as the consumer's self-efficacy and the product's usefulness. External factors refer to environmental factors such as social influence or communications.

The third and the fourth categories have respectively addressed the roles of affordability and availability in the diffusion process (Brown, 1981; Miller & Garnsey, 2000). Theories and models in the third category explain the diffusion process as a consequence of the unequal distribution of resources in society and the variation in adopters' affordabilities. Studies based on these theories and models see the diffusion process through the lens of development economics. In contrast, theories and models in the fourth category suggest the diffusion process is s a consequence of unequal opportunities to adopt. Factors such as geographical locations would influence the market infrastructure, and the market infrastructure would influence the product's availability.

2.2 Entrepreneurship and Business Models

Entrepreneuring is a purposeful activity to seek the opportunity, initiate, maintain and enlarge a profit business, and make impacts on the market by innovatively mobilizing resources (Cole, 1949; Wiklund, 1998). Business models generally emphasize systemic explanations about how firms, including startup companies, fruits of entrepreneurial activities, are doing business. The interest of scholars for the notion of business models has risen a lot since the advent of internet and the development of e-businesses (Amit and Zott, 2001; Mahadevan, 2000; Timmers, 1998, 1999; Zott, Amit & Massa, 2011). Amit and Zott (2001: 494-495) define business model as “the design of transaction content, structure, and governance so as to create value through the exploitation of business opportunities”.

One of the main issues in the literature referring to e-business models concerns the components of a business model. In spite of the diversity of approaches to identify the essential components of business models, there is a certain convergence in the literature pointing to the following elements: Infrastructure (comprising key activities, key resources and a partner network), a value proposition, customer segments and type of relationships, distribution channels, a cost structure, methods to generate revenue streams, as well as key performance indicators and explicit linkages among the variables of the business system to assess its consistency (Dubosson-Torbay, Osterwalder, & Pigneur, 2002; Osterwalder & Pigneur, 2002).

2.3 Technology Adoption and Diffusion from an Entrepreneurship and Business Model Perspective

Empirical data show entrepreneurial activities and business models play an important role in bringing technology-based products or services to market. Using different business models to take products or services based on the same technology to market yields different economic and market outcomes (Chesbrough, 2010; Chesbrough & Rosenbloom, 2002; Schumpeter; 1947). However, the role of entrepreneurial activities and business models has not been specifically and systematically explored and discussed in the adoption and diffusion literature, although the importance of some activities related to business-model design have been touched upon in previous adoption and diffusion research, for instance, marketing and investment activities.

Miller & Garnsey (2000) point out the significance of entrepreneurship is overlooked in existing diffusion literature. The first category of adoption and diffusion theories and models, the communication view of adoption and diffusion phenomena, is overly demand-side oriented, and neglects supply-side processes and actors. The second category, the economic view of adoption and diffusion phenomena focuses on entrepreneurs’ or organizations’ efforts in improving technology and product performance and ignores non-technical problems such as marketing, distribution, pricing, finances, etc. The third and fourth categories of adoption and diffusion theories and models, which address the affordability and availability issues, have overlooked the possibility that entrepreneurial activities can change the resource distribution and market infrastructure by mobilizing resources and propagating technologies and products.

The overlooked importance of entrepreneurship and business models in diffusion research might be able to explain the scarcity of simulation models that have studied technology adoption and diffusion from an entrepreneurship and business model perspective. A fair amount of diffusion simulation models were developed based on the famous Bass Model (1969), which reflects a communication view, probably an overly demand-side oriented view as pointed out by Miller & Garnsey (2000), of adoption and diffusion phenomena. The key hypothesis of this model is that the probability that an initial purchase will be made at a certain time is a linear function of the previous buyers. The bass model addresses the importance of early adopters and other adopters' imitation behavior. The pressure operating on imitators increases as the number of previous buyers increase. Another set of diffusion simulation models follows the economic view of adoption and diffusion phenomena and addresses efforts in technical development, but has a limited discussion on non-technical issues. For example, Jack Homer's model (1987), describes how medical technologies evolves because producers are continuously improving the technology based on consumers' feedbacks, and consumers keeps adjusting their attitudes towards the technology as these improvements are made. More up-to-date diffusion simulation models have been trying to capture a systematic view of adoption and diffusion phenomena and include various factors such as heterogeneity among potential adopters, market competition, regulations and policies, etc. (Dattée, 2007; Dattée & Weil, 2005; Weil & Utterback, 2005). However, our review has found few diffusion simulation models that have studied technology adoption and diffusion from an entrepreneurship and business model perspective. The purpose of our study is to contribute to this literature by exploring the role of entrepreneurship and business models in the diffusion process.

3. Method

In this study we use system dynamics simulation experiments to explore the relationship between business models and diffusion related market behaviors. The basic structure of our system dynamics model is built based on theories and models in existing adoption and diffusion literature. We adapted and developed this basic structure to characterize different scenarios in which products developed based on the same enabling technology are taken to market by various (corporate) entrepreneurs using different business models. These scenarios are designed based on empirical data collected from a case study. The following two sections are an elaborate description of this process.

3.1 Case Study

Besides the literature, the basis for our model building is an initiative called I-Choose. I-Choose Project Team has been trying to increase supply chain transparency and product data disclosure of coffee grown and sold in the North American Free Trade Area (NAFTA). An essential goal of I-Choose project is to create a set of standards to facilitate product certification and inspection data disclosure, sharing and utilization. The set of standards include a series of ontologies that defines the certification and inspection knowledge domain, semantically organizes certification and inspection data, and enables transparent, complete, and reliable certification and inspection data retrieval. This series of ontologies are called Certification and Inspection Big Data Infrastructure Building Block (CIDIBB). CIDIBB can be used to produce a variety of applications or services. These applications or services can make information about how, where, by whom, and under what conditions a particular product was produced available and usable to consumers, and helps them make more informed and ethical purchase decisions with regards of the social and environmental impacts of the coffee they drink (Luna-Reyes, Andersen, Andersen et al., 2012; Luna-Reyes, Sayogo, Zhang et al., 2012). In the context of this paper, CIDIBB is the enabling technology under discussion. The purpose of our simulation experiments is to observe how the diffusion paths of CIDIBB-based applications or services would differ if they are taken to market by (corporate) entrepreneurs using different business model designs.

3.2 Simulation Experiment Design

Through analyzing I-Choose interview data collected from coffee producers, retailers, certification and inspection practitioners, and consumers, we designed five scenarios to represent different ways to startup a CIDIBB-based business. The business models characterized in these scenarios vary in terms of different designs of certain business-model elements, as shown in Table 1.

Table 1. Scenarios Represent Different Business-model Element Designs

Business Model Elements					
Scenarios: (Corporate) Entrepreneurs	**Value Proposition**	**Customer Segment(s)**	**Revenue Generation Mechanism**	**Cost Structure**	**Partner Network**
#1: Virtual Certifier	Help producers attract valued consumers	Producers	Certifying Fee	Marketing to producers; CIDIBB construction & maintenance	none
#2: Consumer Advocate	Enrich consumer purchasing experience	Consumers	Information Package (Product Ratings) Sale	Marketing to consumers; CIDIBB construction & maintenance	none
#3: TallMart	Help producers distributing products; Attract valued consumers by enriching consumer purchasing experience	Consumers; Producers	Premium from consumers; Distribution fee from producers	Marketing to producers and consumers; CIDIBB construction & maintenance; Dividend to producers	Individual producers

#4: iGuide	Help retailers attract valued consumers; Motivate producers to disclose product data	Retailers	Distribution fee from retailers	Marketing to retailers; CIDIBB construction & maintenance; Subsidy to producers	Individual producers
#5: Producer Association	Help producers distributing products; Attract valued consumers by enriching consumer purchasing experience	Consumers	Premium from consumers; Association fee (registration fee in the model)from producers	Marketing to consumers; CIDIBB construction & maintenance;	Producers form an alliance

In scenario 1, a certifying organization called *Virtual Certifier* uses CIDIBB to create a virtual certificate. The virtual certificate allows consumers to trace and obtain detailed certification information online or scanning the product barcode. The virtual certifier charges producers certifying fees. Producers benefit by charging consumers an extra premium for the virtual certificate attached to their products.

In scenario 2, the *Consumer Advocate* is a product rating firm. The Consumer Advocate produces product ratings based on data retrieved through CIDIBB infrastructure and publishes these ratings as information packages. Their business model is to sell a low cost-subscription to their information packages to individual consumers.

In scenario 3, a corporation called *TallMart* recognizes the potential of the CIDIBB to bring trusted information into the consumer marketplace as well as the commercial potential of creating a platform wherein retail consumers pay a premium for products that can be sold with CIDIBB-certified virtual certificates while at the same time producers of sustainable products are willing to pay a fee to have information about their products distributed on TallMart's platform using the CIDIBB standard. TallMart also shares the profit with the producers to strengthen their partnership.

In scenario 4, the corporation *iGuide* create a platform similar to TallMart's , but they have designed a different way of doing business. They help retailers to distribute products. Also they subsidize producers and motivate producers to disclose product information. The premium paid by consumers goes directly to retailers.

In scenario 5, producers form an alliance called *Producer Association*. Producers create a platform of their own to distribute products. They share costs and receive premiums from consumers.

We built system dynamics models that simulate these five scenarios, which are described in the following section.

4. Model Description

Figures 1 to 5 are abstracted views of our model structures for scenarios introduced in the previous section, which illustrates the main causal loops that are operating in the simulated system. The final running model (please see the supporting material) is more complicated than the high level view provided in Figures 1 to 5. In each scenario, there is a sector to describe each agent. For example, agents in the Producer Association scenario include consumers and producers, so for this scenario there is a sector dedicated to consumers, and another to producers. In the TallMart scenario, there are three sectors, one to describe producers, another sector to describe consumers, and the third sector for TallMart. Except for corporate entrepreneurs, e.g., Virtual Certififer, TallMart, etc., the model assumptions of agent behaviors are the same across these five scenarios. The sector for the corporate entrepreneur depicts how information and cash flow among various agents as a result of different business-model-element designs.

To avoid an overly complicated model structure and focus on studying the influence of business-model-element design on the diffusion process, we have made simplified assumptions of agents at the current stage of model development. Consumers in our current model make purchasing decisions by evaluating information trustworthiness ("information credibility" in the model). The information trustworthiness will drive whether or not consumers keep buying the product in the long run. The basic consumer sector structure is an adaption of the classic diffusion model. There are two paths by which non-adopters would become adopters. One is through the influence of word of mouth, and the other is through marketing. The degree of the influence of word of mouth depends on information trustworthiness and the number of adopters, while the degree of the influence of marketing is determined by available marketing budgets and the number of adopters. Producers and retailers are rational economic agents, and their behaviors are governed by evaluating benefits and costs. A high benefit to cost ratio will drive producers and retailers to join the CIDIBB-based system, while a low benefit to cost ratio will make them leave the system.

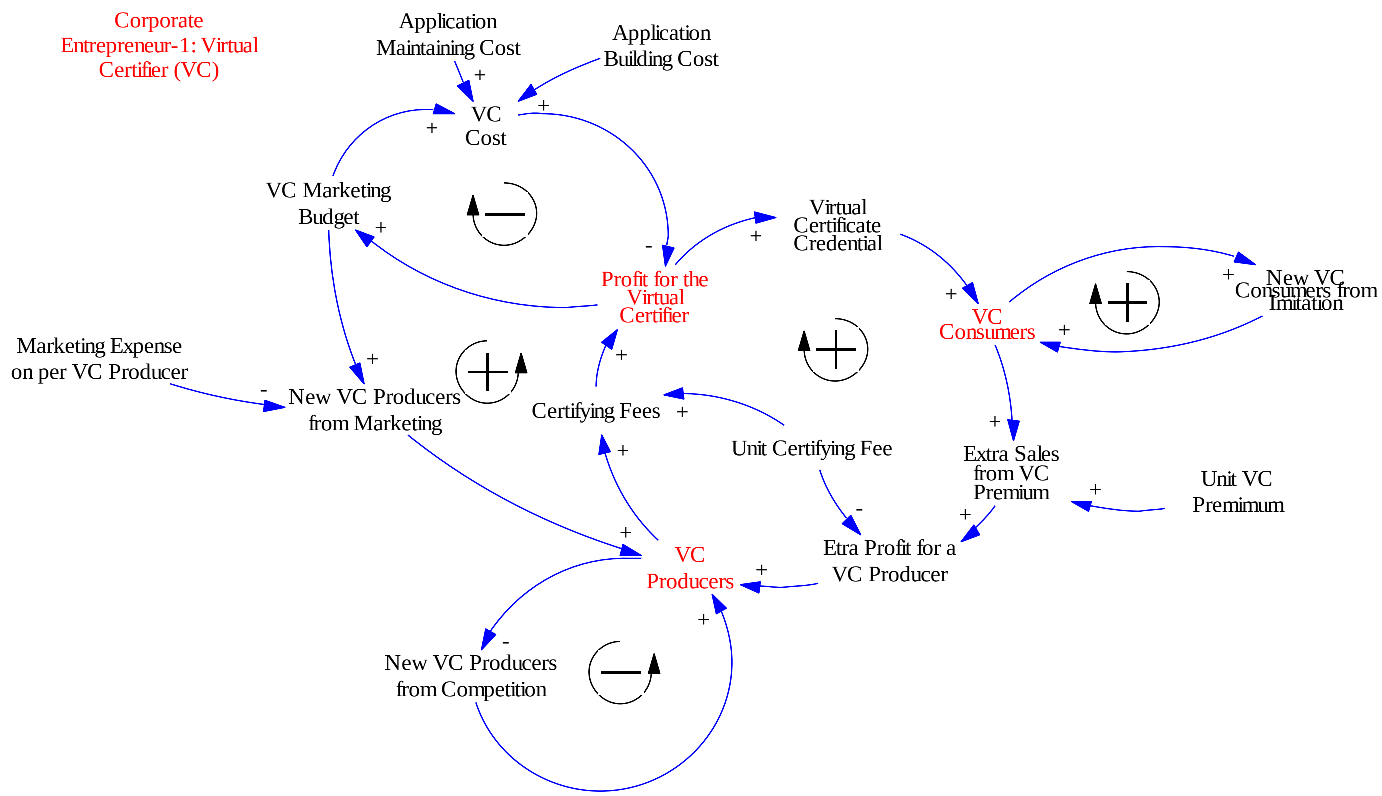

Figure 1 Causal Loop Diagram of the Virtual Certifier Scenario

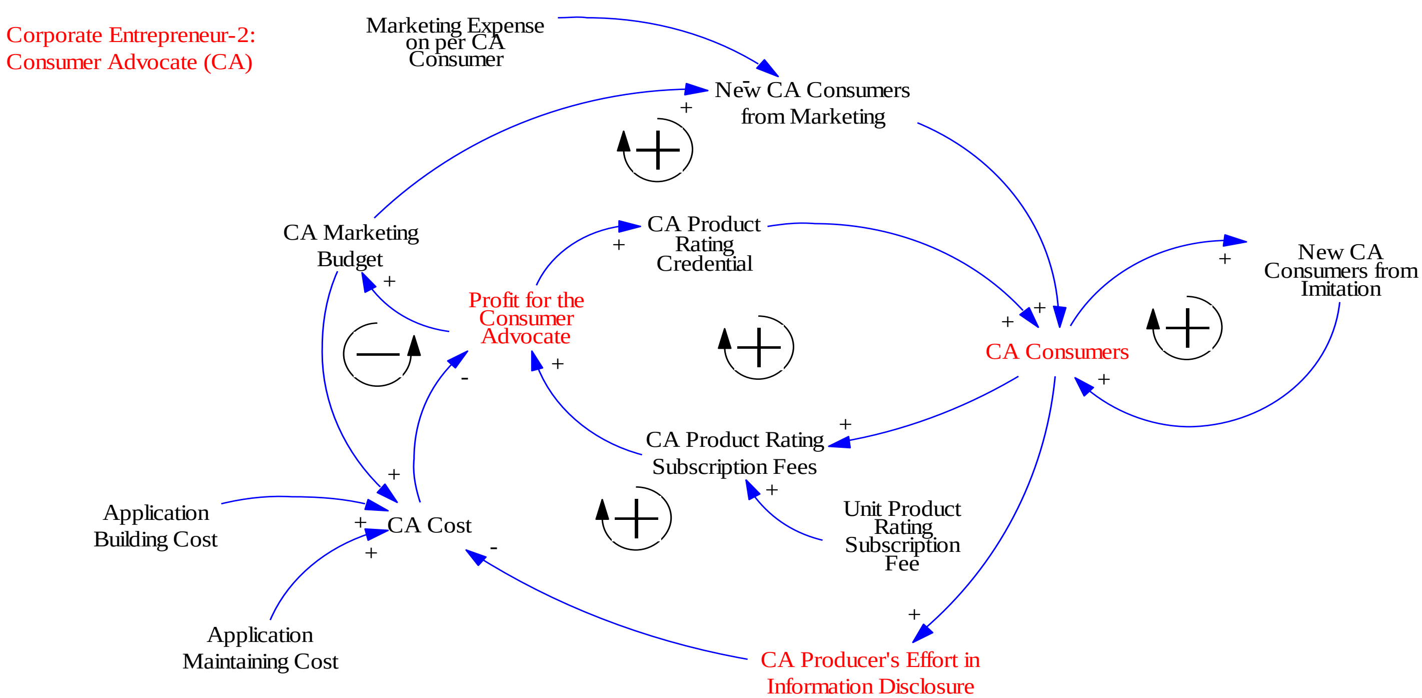

Figure 2 Causal Loop Diagram of the Consumer Advocate Scenario

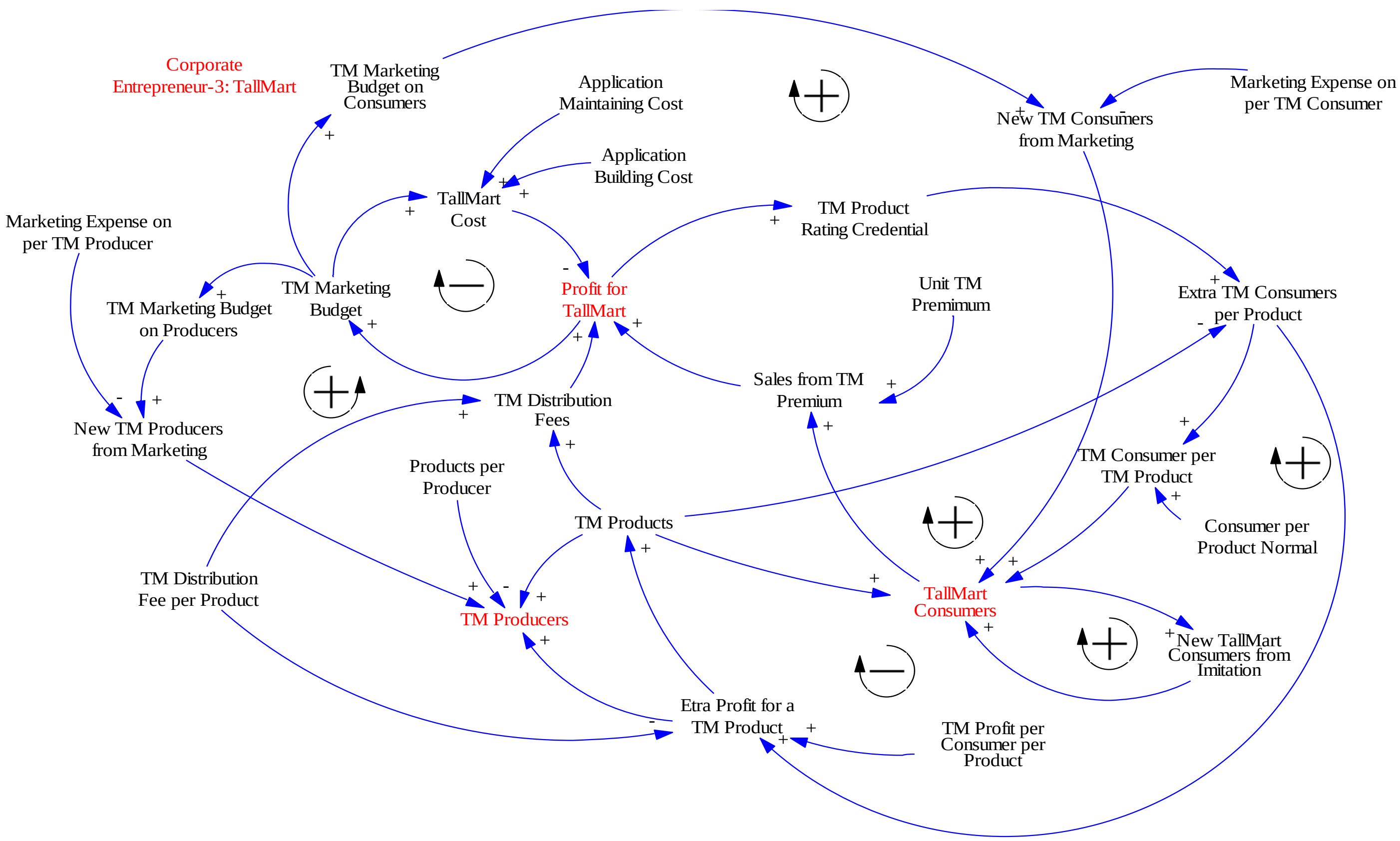

Figure 3 Causal Loop Diagram of the TallMart Scenario

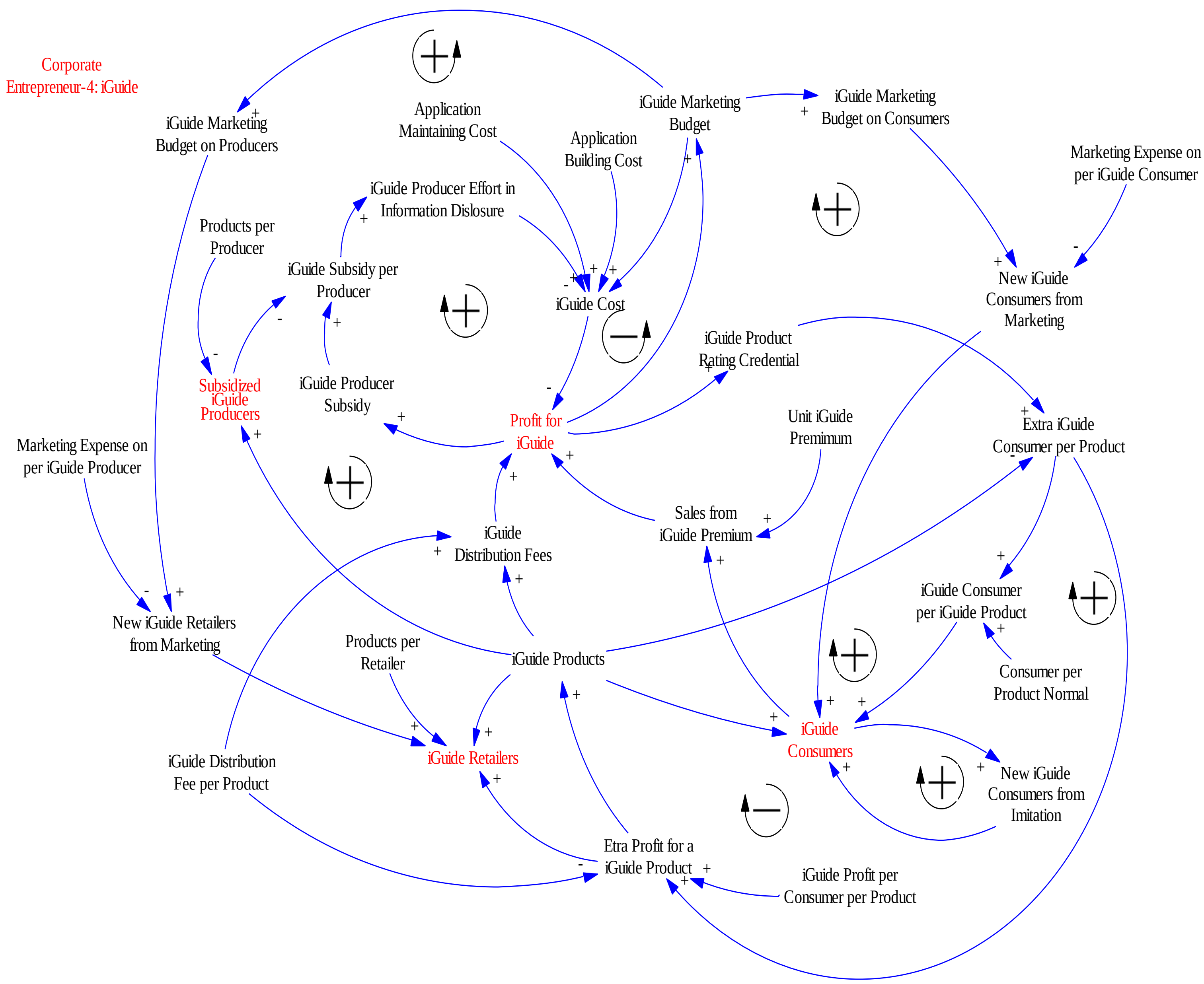

Figure 4 Causal Loop Diagram of the iGuide Scenario

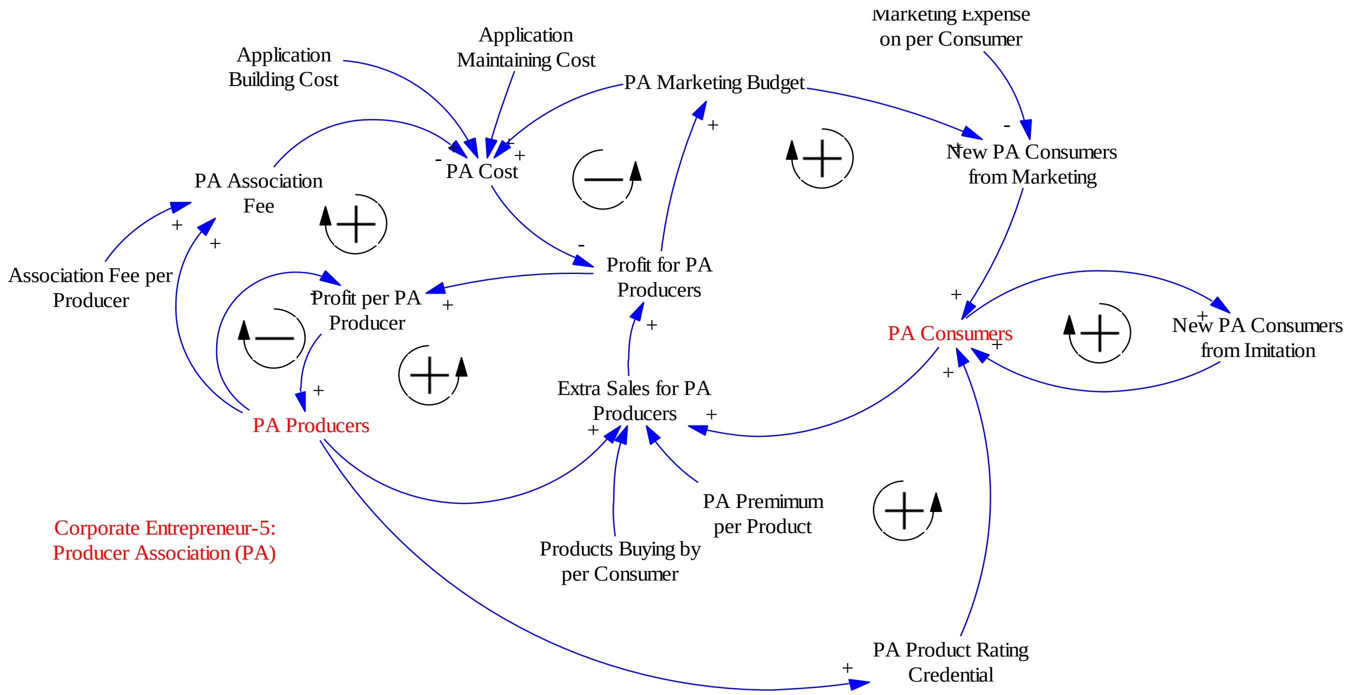

Figure 5 Causal Loop Diagram of the iGuide Scenario

5. Simulation Results

This section reports our simulation results. The parameter values for base runs were calibrated against empirical data collected in I-Choose project. We also conducted a series sensitivity experiments to test the robustness of our model and the reliability of simulation results of base runs.

5.1 Base Run Results

As shown in Figure 6, the base run result of the Consumer Advocate scenario shows that the number of consumers who are buying coffee from the platform gradually increases to 3000 (10% of the total consumer population) and stops growing by the end of the 9th year after the platform is launched into the marketplace.

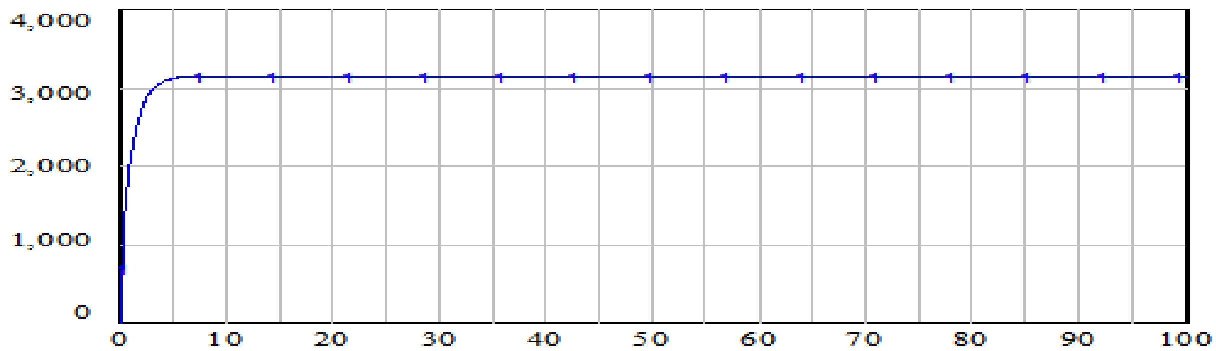

Figure 6 Base Run Result of the Consumer Advocate Scenario

As for the Virtual Certifier and iGuide scenarios, their base run results show that there are few consumers who are buying coffee from the platform, and this situation has remained the same ever since the platform is launched into the marketplace, as shown in Figure 7.

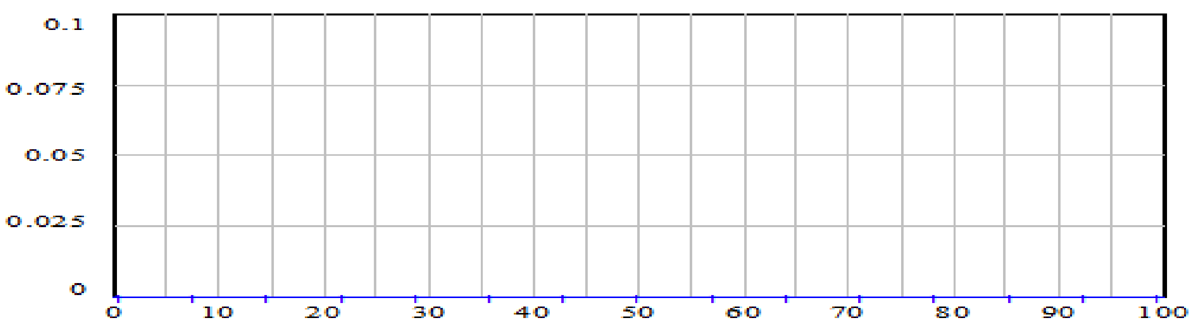

Figure 7 Base Run Results of the Virtual Certifier and iGuide Scenarios

Figure 8 shows the base run result of the TallMart scenario: In the first eight years after the platform is launched into the marketplace, the number of LOHAS consumers who are buying coffee from the platform remains at the level of 3000 (10% of the total LOHAS consumer population). The LOHAS consumer number starts growing rapidly around the 9th year and increases to 30,000 (100% of the total LOHAS consumer population) by the end of the 24th year.

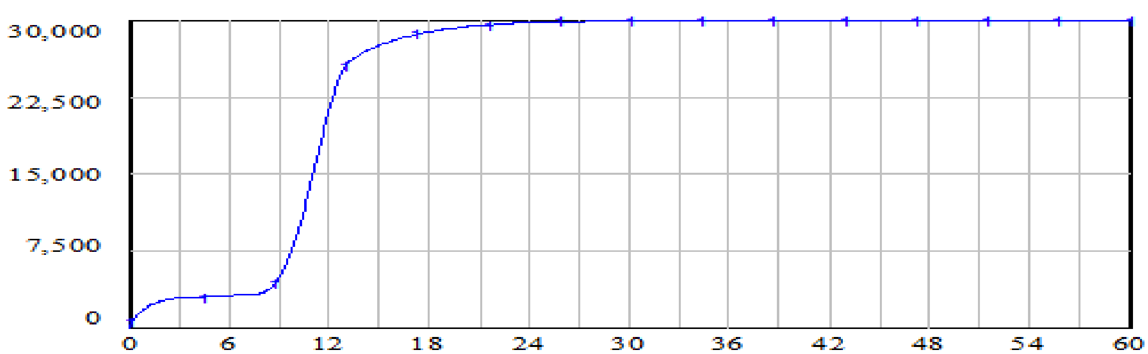

Figure 8 Base Run Result of the TallMart Scenario

As for the Producer Association scenario, in the first 15 years after the platform is launched into the marketplace, the number of consumers who are buying coffee from the platform remains at the level of 3000 (10% of the total consumer population). The consumer number starts growing rapidly around the 16th year and increases to 30,000 (100% of the total consumer population) by the end of the 33rd year, as shown in Figure 9.

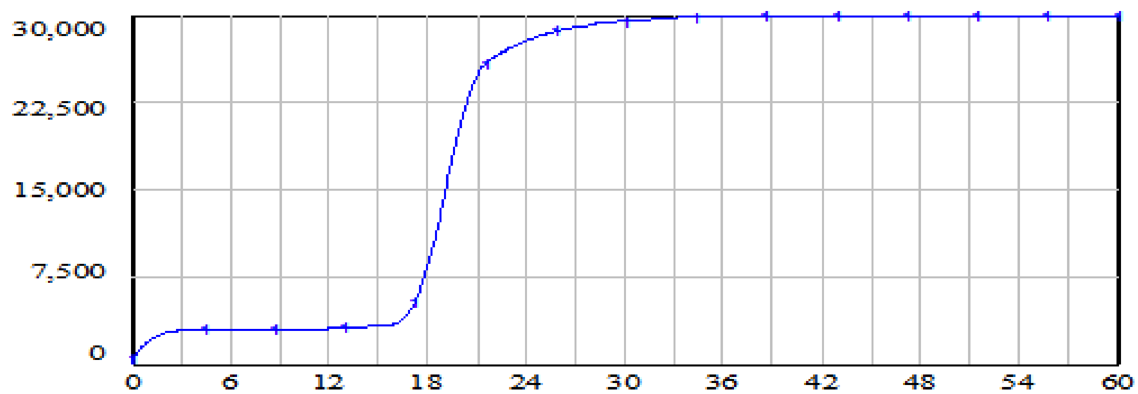

Figure 9 Base Run Result of the Producer Association Scenario

5.2 Sensitivity Test Results

We normalized model parameters and conducted sensitivity experiments on a series of parameters to strengthen our confidence in the model and test the reliability of simulation results of base runs. These parameters include the ratio of the number of producers to the number of consumers, the ratio of the number of producers to the number of retailers, the market size, the ratio of the size of customer base to fixed Cost, the marginal cost for a producer or retailer, the rating-subscription fee per consumer, and the subsidy per producer. Detailed experiment results are as follows.

Sensitivity tests on the ratio of the number of producers to the number of consumers: As for the iGuide and Virtual Certifier scenarios, test results show the same diffusion pattern. The market behavior is hardly influenced by the variation of the ratio of the number of producers to the number of consumers, as shown in Figure 10. As for the TallMart and Producer Association scenarios, test results show the same general diffusion pattern as the ratio of the number of producers to the number of the consumers changes within a certain range, however, as the ratio gets bigger in this range, the initial growth rate of the rapid-growth period becomes smaller. As the ratio of the number of producers to the number of the consumers changes outside of this range, the diffusion process cannot take off, as shown in Figure 11.

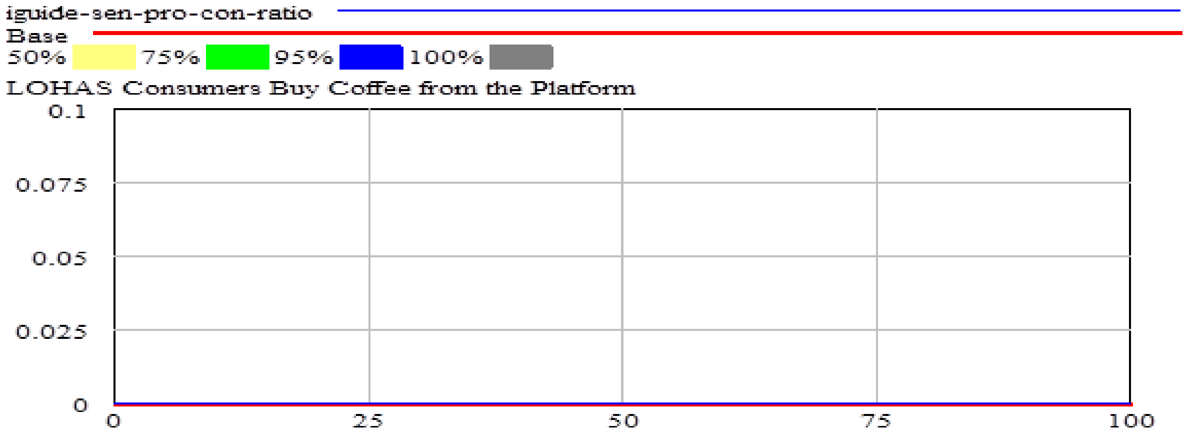

Figure 10 Sensitivity Tests on Producers to Consumers (iGuide and Virtual Certifier)

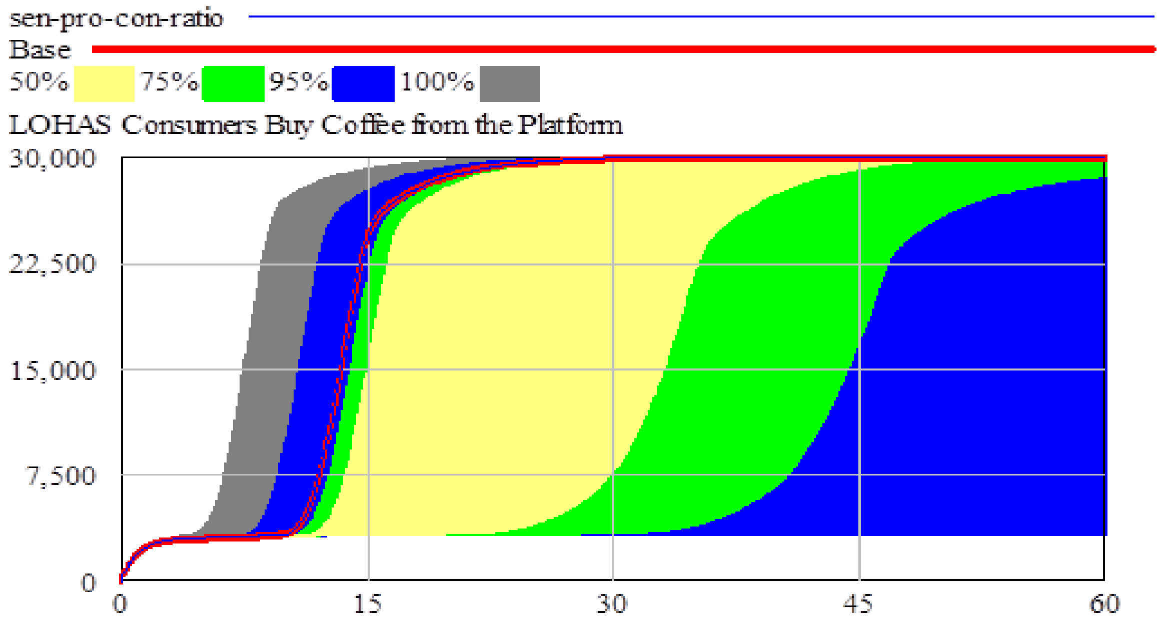

Figure 11 Sensitivity Tests on Producers to Consumers (TallMart and Producer Association)

Sensitivity tests on the ratio of the number of producers to the number of retailers: As for the iGuide scenario, test results show the same diffusion pattern. The market behavior is hardly influenced by the variation of the ratio of the number of producers to the number of retailers, as shown in Figure 12. This test is not applicable for other scenarios, since there is no retailer agent in other scenarios.

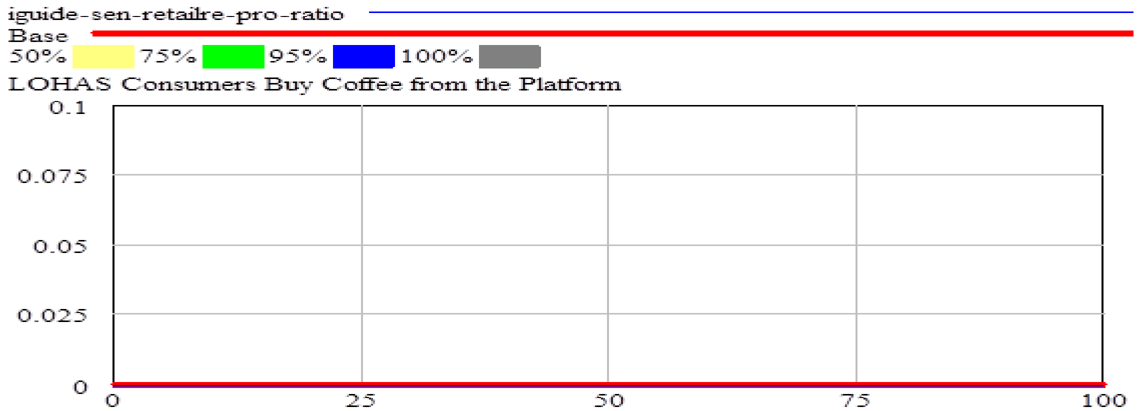

Figure 12 Sensitivity Tests on Producers to Retailers (iGuide)

Sensitivity tests on the market size: As for the iGuide, Virtual Certifier (as shown in Figure 13), and Consumer Advocate (as shown in Figure 14) scenarios, test results show the same diffusion pattern. The market behavior is hardly influenced by the variation of the market size. As for the TallMart and Producer Association scenarios, test results show the same general diffusion pattern as the market size changes between a certain range, however, as the market size gets bigger in this range, the take off defers. As the market size changes outside of this range, the diffusion process cannot take off, as shown in Figures 15 to 18.

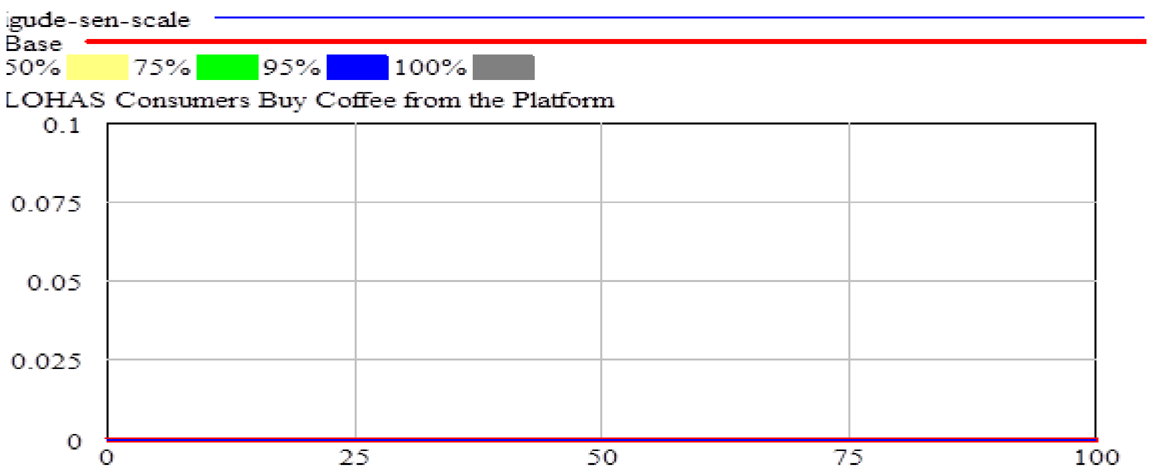

Figure 13 Sensitivity Tests on Market Size (iGuide)

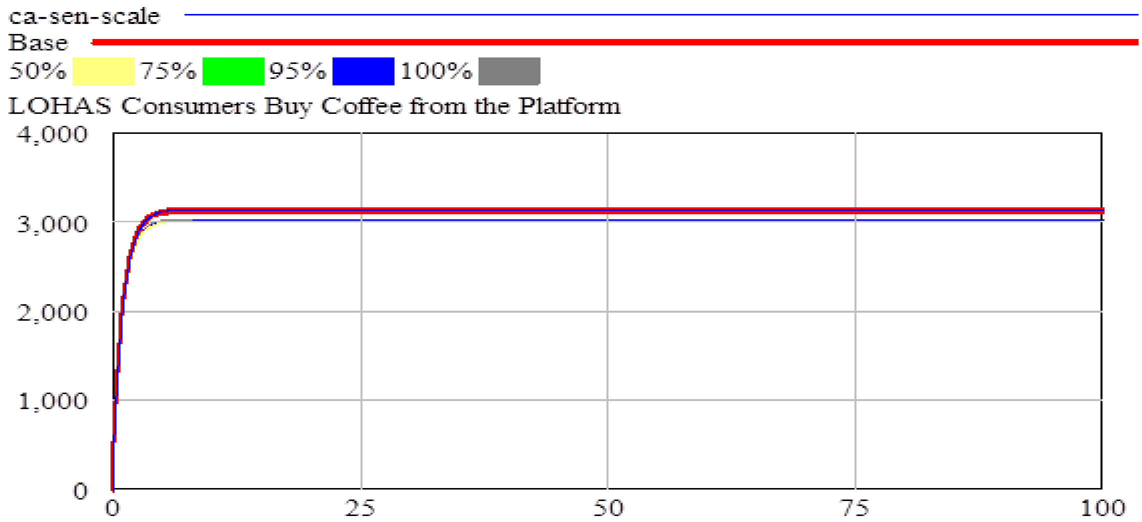

Figure 14 Sensitivity Tests on Market Size (Consumer Advocate)

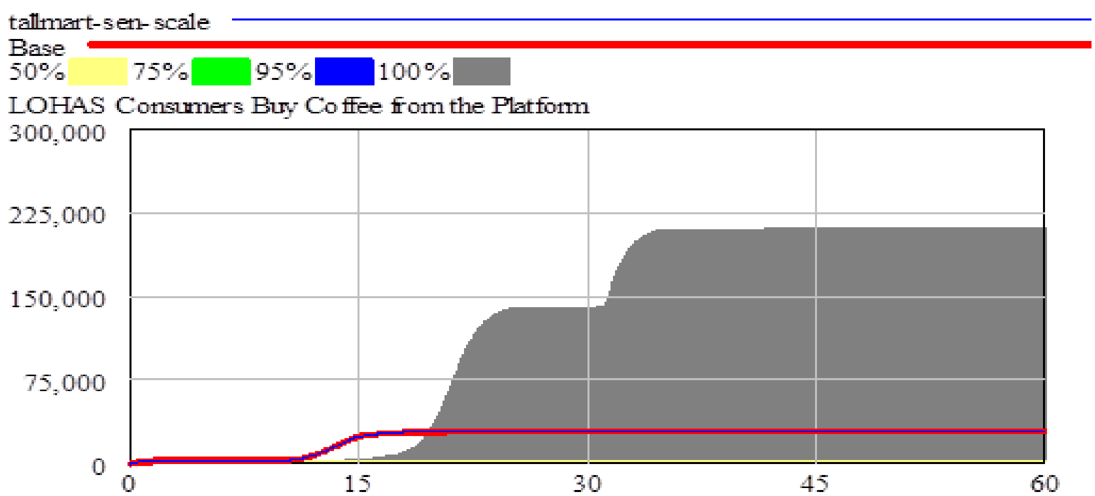

Figure 15 Sensitivity Tests on Market Size (TallMart)

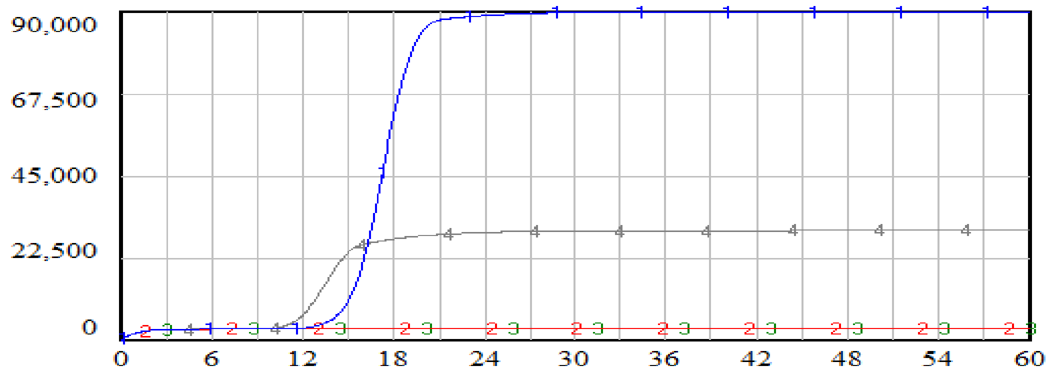

Figure 16 Sensitivity Tests on Market Size (TallMart)

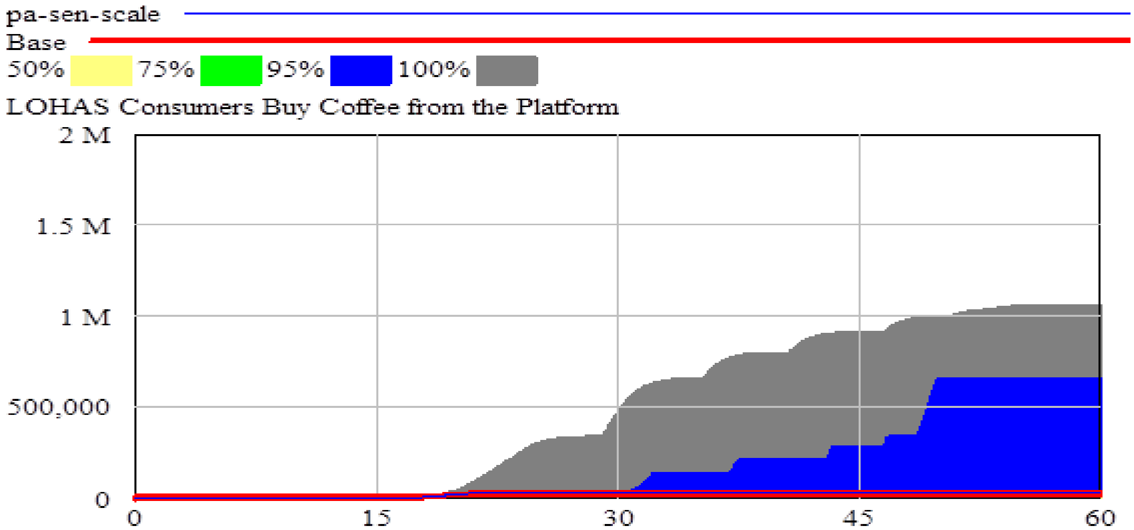

Figure 17 Sensitivity Tests on Market Size (Producer Association)

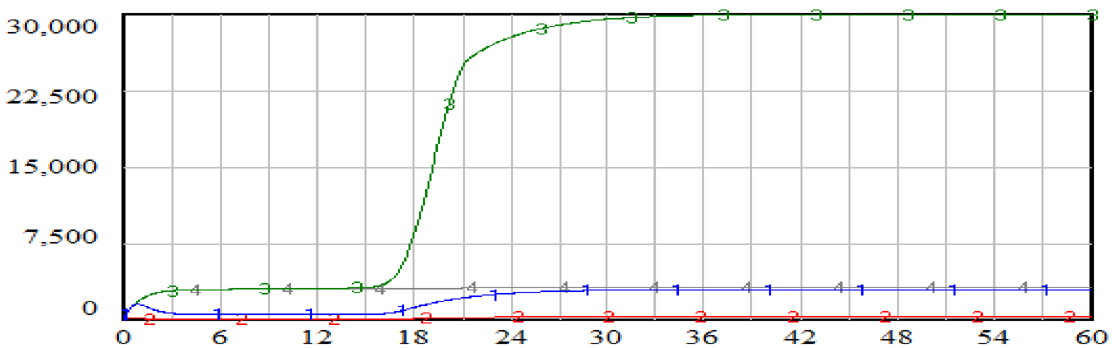

Figure 18 Sensitivity Tests on Market Size (Producer Association)

Sensitivity tests on the ratio of the size of consumer base to fixed cost: As for the iGuide, Virtual Certifier (as shown in Figure 19), and Consumer Advocate (as shown in Figure 20) scenarios, test results show the same diffusion pattern. The market behavior is hardly influenced by the variation of the ratio of the consumer number to the fixed cost. As for the TallMart and Producer Association scenarios, test results show the same diffusion pattern as the ratio of the consumer number to the fixed cost changes in a certain range, however, as the ratio gets smaller in this range, the take off defers. As the ratio of the consumer number to the fixed cost changes outside of this range, the diffusion process cannot take off, as shown in Figures 21 to 22.

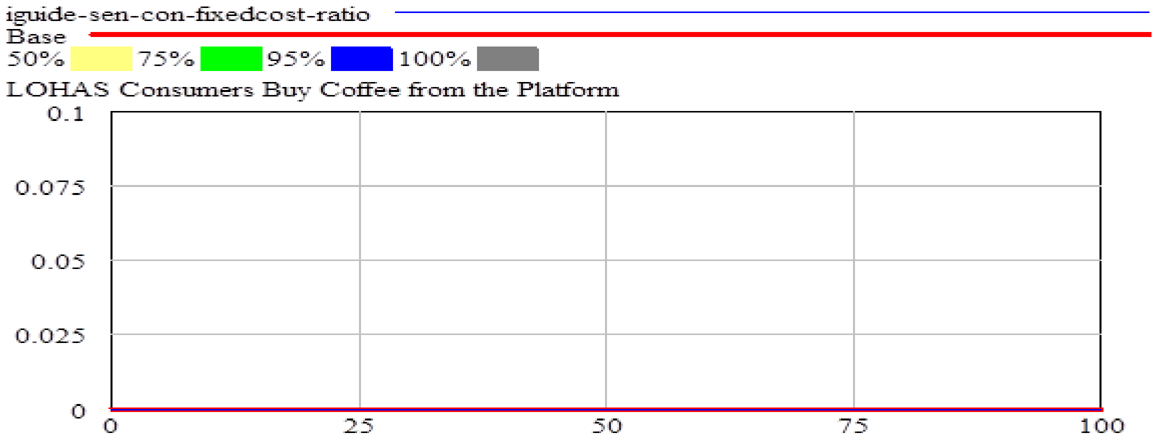

Figure 19 Sensitivity Tests on Consumers to Fixed Cost (iGuide and Virtual Certifier)

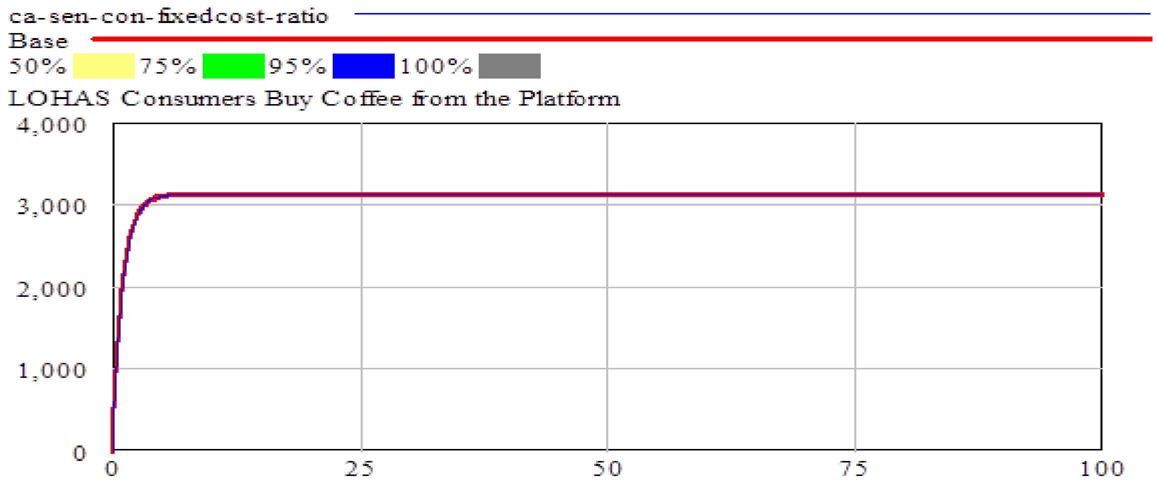

Figure 20 Sensitivity Tests on Consumers to Fixed Cost (Consumer Advocate)

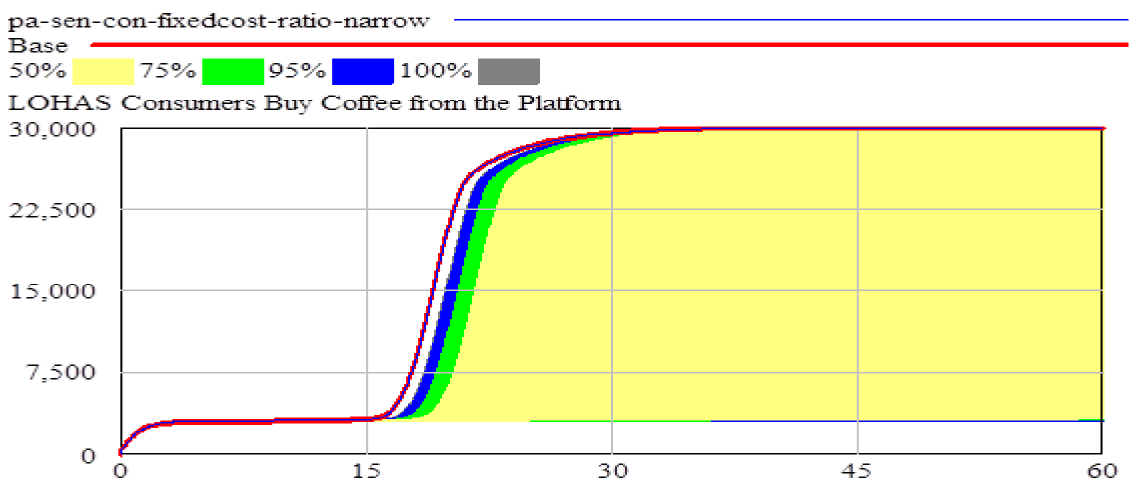

Figure 21 Sensitivity Tests on Consumers to Fixed Cost (TallMart and Producer Association)

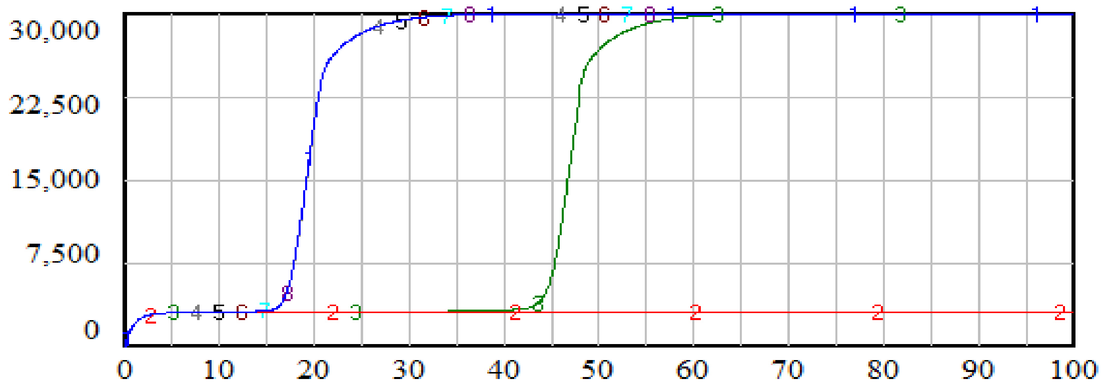

Figure 22 Sensitivity Tests on Consumers to Fixed Cost (TallMart and Producer Association)

Sensitivity tests on the marginal cost for a producer or retailers show the similar results as the sensitivity test result on the ratio of the size of consumer base to fixed cost: As for the iGuide and Virtual Certifier scenarios, test results show the same diffusion pattern. The market behavior is hardly influenced by the variation of the marginal cost for a producer or retailer. As for the TallMart and Producer Association scenarios, test results show the same diffusion pattern as the marginal cost for a producer changes in a certain range, however, as the marginal cost gets bigger in this range, the take off defers. As the marginal cost for a producer changes outside of this range, the diffusion process cannot take off. *Sensitivity tests on the rating-subscription fee per consumer and the subsidy per producer* show the same diffusion pattern. The market behavior is hardly influenced by the variation of these parameter values.

6. Discussion and Conclusion

Our base run simulation results show that the diffusion path varies in these five scenarios, although agent-behavior assumptions are the same across scenarios. For the Consumer Advocate scenario, the number of consumers who are buying coffee from the platform increases and then stops growing. For the Virtual Certifier and iGuide scenario, the system never takes off. For the TallMart and Producer Association, the number of consumers grows and eventually reaches the saturation. Sensitivity test results show the same general diffusion patterns as a series of parameter values change. In brief, our simulation results show that different designs of business-model elements (i.e., the value proposition, customer segments, the revenue generation mechanism, the cost structure, and the partner network) lead to different diffusion paths.

A possible explanation for this could be different designs of business-model elements result in different system structures within the simulation boundary, which in turn lead to different system behaviors (diffusion paths). We speculate some designs are superior to other designs since they will form a structure that has moderate negative effects to hinder the market take-off. If we try to capture the structure difference between scenarios that take off and scenarios that do not take off, it seems that when the business model represents a one-way relationship, it has a poor performance in realizing the market take-off. In the iGuide scenario, iGuide receives distribution fees from retailers, retailers receive premiums from consumers, and iGuide subsidizes producers. This scenario can be visualized as one-way relationship: consumers→retailers→iGuide→producers. In the Virtual Certifier scenario, Virtual Certifier receives distribution fees from producers, and producers receive premiums from consumers. This scenario can also be visualized as a one-way relationship: consumers→producers→virtual certifier. Similarly, in the Consumer Advocate scenario, Consumer Advocate receives rating subscription fees from consumers: consumers→consumer advocate, also a one-way relationship. In contrast, in the Producer Association scenario, producers share costs, and receive premiums from consumers. Producers form an alliance and interact with consumers. This scenario can be visualized as a multi-sided relationship: consumers→producers; producers←→producers. In the TallMart scenario, TallMart receives distribution fees from producers, receives premiums from consumers, and pays dividend to producers. This scenario can also be visualized as a multi-sided relationship: producers→TallMart←consumers; TallMart→producers. Nevertheless, these ideas need to be further investigated and tested.

Our next steps include an in-depth explanation of our findings by examining the system structure of each scenario, more comprehensive scenario design based on a business-model typology to include various types of business models, looking for empirical cases to support building simulation models that represent newly designed scenarios, and further investigating the relationship between diffusion related market behaviors and structure features derived from business-model designs.

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