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A mode of developing financial service innovation management for digital finance in property insurance business - data from insurance companies in Guangdong province, China

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Abstract: For the insurance industry with strong data dependence, insurance companies urgently need to accelerate the process of digital transformation and improve the financial service innovation management of insurance companies through digital finance and precision marketing. Therefore, the objectives of this research were (1) to study the current situation of global and Chinese digital financial innovation service management; (2) to analyze the factors affecting the property insurance business in Guangdong, China; (3) to propose a management model for financial business service innovation. Guided by constructivism and positivism methodology, this study uses qualitative and quantitative analysis and conducts empirical research. The first study recruited 30 participants to conduct in-depth interviews. The second study used questionnaires to obtain 833 valid responses. Advanced statistical software was used for the analysis of the survey data. This paper draws the following conclusions: (1) digital finance has a role in improving innovation management; (2) precision marketing has an improving effect on innovation management; (3) precision marketing has a partial intermediary role between digital finance and the innovation management of property insurance companies. Based on these findings, this study proposes the theoretical framework of digital finance, precision marketing, and financial service innovation management. This research provides decision support to the management of insurance companies and is of great significance for insurance companies to continuously promote digital finance and precision marketing and improve financial service innovation management. At the same time, it also provides a reference for the improvement and sustainable development of financial service innovation management of similar insurance companies.

Keywords: Digital finance, Innovation management, Insurance companies, Precision marketing.

1. Introduction

Finance is a credit-based transaction and improvement of the financial industry is a process of diversification and deepening of financial services [1]. Therefore, the innovation and development of financial services is important to the development of the financial industry in various countries around the world. Property insurance, as one of the indispensable components of the financial industry, is a socialized economic compensation system with various property materials and the basic purpose of compensating the economic losses of the policyholder or the insured [2]. It mainly includes property insurance, agricultural insurance, auto insurance and the other kinds of insurance that takes property or interests as the subject matter insured. In all types of financial services, the financial insurance service occupies an important part, so the digital finance of financial insurance companies also plays a very crucial role in the innovation of financial services. This section will elaborate the research background of this paper from three perspectives: global financial service innovation and development [3].

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Due to the continuous advancement of global insurance digital transformation, the global average insurance density has also continued to rise, as shown in the figure below. Therefore, the realization of insurance digital transformation is not only an important driving force to enhance insurance service innovation, but also a driving force to promote the new development of the insurance industry. From the perspective of global property insurance service innovation, it is not difficult to find that most of the successful service innovations are located in developed countries in Europe and the United States. For Asia, there is still a lot of room for development in making full use of digital technologies and cultivating high-quality digital technical talents [4].

The State Council issued the Opinions of "the People's Bank of China, the Banking Regulatory Commission, the Insurance Regulatory Commission Intellectual Property Office on Strongly Recommending Institutional and Mechanism Innovation to Do a Solid Job in Fintech Services", proposing to strongly support the coverage of financial service innovation. The document elaborates that it is necessary to explore the construction of insurance products and services that meet the characteristics of scientific and technological innovation, establish and improve the scientific and technological insurance system, accelerate the innovation of financial service innovation in the insurance industry [55]. The release of the document has greatly promoted the further development of financial service innovation in China. Over the decades, the financial industry has undergone a constant evolution in terms of service delivery due to digitization [6]. The digitalization of financial services covers numerous new financial products and services provided by fintech companies and innovative financial service providers, such as the development of application software, which enables customers to enjoy financial services directly through the Internet and creates new user experiences for customers [7]. Meanwhile, the feasibility of such service innovation is well reflected by the number of monthly active users of the software.

As a major financial province, the added value of the financial industry in Guangdong province reached 1.24 trillion yuan in 2023, an increase of 7.1% year on year, accounting for 9.15% of GDP and contributing 13.8% to economic growth. The main financial indicators of Guangdong Province also continued to maintain rapid growth. Among them, by the end of 2023, the balance of local and foreign currency deposits will reach 35.1 trillion yuan, up 8.9 % year-on-year, and the balance of local and foreign currency loans will reach 27.2 trillion yuan, up 9.6 % year-on-year. The province's securities trading volume reached 300 trillion yuan, up 5% year-on-year, accounting for 40% of the country. And the annual premium income reached 655.6 billion yuan, up 11.2 %, accounting for 12.5 % of the national total [8]. From this, it can be seen that the overall development of Guangdong's financial industry is relatively good, and the main reason to promote its development is the innovative development of financial services.

2. Theoretical Review and Prospect

2.1. Literature Review

This paper specifically studies the influencing factors of financial service innovation management of insurance companies and the existing problems and motivations in its development process, so as to support the better development of Chinese insurance companies and maximize the comprehensive social benefits. The concepts involved in this paper are: innovation management, digital finance and precision marketing.

The idea of innovation management is closely accompanied by the development of practice. The first and the second Industrial Revolution saw technological innovations represented by the large-scale application of steam engine and electricity respectively. In this context, relevant studies were developed. The innovation management of companies is the management process of companies to achieve development and promote their own value increase. Scholars generally hold a positive view on innovation management and believe that innovation management is beneficial to companies. Innovation management relies on the external environment of a company [9]. In a broad sense, innovation management includes the whole process from production to research, development, trial production and manufacturing commercialization. In a narrow sense, innovation management is a theory and method that integrates various management modes and disciplines and is applied to company management. It can be said that innovation management is an important activity of a company that manages innovation [10]. To sum up, this study draws on the definition of Gong [11] and Zhuang and Yu [12] defines innovation management as a dynamic process of managing innovation activities by gathering multiple elements through platform support and mechanism coordination. In this paper, innovation management of financial services is specifically mentioned.

Digital finance is a revolutionary product which has a long history, and the concepts of "fintech", "electronic finance", "online finance", "Internet finance" and "digital finance" have emerged successively. Bettinger [13] first put forword the concept of "fintech", pointed out that fintech was the combination of computer technology, banking expertise and modern management science. In the late 20th century, the most prominent performance of finance and technology was the use of information technology to promote the electronization of traditional financial business processes, thus producing the concept of "electronic finance". Since then, Internet technology has been widely applied, thus giving birth to the concept of "Internet finance". Internet finance is a new financial model integrating mobile payment, information processing and resource allocation [14]. The United States Trade Development Council initially called it online finance, including online banking, online broker, online insurance and other online financial services. The further integration of finance and technology not only promotes financial innovation, but also subverts traditional financial services and forms digital financial formats [15]. However, because of the late appearance of the concept of digital finance, no unified definition has been formed, and there are some differences in the definition perspectives and emphases. Based on the dual attributes of "finance + technology", the performance of digital finance, including mobile payment, mobile banking, electronic wallet, online banking, online lending etc., the concept of "digital finance" is a synonym of "technology finance", "finance technology" and "Internet finance". But in the traditional sense, technology finance emphasizes the innovative financial model influenced by science and technology, finance technology emphasizes the technicality [16]. While Internet finance refers to Internet companies engaging in relevant businesses within the service scope of traditional financial institutions [17]. To sum up, digital finance is a brand-new financial service model and an emerging field closely linked with finance and technology. Compared with traditional financial service models, digital finance can provide "efficient, responsible and commercially sustainable" financial services to more economic entities with lower capital cost and more convenient service methods, and is considered to be an important support for promoting high-quality economic development [18]. As the academic circles, companies and government agencies pay more and more attention to the function of digital finance, how to effectively release the digital finance to improve the financial service innovation management of Chinese insurance companies has become a hot issue of current research.

With the rapid development of the Internet, the network has influenced all areas of people's lives, and the resulting massive consumer data plays an increasingly important role in the positioning of target customers, the formulation of marketing strategies and the provision of precise services. In this context, Kotler [19] proposed the concept of precision marketing in theory for the first time in 2005, and proposed that companies need accurate, measurable and high return on investment marketing communication. Precision marketing is a skill that needs to be mastered by companies that want to engage with users, and it has high requirements for companies. Precision marketing requires companies to accurately identify customers and subdivide customers, that is, to have an accurate user portrait [20]. Scholars generally believe that it is necessary for companies to carry out precision marketing. To sum up, this study draws on the definition of Philip Kotler, the father of modern marketing, Zhang [21] and other scholars, and defines precision marketing as the use of digital technology to track the needs of end users, providing customers with precise products through accurate methods to achieve sales effectiveness [22]. The precision marketing in this paper refers specifically to the precision marketing.

2.2. Theoretical Analysis and Hypothesis

The existing literature shows that digital finance can be conducive to enterprise innovation [23]. In the research, scholars directly or indirectly prove the positive relationship between digital finance and innovation management by studying the relationship between digital finance and regional innovation ecology, technological innovation capability, innovation efficiency, etc. In other words, the current research generally believes that in the process of specific analysis of the research content, at least one aspect of financial intelligentization or digital capitalization can be used as the suggested direction for improving innovation management by the above scholars [24]. In other words, the promotion effect of digital finance on innovation management is manifested through financial intelligentization and digital capitalization. This paper assumes that the influence is general, that is, digital finance has a promoting effect on financial service innovation management. Therefore, based on the resource-based theory and innovation theory, this paper puts forward the following hypothesis:

Hypothesis H.: Digital finance has a significant positive impact on financial service innovation management.

Hypothesis H₁₄: Digital capitalization has a significant positive impact on financial service innovation management.

Hypothesis H₁₀: Financial intellectualization has a significant positive impact on financial service innovation management.

Through combing, it is found that few scholars directly link digital finance with precision marketing to carry out research, but scholars may conduct research on digital finance from the perspective of users, such as consumer rights protection, optimization of payment environment, reduction of payment costs, etc., or consider marketing from the perspective of finance. Scholars generally believe that marketing is very important in finance, and the combination of marketing and digital finance is conducive to economic development [25]. It can be concluded from the above literature that in digital finance, users can be contacted by strengthening the establishment of mechanisms based on consumption scenarios, building outlets, brand marketing and improving core financial functions, so as to achieve precision marketing. Generally speaking, these means are the embodiment of digital capitalization and financial intelligentization [26]. This paper assumes that digital finance has a general effect on precision marketing. Therefore, based on the resource-based theory, innovation theory and long tail theory, this paper proposes the following hypotheses:

Hypothesis H₂: Digital finance has a significant positive impact on precision marketing.

Hypothesis H_{2a}: Digital capitalization has a significant positive impact on precision marketing.

Hypothesis H_{2b}: Financial intellectualization has a significant positive impact on precision marketing.

By summarizing the key words in the literature, it can be found that the relevant research focuses on marketing innovation, innovation management, user demand and other aspects, but they all reveal a consensus, that is, the design of precision marketing is conducive to improving the innovation ability of companies [27]. At the same time, precision marketing also puts forward requirements for companies' innovation management ability. Therefore, it can be considered that precision marketing has a significant positive impact on company financial service innovation management [28]. In the process of specific analysis of the research content, it is found that at least one of user portrait or service differentiation can be used as the suggested direction for improving financial service innovation management obtained by the above scholars through research. It can be concluded that the promotion effect of precision marketing on company financial service innovation management is manifested through user portrait and service differentiation.

Therefore, this paper applies the innovation theory and the long tail theory to propose the following hypothesis:

Hypothesis $H_{s:}$ Precision marketing has a positive impact on the innovation management of financial services. Hypothesis $H_{s:}$ User portrait has a positive impact on financial service innovation management. Hypothesis $H_{s:}$ Service differentiation has a positive impact on financial service innovation management. Although the existing research does not directly mention whether precision marketing can play an intermediary role in the impact of digital finance on financial service innovation management, by combing scholars' literature on finance, marketing and innovation management [29]. Firstly, we can know that digital finance, precision marketing and innovation management are closely related. Moreover, since users are very important in sales, external influences, including the impact of the emergence of digital finance on companies, will inevitably directly or indirectly affect the users of companies [30]. It can be inferred that digital finance has an impact on the innovation management of financial services through precision marketing. Therefore, on account of the resource-based theory, innovation theory and long tail theory, this paper makes the following assumptions:

Hypothesis H₄: Digital finance has a significant positive impact on financial service innovation management through precision marketing.

3. Research Method and Design

3.1. Research Methods

Through the second part of the relevant theories and digital finance, precision marketing, innovation management and other related research literature review, this part elaborates the research methodology. Literature research method, questionnaire survey method, empirical analysis method can independently verify the relevant theoretical hypotheses, and ensure the accuracy of the research content based on different perspectives [31]. On account of the research objectives conducted in this paper, the research methodologies include literature research method, questionnaire method and empirical analysis method.

3.1.1. Literature Analysis Method

Literature research method refers to having a clear understanding of the latest progress in related fields through careful study of existing literature in related research fields, analysis and summary of research content. Literature research method is the "cornerstone" of academic paper writing. It is a method to screen, sort out and summarize existing research results in related fields by focusing on keywords, and then understand the research status and frontier of research issues. In the process of research, this paper searches paper and electronic materials, combs relevant literature at home and abroad, and conducts a wide range of literature search on the theme of digital economy, insurance companies, innovation management and other influencing factors, so as to understand the research status of financial service innovation management of insurance companies under the background of digital economy. Collect relevant theoretical evidence on digital finance, service innovation, precision marketing and innovation management and other aspects, and sort out the obtained data in detail, summarize the viewpoints put forward by different scholars, and clarify the development direction of relevant theories, so as to further study the impact mechanism of digital finance, service innovation and precision marketing on innovation management driven by digital economy. To construct the theoretical research framework of this paper, and lay a solid foundation for the empirical research of this paper.

3.1.2. Questionnaire Survey Method

The purpose of this paper is to explore the impact of digital finance and service innovation on the financial service innovation management of insurance companies under the role of precision marketing intermediaries. The objective data of property insurance companies in Guangdong Province of China cannot fully meet the requirements of this paper. Therefore, this paper adopts the questionnaire survey method to carry out empirical research. Based on the literature research method, the dependent variable (financial service innovation management), independent variable (digital finance) and intermediary variable (precision marketing) designed in this paper are determined, and the measurement index of influencing factors of enterprise financial service innovation management is identified. The steps of developing the questionnaire are as follows: first, study the existing relevant literature, collect and sort out the mature relevant variable scale at home and abroad on this basis, and make appropriate adjustments according to the actual content of this paper to develop the questionnaire suitable for this paper [32].

The second is to conduct a preliminary survey in a small range and adjust the questionnaire according to the survey results; The third is to conduct field survey and network survey on middle and senior management personnel and users of property insurance companies with successful digital transformation in Guangdong Province with the revised questionnaire, to obtain first-hand data and provide scientific guarantee for subsequent analysis and verification; Fourthly, the data collected by the questionnaire were sorted out.

3.1.3. Empirical Analysis Method

The empirical analysis method used in this paper includes the following seven aspects: Firstly, in order to understand the general situation of the data obtained from the questionnaire, descriptive statistical analysis of the survey data. Secondly, in order to ensure the consistency and stability of the survey data, the reliability analysis of the survey data. Thirdly, in order to ensure the realization of the research purpose, the validity analysis of the survey data. Fourthly, in order to study the linear relationship between three variables of digital finance, precision marketing and innovation management, this paper uses correlation analysis to study the correlation relationship between the variables. Fifthly, the multiple linear regression model is used to test whether theoretical hypothesis 1 to theoretical hypothesis 3 is valid. Sixthly, the intermediate effect model is used to test whether theoretical hypothesis 4 is valid. Seventh, construct structural equation model [33].

3.2. Questionnaire Design

The respondents of this questionnaire are the users of the property insurance companies in Guangdong Province, China, and the background of the investigated property insurance companies, such as purchase years and purchase channels, is taken as the control variables of the empirical model. In the multiple linear regression analysis, the control variables can improve the overall goodness of fit of the model. The mature Advanced Statistic Software was used for data processing, and statistical analysis of the survey data was carried out in strict accordance with the process specifications.

Advanced Statistic Software was used for descriptive statistical analysis, reliability analysis, validity analysis, exploratory factor analysis, typical correlation analysis and regression analysis of the survey data. Advanced Statistic Software was used for path analysis of the survey data.

This paper mainly introduces the process of the survey plan design, including determining the survey object and purpose, determining the sampling method and sample size, questionnaire scale development and design, questionnaire distribution and recycling. Based on the available relevant channels, materials and information, the survey objects of this paper are mainly users of insurance companies in Guangdong Province, from whom we can learn about the impact of digital finance on the innovation management of insurance companies under the role of precision marketing intermediaries and related data.

The purpose of the survey is to understand the basic information and data of the relevant variables. Firstly, from the perspective of property insurance company users, to understand the basic situation of the impact of variable digital finance on the innovation management of property insurance companies and collect relevant data. Secondly, from the perspective of property insurance company users, understand the basic situation of the impact of variable digital finance on precision marketing and collect relevant data. Thirdly, from the perspective of property insurance company users, understand the basic situation of the impact of variable precision marketing on the innovation management of insurance companies and collect relevant data. Fourthly, from the perspective of property insurance company users, understand the basic situation of variable precision marketing in the process of digital finance's impact on property insurance company users, understand the basic situation management and collect relevant data. From the perspective of property insurance company users, understand the basic situation of variable precision marketing in the process of digital finance's impact on property insurance company users, understand the basic situation of variable precision marketing in the process of digital finance's impact on property insurance company users, understand the basic situation of variable precision marketing in the process of digital finance's impact on property insurance company users, understand the basic situation of variable precision marketing in the process of service innovation management and collect relevant data.

This section introduces the sampling method and the determination of sample size to lay the foundation for the investigation. Considering the constraints of manpower, time and funds, stratified sampling method was adopted in this questionnaire. According to the expenditure of property insurance

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company users, 0-1000 yuan: 1000-3000 yuan: more than 3000 yuan =6:3:1, stratified sampling is carried out. Determine the sample size of the property insurance company user survey questionnaire. using the Yamane [34] formula $n=z^2p(1-p)/e^2$, z = 1.96, p= 0.5, e= 0.04, n=600.25, the sample size $n \ge 601$.

The questionnaire for users of property insurance companies adopts the form of five-point Likert scale, that is, the problem description of each variable and its dimension is scored from 1 to 5. There are 1-5 levels to choose from in the table, where 1 is strongly disagree, 2 is somewhat disagree, 3 is fair, 4 is somewhat agree, 5 is very agree.

Due to the relatively professional content of the questionnaire, in order to ensure the authenticity of the questionnaire data and the accuracy of the empirical analysis results, the questionnaire and data collection in this paper are strictly controlled in the selection of distribution objects and distribution channels, and follow the principle of objectivity and balance, so as to minimize the interference of other factors on the questionnaire filling. To improve the quality of questionnaire data. In the design of the survey items, try to avoid privacy issues in the questionnaire content, and promise that the relevant data will only be used for academic research and not for commercial use, and promise to use anonymous method to recover data.

There are three main ways to issue and retrieve questionnaires. Firstly, the questionnaire is sent to the relevant personnel of the company to fill in and recover through wechat. Secondly is to send the questionnaire star link to the property insurance company users, fill in the questionnaire star directly, and save the results directly in the background of the questionnaire star, presented in Excel form. Thirdly is to use my contacts in the insurance industry to directly visit and issue the questionnaire.

4. Empirical Analysis

4.1. Descriptive Statistics and Correlation Analysis of Questionnaire

4.1.1. Description of Basic Information of Samples

The distribution frequency and proportion of gender, age and educational background of the surveyed property insurance company users are shown in Table1.

Basic Characteristics of Users	Items	Frequency	Percentage
Gender	male	442	53.06%
Gender	Female	391	46.94%
	18-30 Years Old	143	17.17%
A	31-40 Years Old	223	26.77%
Age	41-50 Years Old	343	41.18%
	More than 50 Years Old	124	14.89%
	Middle School Degree or Under	39	4.68%
Educational	College Degree	237	28.45%
Background	Bachelor Degree	470	56.42%
	Master Degree or Above	87	10.44%

Table 1.

The Rec	ic Infor	mation o	f tha	Samples

4.1.2. Descriptive Statistical Analysis of Variables

Based on the sample data of 833 valid questionnaires from users of property insurance companies in Guangdong Province, the descriptive statistical analysis of four variables, namely digital finance, precision marketing and innovation management, is shown in Table 2.

Table 2.Basic description of variables.

Variables	Dimensions	Items	Number of Samples	Mean Value	Standard Deviation
		DC1	833	3.54	0.85
		DC2	833	3.35	0.98
	Digital Capitalization (DC)	DC3	833	3.65	0.91
	Digital Capitalization (DC)	DC4	833	3.44	1.01
		DC5	833	3.96	0.83
Digital Finance		DC6	833	3.39	0.98
DFIE)		FI1	833	3.45	0.99
		FI2	833	3.41	0.93
	Financial Intelligentization (FI)	FI3	833	3.09	0.93
	r mancial intelligentization (FI)	FI4	833	2.97	0.81
		FI5	833	3.52	0.92
		FI6	833	3.26	0.93
		UP1	833	3.60	1.03
		UP2	833	3.37	0.98
		UP3	833	3.50	0.89
	User Portrait (UP)	UP4	833	3.21	0.93
		UP5	833	3.52	0.99
Precision		UP6	833	3.58	1.00
Marketing (PMIE)		SD1	833	3.77	0.95
		SD2	833	3.25	1.02
	Service	SD3	833	3.53	1.04
	Differentiation (SD)	SD4	833	3.35	0.98
		SD5	833	3.49	0.88
		SD6	833	3.73	0.97
		VC1	833	3.15	1.00
		VC2	833	3.54	0.97
		VC3	833	3.60	0.93
	Value Co-creation (VC)	VC4	833	3.58	0.95
		VC5	833	3.71	0.92
		VC6	833	3.74	0.91
		VI1	833	3.91	0.84
		VI2	833	3.52	0.85
		VI3	833	3.53	0.94
	Value Innovation (VI)	VI4	833	3.77	0.84
		VI5	833	3.55	1.05
		VI6	833	3.59	1.01
		MT1	833	3.80	0.84
		MT2	833	3.38	0.95
Innovation		MT3	833	3.65	0.81
Management	Business Model Transformation (MT)	MT4	833	3.26	1.07
		MT5	833	3.30	0.99
		MT6	833	3.59	0.88
		CB1	833	3.42	0.96
		CB2	833	3.32	1.03
		CB2 CB3	833	3.39	1.00
	Dynamic Capacity Building (CB)	CB4	833	3.59	0.88
		CB5	833	3.70	0.94
		CB5 CB6	833	3.72	0.94

4.1.3. Correlation Analysis

In order to verify the correlation degree among variables digital finance, precision marketing and innovation management, this section applies the typical correlation analysis model measurement and

analyzes the typical correlation coefficient among digital finance, precision marketing and innovation management by using the data provided by property insurance company users, as shown in Table 3.

Table 3.

	Digital Finance	Precision Marketing	Innovation Management
Digital Finance	1		
Precision Marketing	0.662**	1	
Innovation Management	0.725**	0.822**	1

Correlation analysis of each dimension.

Note: *** means p<0.01; ** means p<0.05; * means p<0.1.

It is demonstrated that in Table 3 that the significance level of the correlation coefficients among digital finance, precision marketing and innovation management is all lower than 0.05. It can be seen that the development trends among digital finance, precision marketing and innovation management are the same, either increasing or decreasing at the same time.

4.1.4. Regression Analysis

According to the above analysis results, digital finance, precision marketing and innovation management have a high degree of linear relationship. However, typical correlation analysis can only study the correlation between variables, but cannot study the causal relationship between variables. Therefore, for the sake of verifying the causal relationship between digital finance, precision marketing and innovation management, this paper adopts the data provided by the users of property insurance companies in Guangdong Province to further conduct multiple linear regression analysis.

1. The Impact of Digital Finance on Innovation Management

In order to explore the relationship between digital finance (DFIE) and innovation management (IMIE) from the perspective of users of property insurance companies, this paper adopts digital capitalization (DC) and financial intelligentization (FI) of digital finance (DFIE) as independent variables, and innovation management (IMIE) as dependent variable for linear regression analysis. See Table 4.

Item	Unstand Coefficie		Standardized Coefficient	t	Significance	VIF	R ²	Adjusted R	F
	В	Standar d Error	Beta						
(Constant)	0.312	0.110		2.853	0.004				
DC	0.390	0.047	0.316	8.310	0.000	2.543	0.527	.527 0.526	462.629
FI	0.557	0.047	0.452	11.876	0.000				

Table 4.

	Linear regression	between digital	finance and innovation	management (N=833).
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It is demonstrated that in Table 4, the two dimensions of digital finance can explain 52.6% of the change in innovation management (model $R^2=0.526$). p=0.000<0.05 and VIF values are both 2.543<10, indicating that there is no multicollinearity in the model. The model formula for the impact of two dimensions of digital finance on innovation management is: IMIE=0.312+0.390*DC+0.557*FI. From this, we can see:

Firstly, the regression of digital capital (DC) of digital finance on innovation management (IMIE) is significant (β =0.316, P<0.05), and there is a significant positive relationship between the two. Hypothesis H1a is verified.

Secondly, financial intelligentization (FI) of digital finance has a significant regression on innovation management (IMIE) (β =0.452, P<0.05), and there is a significant positive relationship between the two. Hypothesis H1b is verified.

2. The Impact of Digital Finance on Precision Marketing

For the purpose of exploring the relationship between digital finance and precision marketing, this

paper takes digital capitalization (DC) and financial intelligentization (FI) of digital finance (DFIE) as independent variables, and precision marketing (PMIE) as dependent variable for linear regression analysis, as shown in Table 5.

Table 5.

Item	Coefficient		Standardized Coefficient	t	Significance	VIF	R ²	Adjusted R	F
	В	Standard Error	Beta						
(Constant)	0.767	0.110		6.990	0.000				
DC	0.355	0.047	0.314	7.565	0.000	2.543	0.438	0.437	323.441
FI	0.438	0.047	0.387	9.334	0.000				

Linear Regression between Digital Finance and Precision Marketing (N=833)

Table 5 shows that the two dimensions of digital finance (DFIE) can explain 43.7% of the variation of precision marketing (PMIE) (model R²=0.437). p=0.000<0.05 and VIF values were both 2.543<10, indicating that there was no multicollinearity in the model. The model formula for the impact of two dimensions of digital finance (DFIE) on precision marketing (PMIE) is: PMIE=0.767+0.355*DC+0.438*FI. From this, we can see:

Firstly, the regression of digital capitalization (DC) of digital finance (DFIE) to precision marketing (PMIE) is significant (β =0.314, P<0.05), and there is a significant positive relationship between the two. Hypothesis H2a is verified.

Secondly, the financial intelligentization (FI) of digital finance (DFIE) has a significant regression on precision marketing (PMIE) (β =0.387, P<0.05), and there is a significant positive impact relationship between the two. Hypothesis H2b is verified.

3. The Impact of Precision Marketing on Innovation Management

In order to explore the relationship between precision marketing and innovation management, this paper takes the two dimensions of user portrait (UP) and service difference (SD) of precision marketing (PMIE) as independent variables, while innovation management (IMIE) as dependent variable for linear regression analysis, as shown in Table 6.

Table 6.

Itom	tem Unstand		Standardized Coefficient	t	Significance	VIF	R ²	Adjusted R	F
Item	В	Standard Error	Beta						
(Constant)	0.431	0.077		5.617	0.000			6 0.675	864.791
DC	0.472	0.038	0.452	12.406	0.000	3.390	0.676		
FI	0.423	0.038	0.406	11.144	0.000				1

Linear Regression between Precision Marketing and Innovation Management (N=833).

Table 6 shows that the two dimensions of precision marketing (PMIE) can explain 67.5% of the change in innovation management (IMIE) (model R^2 =0.675). p=0.000<0.05, VIF values of 3.390, both less than 10, indicating that there is no multicollinearity in the model. The model formula for the influence of two dimensions of precision marketing (PMIE) on innovation management (IMIE) is: IMIE=0.431+0.472*UP+0.423*SD. From this, we can see:

The regression of user profile (UP) of precision marketing (PMIE) to innovation management (IMIE) was significant (β =0.452, P<0.05), and there was a significant positive relationship between the two. Hypothesis H3a is verified.

The service difference (SD) of precision marketing (PMIE) has a significant regression on innovation management (IMIE) (β =0.406, P<0.05), and there is a significant positive relationship between the two.

Hypothesis H3b is verified.

4.1.5. Mediating Effect Analysis

From the perspective of users of property insurance companies, this section adopts the three-step method of intermediary effect to analyze the intermediary role of precision marketing (PMIE), and verifies the direct role of digital finance (DFIE) on innovation management (IMIE), digital finance (DFIE) on precision marketing (PMIE), and precision marketing (PMIE) on innovation management (IMIE).

The Mediating Role of Precision Marketing between Digital Finance and Innovation Management

In order to explore the mediating role of precision marketing (PMIE) in the impact of digital finance (DFIE) on innovation management (IMIE), this paper constructs a relevant model and analyzes the model results.

Description of the research model:

Model 1: Regression test was conducted between independent variable digital finance (DFIE) and dependent variable innovation management (IMIE).

Model 2: Regression test of independent variable digital finance (DFIE) and intermediate variable precision marketing (PMIE).

Model 3: Independent variable digital finance (DFIE), intermediate variable precision marketing (PMIE) and dependent variable innovation management (IMIE) were tested simultaneously.

Multiple regression analysis was carried out on the above three models, and the results were shown in Table 4.24.

Table 7.

Multiple Regression of Digital Finance, Precision Marketing and Innovation Management (N=833).

Variables	Model 1 (Innovation Management)	Model 2 (Precision Marketing)	Model 3 (Innovation Management)
Constant	0.294***	0.754***	-0.209*
Digital Finance	0.947***	0.794***	0.420***
Precision Marketing			0.663***
\mathbb{R}^2	0.525	0.438	0.734
Adjusted R	0.525	0.437	0.733
F Value	918.880	646.112	1144.117

Note: *** means p<0.01; ** means p<0.05; * means p<0.1.

Firstly, in model 1, digital finance (DFIE) has significant regression on innovation management (IMIE), with $R^2=0.525$ of the regression model, adjusted R=0.525, F=918.880, and regression coefficient $\beta=0.947$ (P<0.01), indicating that the regression model fits well. Hypothesis H1 is verified.

Secondly, in model 2, digital finance (DFIE) has significant regression to precision marketing (PMIE), with $R^2=0.438$ of the regression model, adjusted R=0.437, F=646.112, indicating that the regression model is well fitted, and the regression coefficient $\beta=0.794$ (P<0.01). Hypothesis H3 is verified.

Thirdly, in model 3, the regression of precision marketing (PMIE) to innovation management (IMIE) is significant, the regression model $R^2=0.734$, the adjusted R=0.733, F=1144.117, indicating that the regression model is well fitted, and the regression coefficient $\beta=0.420$ (P<0.01). Hypothesis H5 is verified.

Fourthly, in model 3, after precision marketing (PMIE) is added as an intermediary variable, the influence coefficient of digital finance (DFIE) on innovation management (IMIE) decreases, and the regression coefficient decreases from β =0.947 (P<0.01) in model 1 to β =0.420 (P<0.01) in model 3. This indicates that precision marketing (PMIE) plays a partial mediating role in the influence of digital finance (DFIE) on innovation management (IMIE), and the ratio of the intermediary effect of precision marketing (PMIE) to the total effect is 0.794*0.663/0.947*100%=55.59%. The ratio of the direct effect of precision marketing (PMIE) on innovation management (IMIE) to the total effect is 44.41%. Hypothesis H4 is verified.

4.2. Results

Based on the sample data that have passed the reliability and validity tests, this chapter begins with a brief description of the respondents. Secondly, we carry out typical correlation analysis, regression analysis, mediation effect analysis and path analysis to verify whether the hypothesis is valid. The hypotheses in this paper are mainly reflected in four aspects: the impact of digital finance on the innovation management of property insurance companies.; The impact of digital finance on precision marketing. Analysis of the impact of precision marketing on the innovation management of property insurance companies. Whether there is an intermediary effect and the intensity of the intermediary effect between digital finance and property insurance company innovation management are discussed, and the research results of this paper are verified. Thirdly, this paper conducts a stability test on the research hypotheses in this paper, and the test results show that there are 4 hypotheses proposed in this paper, 4 of which are stable. Through statistical analysis, this paper verifies that digital finance not only have a significant impact on precision marketing, but also have a significant impact on the innovation management of property insurance companies, and precision marketing plays a part of the intermediary role between digital finance and innovation management of property insurance companies.

5. Conclusion and Suggestions

5.1. Conclusion

The initial objective is to study the current situation of global and Chinese digital financial innovation service management. Firstly, the global digital financial innovation service management is developing in the direction of digitalization and intelligentization, and technological innovation and regulatory adaptability have become the key factors to promote the development of the industry. China's digital financial innovation service management is promoting the development of financial services to precision, intelligence, security and standardization.

The second research objective is to analyze the factors affecting the property insurance business in Guangdong, China. The result of correlation analysis demonstrates that the significance level of the correlation coefficients among digital finance, precision marketing and innovation management is all lower than 0.05. It can be seen that the development trends among digital finance, precision marketing and innovation management are the same, either increasing or decreasing at the same time. Moreover, the significance level of correlation coefficients among digital capitalization, financial intelligentization, financial service content innovation, financial service process innovation, user portrait, service difference, value joint creation, value innovation, business model transformation and dynamic capacity building is all lower than 0.05. It can be seen that the development trends of digital capitalization, financial service content innovation, financial service process innovation, user portrait, service difference, value joint creation, financial service content innovation, financial service process innovation, user portrait, service difference, value co-creation, value innovation, business model transformation and dynamic capacity building are the same, either increasing or decreasing at the same time. Therefore, the combination of digital finance and precision marketing has had an important impact on the property insurance business in Guangdong, China.

The third objective of this paper is to propose a management model for financial business service innovation. By using the result of regression analysis, the regression of digital capital (DC) of digital finance on innovation management (IMIE) is significant (β =0.316, P<0.05), and there is a significant positive relationship between the two. Hypothesis H1a is verified. Secondly, financial intelligentization (FI) of digital finance has a significant regression on innovation management (IMIE) (β =0.452, P<0.05), and there is a significant positive relationship between the two. Hypothesis H1a is verified.

The regression of digital capitalization (DC) of digital finance (DFIE) to precision marketing (PMIE) is significant (β =0.314, P<0.05), and there is a significant positive relationship between the two. Hypothesis H2a is verified. Secondly, the financial intelligentization (FI) of digital finance (DFIE) has a significant regression on precision marketing (PMIE) (β =0.387, P<0.05), and there is a significant positive impact relationship between the two. Hypothesis H2b is verified.

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Therefore, under the background of digital economy, the property insurance companies in Guangdong Province of China can promote the effective path of innovation management through digital finance. This study builds an analytical framework model of digital finance and innovation management, and establishes a relationship model and action path between digital finance (independent variable) -- precision marketing (intermediary variable) -- innovation management (dependent variable) based on the background of digital economy.

On the basis of the above research conclusions, there are four effective ways for property insurance companies in Guangdong Province in China to promote innovation management through digital finance under the background of digital economy. Path 1: Digital finance directly promotes innovation management. Path 2: digital finance drives precision marketing, and then indirectly improves innovation management through precision marketing.

5.2. Proposal

This paper takes the finance and insurance enterprises in Guangdong Province of China as the research object and discusses the relationship between digital finance, precision marketing and innovation management, which not only enriches the research content in this field, but also provides reference suggestions for the operation of insurance enterprises. According to the relevant conclusions of theoretical research and empirical research, this study explores the improvement path of innovation management of finance and insurance enterprises from the two perspectives of government and enterprises. Based on this, this section provides specific implementation strategies and suggestions according to the designed scheme and research conclusions.

5.2.1. Operational Recommendations

In the process of digital finance, property insurance companies need more cutting-edge and difficult digital technology support when they extend the service model to after-sales management and claim settlement, etc. However, relatively backward digital technology is the fundamental reason that hinders the service innovation of Chinese property insurance companies based on the digital economy. When property insurance companies actually carry out service innovation, they must attach great importance to human resource management, and always put this work in a crucial position. Insurance talents in the digital economy era must understand not only digital technology security precautions, but also insurance laws and regulations and operations. Because in the process of operation and development of property insurance companies, excellent insurers are an important way for companies to improve business performance, and also make service innovation obtain more support and guarantee [35]. Therefore, property insurance companies continue to introduce professional talents, strengthen the training of employees, optimize and constantly improve the existing human resources system, in order to comprehensively enhance the core competitiveness of companies.

For insurance users, one of the key concerns is insuring, in the process of insurance will inform the work to do, whether it can perfectly answer the user's questions. Therefore, insurance companies need to continuously break through the difficulties in realizing the automation and mobility of insurance and claim services, improve the degree of automation application, improve user experience through the application of artificial intelligence and digital technology in marketing, customer service and other fields, and sort out product rules in time to make insurance products more user-friendly and easier to understand; Improve the simplification of business handling process, improve the efficiency of company operation and insurance timeliness, and provide users with faster and more professional services [20]. Continuously polish the purchase and after-sales service experience, reduce the incidence of complaints and optimize

the complaint handling process of the company, and continuously improve service efficiency and user experience, so as to enhance user stickiness and maximize customer retention.

The purpose of insurance is to prevent risks, so for insurance users, another focus is to settle claims, and whether they can get efficient and convenient claims and extended services in the process of settling claims. How to improve the efficiency of claims service and simplify the claims process is the key focus of property insurance companies. Under the guidance of the user-oriented" insurance business development strategy, insurance claims user experience has become the operational focus of property insurance companies' insurance claims work, which requires a comprehensive and objective understanding of users' actual experience of insurance claims services by carrying out corresponding user research work. Property insurance companies need to take measures to establish a positive communication relationship with users in insurance operations, and use appropriate evaluation methods to objectively evaluate the user experience of their own insurance claims services. In the future, property insurance companies will provide more personalized value-added services related to insurance [36]. Take auto insurance as an example, insurance services will provide exclusive services for car owners, short-term health insurance will provide value-added services in health management, and so on. Through digital technology to improve claims ability to quickly settle claims, the use of digital technology to further reduce the property insurance company's own operation and claims costs, improve user experience, and ultimately increase business performance.

5.2.2. Policy Recommendations

In recent years, the Chinese regulatory authorities have frequently released a great deal of relevant documents to support the digital transformation of the insurance industry in China, which involve multiple business areas. They emphasize the need to use modern technology to transform and optimize the traditional insurance business, that is, they require the insurance enterprises to improve the speed of transformation and ensure the quality of transformation. At the same time, attention should be paid to standardizing the business activities after the transformation. In June 2018, the former China Insurance Regulatory Commission promulgated the Regulatory Framework of China's Insurance Service Standard System (Draft for Comment), pointing out that it is necessary to realize supply-side innovation of insurance services, build an insurance industry with digitalization as the core, use digital technology to upgrade insurance services, and provide better insurance services for economic and social development. This institutional framework aims to improve the quality of insurance services through digital transformation and upgrading while innovating the service supervision model.

In order to ensure the smooth operation of property insurance companies, the regulatory authorities should apply digital technology to strictly supervise property insurance companies. For example, the CBRC should establish an online user complaint platform, establish a security risk incident reporting mechanism, establish a digital security accountability system and strengthen the management of user privacy.

The Banking and Insurance Regulatory Commission can establish an online user complaint reporting platform on its official website to accept complaints about online insurance sales. The online complaint platform can automatically classify complaint contents by using artificial intelligence and big data, locate hot issues of insurance complaints, and form relevant data images to facilitate regulatory authorities to understand real-time online insurance sales complaints. To deal with insurance sales problems in a targeted manner, and punish the specific sales platform for user complaints. For example, users reflect that they do not understand the insurance terms, requiring property insurance companies to clearly display precautions, set up graphic, audio and video content for the interpretation of special terms, and strengthen user education; For the behavior of misleading users, regulatory penalties should be made and users should be asked to refund or compensation [37].

When property insurance companies encounter cyber-attacks, find system vulnerabilities and business interruptions, they should report to the regulatory authorities in a timely manner so that the regulatory authorities can know the immediate security situation. By collecting and sorting out the digital

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security challenges faced by the insurance industry, the regulatory authorities can put forward targeted digital security opinions on the insurance industry, especially security problems with common characteristics and easy to be attacked, requiring property insurance companies to rectify within a time limit, Organizing the insurance industry to jointly increase research in the field of security and defending against digital risks and maintain digital security [38].

Insurance regulatory authorities should designate the legal representative of a property insurance company as the highest person responsible for digital security of the company, and require the legal representative to appoint a commissioner responsible for digital security matters, and the person in charge is the company's senior executive. The head of digital security shall annually disclose a digital security report, which includes the property insurance company's digital security actions during the year, the latest digital security technologies adopted and the implementation of the digital security requirements of the regulatory authority [39]. In the event of a digital security incident, the digital security responsible person of the property insurance company shall repair the system within 3 days and punish the responsible person. The legal person of the property insurance company shall have the inescapable responsibility. If the digital security caused by the user's property loss, information leakage, according to the size of the loss to determine the size of the property insurance company's digital security responsible for the accident liability, the accident responsibility should be removed from the digital security responsible person in the property insurance company company's digital security responsible for the accident liability, the accident responsibility should be removed from the digital security responsible person in the property insurance company compensation obligations.

Relevant government departments should promote legislation to clearly require property insurance companies to fulfill their obligations to protect user privacy. Property insurance companies should encrypt data transmission from terminal devices, strictly keep confidential sensitive information involving users, such as identity information, communication information, personal health and personal property data, and shall not be used for processing without user authorization [40]. At the same time, the user information protection mechanism and technology should be standardized, and the scenarios, purposes and methods of user data analysis and sharing by property insurance companies should be clarified, as well as the standards for anonymous processing of user information and data desensitization. For the civil and criminal infringement of data leakage caused by illegal computer equipment intrusion, property insurance companies shall inform users of their obligations, and investigate the legal liabilities of relevant responsible subjects according to law, and property insurance companies shall have the obligation to recover users' infringement losses. The judicial organs should firmly deal with individuals or units that seek improper benefits due to malicious disclosure or tampering with user information and put them on the blacklist of the industry.

5.2.3. Recommendations for Future Research

This study provides theoretical and empirical research on the relationship between digital finance and innovation management, and provides research support for property insurance companies in Guangdong Province to improve innovation management through digital finance. Although this paper can provide a new perspective for the improvement of innovation management of property insurance companies in Guangdong Province, due to the influence of many aspects such as scientific research conditions and data availability, there are still some research deficiencies in this paper. The following two aspects need to be further studied and discussed.

Firstly, suggestions on the selection of research samples. Due to the limitation of time and energy, the research samples in this paper are mainly from Guangdong Province, which cannot cover the regional scope of China's digital transformation property insurance companies, and the research conclusions lack certain universality and popularization. Therefore, the subsequent research adopts more extensive samples, increases the number of samples, expands the survey objects to foreign-funded property insurance companies, and compares Chinese-funded property insurance companies with foreign-funded property insurance companies, so as to make the research results more universal. Follow-up studies can also be carried out according to regions or consider conducting comparative studies on property insurance companies in developed areas and regions to be developed. From the perspective of company scale and

maturity, different companies have different resources, capabilities and challenges. The research can be carried out from the dimensions of large companies and small companies, mature companies and startups.

Secondly, suggestions on the research data. This paper obtains data through a relatively subjective questionnaire form, and the collected sample data is cross-section data. The digital finance, precision marketing and innovation management of property insurance companies are in a dynamic process, and the application of digital finance and precision marketing in the actual operation of property insurance companies may have a certain lag period. Digital finance and precision marketing may not produce results in the current period, and it will take a certain amount of time to digest and absorb before it can have an effect. Cross-section data may not be able to objectively and truly reflect the real role of insurance companies in implementing digital finance. We hope to conduct in-depth research on this topic vertically in the future. For example, we can consider a fixed time period, such as 3 to 5 years, and adopt panel data in the research to study long-term dynamic relationship models, so as to draw more accurate conclusions. It is expected to conduct more in-depth research in the future.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Author Contributions:

Jiali Zhong: Conceptualization, Data curation, Investigation, Writing original draft, validation; Khunanan Sukpasjaroen: Methodology, Supervision.

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Appendix

Questionnaire for Insurance Company User

Dear Sir/Madam:

Thank you for your participation in this survey! The purpose of this paper is to study the impact of digital finance on the Financial service innovation Management of Insurance companies: A case study of insurance companies in Guangdong Province, China. Your answer is an important basis for this research. Please answer each of the following questions accurately according to the actual situation of the property insurance company you purchased. Thank you very much! The data collected in this questionnaire is only for academic research and will not reveal your personal privacy. Please try your best to answer objectively and accurately! 5 stands for strongly agree, 4 stands for somewhat agree, 3 stands for fair, 2 stands for somewhat disagree, 1 stands for strongly disagree. Thank you very much for your cooperation and support! I wish you every success and great success.

1. Basic Personal Information

This part is your basic information, mainly to meet the needs of academic research, please fill in the true, this data will not be open to the public. Please select the options, or fill in the corresponding options.

1. Your gender is [single choice] *

 $\circ \ Male \ \circ \ Female$

2. What is your age? [single choice] *

 \circ 18-30 years old $~\circ$ 31-40 years old $~\circ$ 41-50 years old $~\circ$ over 50 years old

3. What is your education background? [single choice] *

○ Secondary School or below ○ Junior College ○ Bachelor Degree ○ Master Degree or above

4. How many years have you bought property insurance? [single choice] *

 \circ Within 1 to 3 years \circ 3 to 5 years \circ 5 to 10 years \circ 10 to 20 years \circ more than 20 years

5. How much you spend on property insurance? [single choice] *

 \circ 0-1000 yuan $~\circ$ 1001-3000 yuan $~\circ$ 3001 yuan or more

2. Digital Finance Related Questions

Please rate the following items: 5 is strongly agree, 4 is agree, 3 is neutral, 2 is disagree, 1 is strongly disagree.

ID	Measurement question item	5	4	3	2	1
DC1	Digital services meet customers' requirements.					
DC2	Customers trust companies to handle digital assets.					
DC3	The good protection of customers' digital assets.					
DC4	The expertise level of property insurance in digital transformation of the companies.					
DC5	The future strategy of property insurance of digital asset management.					
DC6	The increasing products value of property insurance.					
FI1	Easier to access financial services through Fintech.					
FI2	Intelligence technology meets the requirements of several personal financial needs.					
FI3	Intelligent technology improves service efficiency.					
FI4	Financial platforms help companies to access the financial information of property insurance.					
FI5	Intelligent technology reduces operating costs.					
FI6	Intelligent technology provides immediate financial services.					

3. Precision Marketing Related Questions

Please rate the following items: 5 is strongly agree, 4 is agree, 3 is neutral, 2 is disagree, 1 is strongly disagree.

ID	Measurement question item	5	4	3	2	1
UP1	The services requirements match the personal preferences of the customers.					
UP2	The usage of portrait data responses to the personalized needs of customers accurately.					
UP3	The usage of portrait data provides customers with highly personalized products.					
UP4	Customizing services based on user profiles improves the service system.					
UP5	The products recommended based on the user profile inspires the purchase intention.					
UP6	The analysis of the user profile offers more reasonable price to customers.					
SD1	The classification of customers' requirements helps companies to meet unique needs.					
SD2	Several service commitment for different customer groups makes customers happy.					
SD3	Several response to different customers reflects difference service attention.					
SD4	The characteristics of different customers provide several service experience.					
SD5	Different customers need different attractive customized products.					
SD6	The individual preferences of customers recommend several insurance products.					

4. Innovation Management Related Questions

Please rate the following items: 5 is strongly agree, 4 is agree, 3 is neutral, 2 is disagree, 1 is strongly disagree.

ID	Measurement question item	5	4	3	2	1
VC1	Financial interaction with customers provide added value services.					
VC2	Business model realizes on value co-creation products.					
VC3	The usage of resource achieves value co-creation.					
VC4	The protection of intellectual property rights promotes the value co-creation with customers.					
VC5	Feedback plays an important role in the value co-creation process.					
VC6	The cooperation among different parties promotes the value co-creation.					
VI1	Continuous knowledge learning creates innovation ability.					
VI2	Value innovation ability promotes precious worker relationships in insurance companies.					
VI3	The happiness of the team of workers with innovations service value.					
VI4	Offering differentiated products provide innovation value.					
VI5	Innovative management creates value.					
VI6	Value innovation establish good brand images.					
MT1	Innovative market strategies promote business model transformation.					
MT2	The application of new technologies transforms business models.					
MT3	The business model transformation provide increasing services value.					
MT4	Business model transformation achieves continuous development.					
MT5	Business model transformation solves customers' problems effectively.					
MT6	Business model transformation establish sound emergency systems.					
CB1	Dynamic abilities encourage response to customers timely.					
CB2	Dynamic capacity building ensure the continuous guarantee of products.					
CB3	Strong dynamic capacity of resource integration allocates resources effectively.					
CB4	Cross-functional collaboration supplies integrated services through dynamic capabilities.					

ID	Measurement question item	5	4	3	2	1
CB5	The adjustment of insurance products response to market changes flexibly through dynamic abilities.					
CB6	Dynamic ability adapt to market changes continuously.					
5. Suggestions						

Thank you for your participation!

Highlight

- 1. To study the current situation of global and Chinese digital financial innovation service management.
- 2. To analyze the factors affecting the property insurance business in Guangdong, China.
- 3. Precision marketing has a partial intermediary role between digital finance and the innovation management of property insurance companies.