Linking Dynamic Capabilities and Value Co-Creation to Competitiveness in Elderly Care Alliances

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Abstract

This study draws upon the theory of Value Co-Creation to develop a "Dynamic Capability - Value Co-Creation - Competitiveness" model aimed at exploring the mechanisms influencing competitiveness within cross-border alliances in the elderly care real estate sector. Utilizing structural equation modeling, we analyzed responses from 489 senior executives and validated the direct impact of dynamic capabilities—specifically, the ability to integrate, innovate, and relate—on competitiveness. Furthermore, we investigated the mediating effects of both alliance value co-creation (characterized by dialogue, channels, and transparency) and user value co-creation, while also assessing the moderating role of perceived value (encompassing functional, social, and emotional dimensions). The findings indicate that dynamic capabilities exert a significant positive direct influence on competitiveness. Notably, both alliance and user value co-creation positively contribute to enhancing competitiveness. Additionally, perceived value serves as a positive moderator in the relationship between dynamic capabilities and value co-creation. This research extends beyond a singular analytical framework, and uncovers the multi-faceted logic of "capability development - activation of co-creation - value enhancement" within cross-border alliances in the elderly care real estate sector. The insights gained provide actionable recommendations for government initiatives targeting constructing digital platforms, bolstering alliance capabilities, and optimizing value management. Overall, this study offers theoretical and practical pathways for improving competitiveness within the industry.

Keywords: Elderly Care Real Estate; Dynamic Capability; Value Co-Creation; Perceived Value; Competitiveness.

1. Introduction

China entered an aging society in 1999, and the number of elderly individuals has rapidly increased since then. By the end of 2024, the population aged 60 and above is projected to reach 310 million, accounting for 22% of China's total population (National Bureau of Statistics, 2024). Furthermore, it is estimated that this figure will exceed 430 million by 2050 (China Development Foundation, 2021). In comparison with other countries, China's aging phenomenon is characterized by a large base, a rapid growth rate, and a high demand for long-term care [1-3].

Simultaneously, the trend toward smaller family sizes has become increasingly evident, with the average household size decreasing from 3.9 members in 1990 to 2.6 members in 2023 (National Bureau of Statistics, 2024). This shift has weakened the traditional familial role in caregiving. The rise in the elderly population has subsequently led to a

substantial increase in the demand for elderly care housing, while the declining capacity of families to provide care has amplified the demand for socialized elderly care services [4, 5].

The changing consumption structure among the elderly necessitates the evolution of elderly care real estate, which must now be equipped with additional supportive service facilities. Consequently, elderly care real estate has emerged as a vital option for addressing the elder care needs associated with an aging population. In this context, there has been a marked increase in demand for "comprehensive elderly care real estate" that integrates "elderly care," "real estate," and "services," particularly for facilities that offer diverse services and comprehensive amenities [3].

However, the elderly care real estate industry currently faces a pronounced supply-demand imbalance. In 2023, the market demand reached 7.2 trillion yuan, yet effective supply fell below 1.5 trillion yuan. The industry is also characterized by several challenges, including a limited range of development models, inefficient cross-border alliance collaborations, and chaotic competitive dynamics [4, 5].

Most existing studies have focused either on the development models or operational management of individual enterprises within the elderly care real estate sector [1, 6], or have performed static analyses of policies and market demands [7]. There is a lack of multi-factor integrated research on the competitiveness of cross-border alliances.

Specifically, the gaps in the literature manifest in several ways. Firstly, the mechanism by which dynamic capabilities (such as resource integration, innovation ability) influence the competitiveness of the alliance through the value co-creation path is not yet clear ; Secondly, the differentiated effects of "value co-creation of the alliance" (cross-enterprise resource sharing) and "value co-creation of users" (demand feedback participation) on competitiveness have yet to be disentangled [8, 9], and the moderating effect of perceived value (function, emotion, etc.) has not been verified. Thirdly, the interrelationships among dynamic capabilities, value co-creation, and perceived value lack a systematic theoretical framework, complicating the understanding of the industry contradiction where "high investment in capabilities leads to low competitiveness outcomes" [10, 11].

In response to these identified research gaps, this study constructs a multi-level theoretical model based on the theory of value co-creation, focusing on the pathways through which dynamic capabilities enhance the competitiveness of cross-border alliances in elderly care real estate [11].

This study is organized into five interconnected sections. Section 2 reviews relevant literature and formulates hypotheses regarding the relationships among dynamic capabilities, value co-creation, and competitiveness. Section 3 details the research methodology, including sample design, data collection through stratified sampling, and structural equation modeling analysis. Section 4 presents empirical findings derived from reliability tests, hypothesis verification, and mediation/moderation analyses. Finally, Section 5 discusses the findings and contributions, offers recommendations for both government and industry practitioners, and acknowledges limitations and future research directions. The flowchart of this study is illustrated in Figure 1.
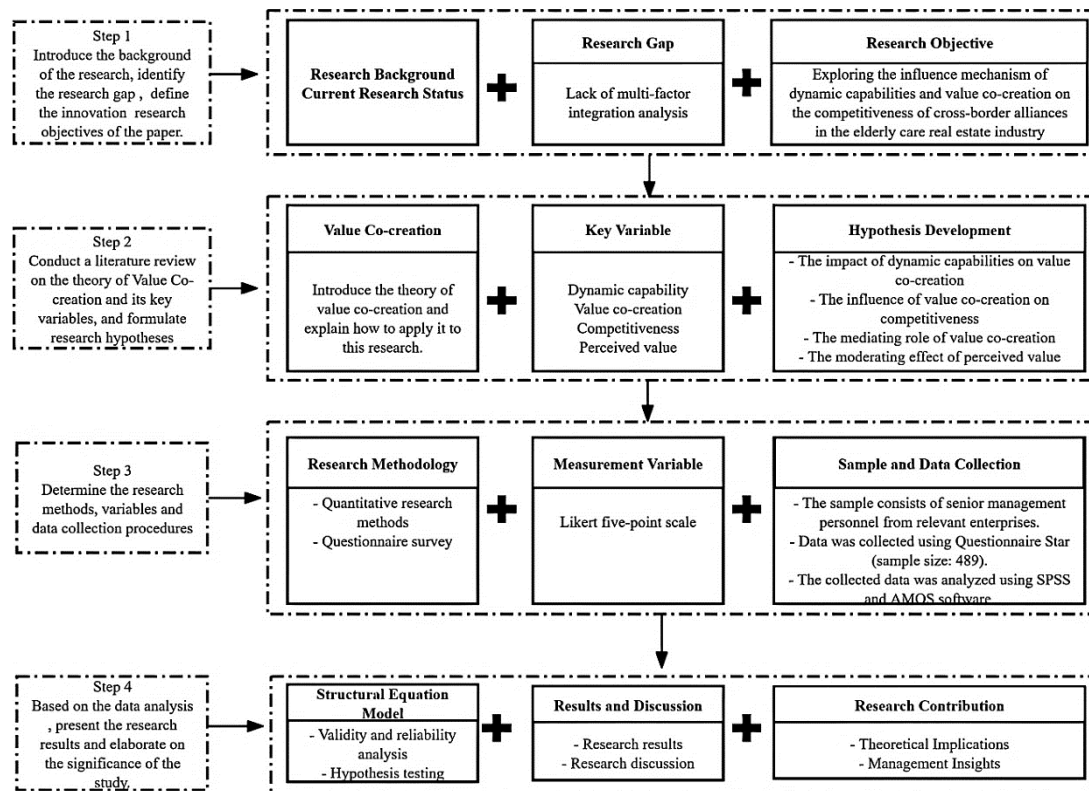

Figure 1. Research Flowchart

2. Literature Review and Hypotheses Development

2.1. Value Co-Creation Theory

Value co-creation theory originated from the concept of "joint production" in marketing. Since Prahalad and Ramaswamy (2000) established its core principles, the scope has expanded from a binary enterprise-customer interaction to a multi-agent network collaboration framework [12]. The theoretical evolution has progressed through distinct phases: initial studies emphasized user initiative [13]; subsequent research incorporated multiple stakeholders, such as suppliers and partners [14]; and recent work has integrated characteristics of the digital economy [15]. This progression indicates that value co-creation must transcend single-user perspectives to establish collaborative networks, aligning with the complex, multi-agent nature of elderly care real estate.

Methodologically, extant research typically employs a "case analysis – theoretical modeling – empirical testing" approach. Qualitative methods, structural equation modeling, and embedded case studies have been used to explore co-creation mechanisms [16-18].

2.2. Elderly Care Real Estate

Emerging in response to global aging populations, elderly care real estate represents a service-oriented business model integrating real estate development with care services [1-3]. It addresses evolving societal needs by providing comprehensive solutions that extend beyond traditional family-based or national care systems. Socially, this model embodies the principle of enabling active participation among older adults, meeting not only fundamental physiological needs but also higher-level requirements for social engagement, education, and self-actualization [19]. Commercially, it combines real estate with elderly care industries to create residential products designed to ensure residents' physical and mental well-being [20, 21].

2.3. Cross-border Alliance Mode of Elderly Care Real Estate

Cross-border alliances involve strategic collaborations across organizational boundaries, a concept adopted from strategic and innovation management [22-24]. Such alliances enable enterprises to integrate unique resources, achieve synergistic (non-linear) effects, and establish competitive advantages [23-27]. Within the elderly care real estate sector, cross-border alliances facilitate multi-dimensional resource sharing, joint market development, and long-term competitiveness through formal contractual arrangements [28, 29].

2.4. Relationship Between Dynamic Capability and Competitiveness

Early research proposed a direct relationship between dynamic capabilities and competitiveness [30]. Teece (2007) emphasized their critical role in explaining sustained competitive advantage across time periods [31]. Scholars adopt varying perspectives regarding this relationship. Different scholarly perspectives exist. Some posit that dynamic capabilities directly influence performance [32], while others contend, they enhance competitiveness indirectly by improving operational capabilities [33]. Kareem et al. (2024) further highlighted the crucial mediating role of innovation ability in translating dynamic capabilities into competitive success [34]. Dynamic capabilities empower enterprises to adapt to changing market conditions, make informed strategic decisions, and strengthen overall competencies [35]. Consequently, the more robust these capabilities are, the greater the potential for securing a competitive advantage. In light of these considerations, this study proposes the following hypotheses:

H1: *Dynamic capabilities positively influence the competitiveness of cross-border alliances in elderly care real estate.*

2.5. Mediating Role of Value Co-Creation in the Dynamic Capability- Competitiveness Relationship

(1) Relationship between Dynamic Capability and Value Co-creation in Cross-border Alliances

Dynamic capabilities refer to the ability of an enterprise to adapt to and shape the constantly changing environment. Research has shown that dynamic capabilities help enterprises seize market opportunities, quickly adjust strategies, and sustain innovation [10, 30, 36].

Sawhney et al. (2005) highlighted that dynamic capabilities facilitate value co-creation development, as continuous user interactions enhance organizational adaptability to market shifts [37–39]. Chesbrough's (2011) open innovation theory further emphasized the reciprocal relationship between dynamic capabilities and co-creation, noting that joint value creation with external participants reinforces this linkage [40]. Rashid et al. (2024) contended that strengthened dynamic capabilities improve collaboration efficiency with stakeholders, establishing organizational preconditions for value co-creation [41].

Therefore, this study proposes the following research hypotheses:

H2: *Dynamic capabilities have a positive impact on value co-creation.*

H2.1: *Dynamic capabilities have a positive impact on alliance value co-creation.*

H2.2: *Dynamic capabilities have a positive impact on user value co-creation.*

 (2) Relationship between Value Co-creation and Competitiveness in Cross-border Alliances

Scholars widely recognize value co-creation as a critical determinant of enterprise competitiveness. Theoretical and empirical studies consistently identify it as a strategic source for enhancing competitive advantage [42-44].

Wan & Liu (2021) observed that firms engage users in production-stage value creation to boost efficiency, reduce costs, and develop user-centric innovations [45]. Shi et al. (2024) emphasized the importance of quantifying intangible customer relationships and financial indicators to promote value sharing [46].

Additionally, the main content of value co-creation is constantly expanding. Suppliers, business partners, and collaborators enter user practices to interact and jointly create value [47, 48].

In summary, whether approached from the user perspective or in the context of cross-border alliances in the elderly care real estate sector, value co-creation emerges as a vital contributor to enhancing competitiveness [49-51].

Therefore, this study proposes the following hypotheses:

H3: *Value co-creation positively influences the competitiveness of cross-border alliances in elderly care real estate.*

H3.1: *Value co-creation within cross-border alliances positively influences the competitiveness of elderly care real estate.*

H3.2: *User value co-creation positively influences the competitiveness of cross-border alliances in elderly care real estate.*

 (3) The mediating Role of Value Co-creation in the Dynamic Capability-Competitiveness Relationship

The connection between dynamic capabilities and competitiveness remains a topic of debate. While a number of scholars have affirmed direct relationships between these constructs, many studies suggest that the dynamics governing this relationship are more intricate than a straightforward direct effect [52, 53].

Wang et al. (2007) argue that although dynamic capabilities exert a significant positive influence on competitiveness, intermediary mechanisms exist that facilitate the transition from possessing dynamic capabilities to enhancing competitiveness [53].

Given these theoretical insights, this study posits that an intermediary variable reflecting "behavior" or "activity" should be identified between the constructs of "dynamic capabilities" and "competitiveness."

Therefore, this study proposes the following hypotheses:

H4: *Value co-creation plays a positive mediating role in the dynamic capability-competitiveness relationship.*

H4.1: *Alliance value co-creation has a positive mediating effect in the relationship between dynamic capabilities and competitiveness.*

H4.2: *User value co-creation has a positive mediating effect in the relationship between dynamic capabilities and competitiveness.*

2.6. The Moderating Effect of Perceived Value on Dynamic Capability and Value Co-Creation

Perceived value reflects an individual's assessment of benefits derived from goods, services, or behaviors. This theoretical framework explains variations in pricing, perceived quality, satisfaction, and competitive positioning [54-56]. Existing research typically treats perceived value as a mediating or moderating variable to examine its positive outcomes [57-59]. As individuals inherently seek to maximize returns, perceived value constitutes a critical determinant of behavioral decision-making [60-62].

In the context of elderly care real estate cross-border alliances, perceived value incentivizes more proactive development of dynamic capabilities. It simultaneously promotes higher-order value co-creation, strengthens alliance-user trust, and stimulates user participation. These mechanisms collectively enhance innovation capacity and market competitiveness within alliances.

Consequently, this study proposes:

H5: *Perceived value has a positive moderating effect on dynamic capability and value co-creation.*

3. Research Methods

3.1. Research Scope and Definitions

***Cross-border Alliances*:** This study defines cross-border alliances as strategic partnerships transcending organizational and sectoral boundaries within China's elderly care real estate industry. These alliances encompass collaborations between various industries—including real estate, healthcare, financial services, technology, and property management; and span across geographic regions within China, while intentionally excluding international partnerships.

***Elderly Care Real Estate*:** For the purpose of this research, elderly care real estate is defined as encompassing residential and care facilities intended for aging populations. This category includes nursing homes, assisted living facilities, independent living communities, continuing care retirement communities (CCRCs), and mixed-use developments that provide integrated elderly care services.

3.2. Population and Sample

The target population comprised middle/senior managers and potential customers from Chinese enterprises in the elderly care real estate sector. The sample comprised managers from a variety of industries, including real estate development, property services, financial and insurance services, medical and health services, and elderly care services, alongside potential customers who have elderly care needs.

Given the indeterminate population size, the minimum sample requirement was calculated as 400 (margin of error ±5%, 95% confidence level). To ensure high data quality and to account for potential non-responses or invalid responses, the study aimed to collect 500 questionnaires, thereby exceeding the minimum required sample size by 25%.

3.3. Research Instruments

The questionnaire was meticulously designed and comprised of three primary sections. The first section offered a background introduction that outlined the purpose and significance of the survey. The second section concentrated on the collection of variable data, employing a Likert 5-point scoring scale to garner information related to dynamic capabilities, value co-creation, perceived value, and competitiveness. The final section expressed gratitude towards participants and included provisions for collecting contact information.

3.4. Data Collection

Data were collected via WenJuanXing, a widely recognized survey tool in China that ensures data security and accessibility for respondents. This online approach was chosen due to its efficiency in reaching geographically dispersed participants within China's elderly care real estate sector, as well as its capacity to facilitate standardized data collection.

The research employed stratified sampling to ensure adequate representation across different professional backgrounds, experience levels, and organizational types within the elderly care real estate industry. The stratification criteria included: (1) professional roles (middle managers, senior managers, potential customers), (2) industry sectors (real estate development, property services, financial services, medical services, elderly care services), (3) geographic distribution across major Chinese cities, and (4) years of professional experience.

Of the 500 questionnaires distributed, 489 valid responses were obtained, resulting in an impressive effective response rate of 97.8%. This high response rate can be attributed to the relevance of the topic for industry professionals and the comprehensive distribution strategy that ensured the survey effectively reached the intended target population across various segments of the elderly care real estate sector (see Table 1).

Table 1. Basic statistical characteristics of samples

Characteristic item	Classify	Frequency	Percentage (%)
Gender	Male	218	44.6
	Female	271	55.4
Education background	Junior college	96	19.6
	Undergraduate	254	51.9
	Master	114	23.3
	Doctor	25	5.1
Work Experience	1-3 years	145	29.7
	3-5 years	171	35
	5-10years	51	10.4
	More than 10 years	122	24.9

3.5. Statistical Analysis

The research employed a robust statistical analysis approach. SPSS 22.0 was used for descriptive statistical analysis, while AMOS 26.0 facilitated confirmatory factor analysis. Reliability was assessed using Cronbach's alpha coefficient, and validity was evaluated through KMO and Bartlett's spherical tests. Structural equation modeling and hierarchical regression analysis were utilized to examine relationships between variables and verify research hypotheses. This comprehensive methodological approach ensured a rigorous and systematic investigation of the research model, providing a solid foundation for analyzing the competitiveness of cross-border alliances in the elderly care real estate sector.

4. Results

4.1. Measurement Model Validation

In social science research, validating the reliability and validity of measurement variables is crucial. To ensure the structural validity of measurement tools, it is essential that the items closely align with the content being assessed and are not significantly associated with extraneous constructs [63].

Scale reliability measures the consistency and stability of measuring the targeted content. The Cronbach's α coefficient is a commonly employed indicator of reliability, with higher values reflecting greater reliability. Nevertheless, while reliability is a necessary condition, it is not sufficient on its own to establish validity. Zeng & Huang (2005) emphasized that validity analysis evaluates the accuracy of measurement and the congruence between research objectives and outcomes [64].

Following conventional psychometric thresholds, Cronbach's α coefficients above 0.80 indicate excellent reliability, values between 0.7-0.8 is acceptable, and 0.60–0.7 is feasible. Values below 0.60 necessitate instrument revision. In this study, internal consistency reliability was assessed via Cronbach's α in SPSS 22.0, Confirmatory factor analysis (CFA) in AMOS 26.0 evaluated composite reliability, convergent validity, and discriminant validity.

The flowchart of the research methodology that was used to achieve the study's aims is shown in Figure 2.
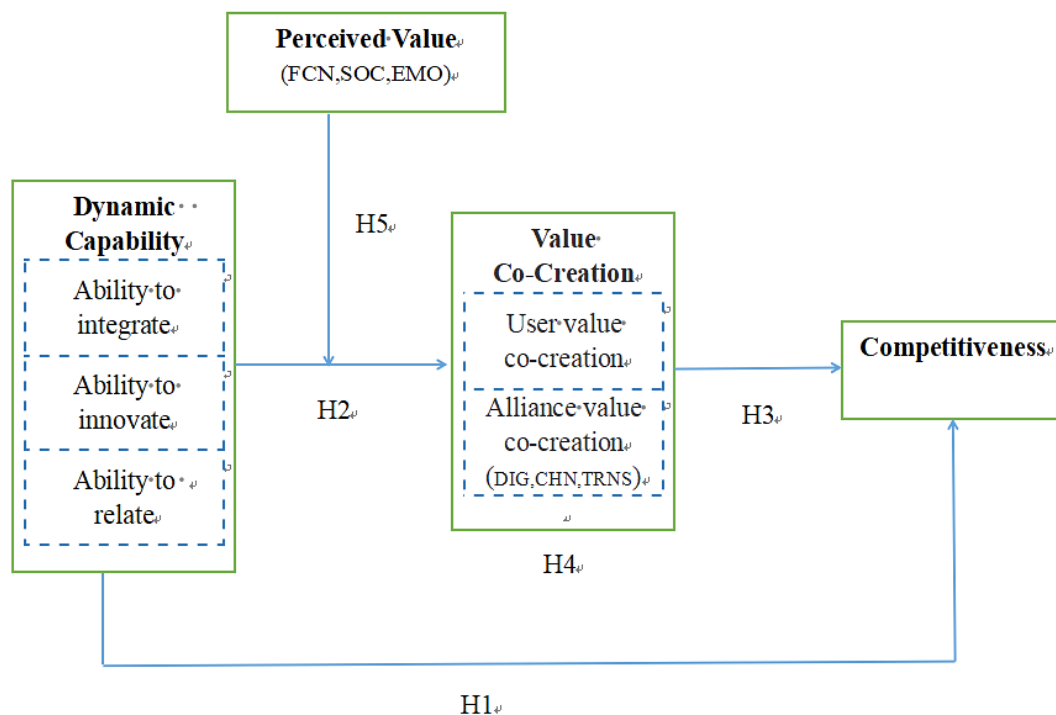
Figure 2. Conceptual Model

4.1.1. Reliability Analysis

The measurement tools were appropriately adapted to align with the research context. Details are presented in Table 2. The Cronbach's α coefficients for the various scales were as follows: dynamic capability measurement scored 0.933, value co-creation scale achieved 0.857, competitiveness measurement reached 0.855, and perceived value measurement recorded 0.962. These results indicate an exceptional level of reliability and internal consistency, thereby providing solid groundwork for the subsequent thorough analyses.

Table 2. Reliability analysis table of each scale for formal investigation

Variable	Project	Each dimension	Cronbach's Alpha
Dynamic Capabilities	Ability to integrate	0.904	0.927
	Ability to innovate	0.823	
	Ability to relate	0.838	
Value Co-Creation	User value co-creation	0.833	0.849
	Alliance dialogue	0.870	
	Alliance channel	0.743	
	Alliance transparency	0.844	
Competitiveness	Competitiveness		0.855
Perceived value	Function value	0.929	0.962
	Social value	0.944	
	Emotion value	0.934	

4.1.2. Validity Analysis

The validity of the measurement model was primarily assessed through the KMO (Kaiser-Meyer-Olkin) test and confirmatory factor analysis.

- KMO and Bartlett's Test of Sphericity (see Table 3);

Table 3. Results of KMO test and Bartlett spherical test

Dimensionality	KMO test	Bartlett sphericity test	
		chi-square test	*P*
Questionnaire population	0.909	16774.717	0.000
Dynamic Capabilities	0.950	3942.307	0.000
User value co-creation	0.802	741.248	0.000
Alliance value co-creation	0.899	2412.214	0.000
Competitiveness	0.860	985.861	0.000
Perceived value	0.886	6343.445	0.000

The KMO value obtained was 0.909, which indicates a remarkably high level of validity. Additionally, the Bartlett's test of sphericity was employed to evaluate whether the observed correlation coefficient matrix of the original variables significantly deviates from the identity matrix.

- Confirmatory Factor Analysis (see Table 4):

Table 4. Confirmatory factor analysis

Path			Estimate	CR	AVE
ATI7	←	ATI	0.757		
ATI6	←	ATI	0.706		
ATI5	←	ATI	0.751		
ATI4	←	ATI	0.815	0.904	0.575
ATI3	←	ATI	0.686		
ATI2	←	ATI	0.756		
ATI1	←	ATI	0.825		
ATN11	←	ATN	0.766		
ATN10	←	ATN	0.616	0.826	0.545
ATN9	←	ATN	0.787		
ATN8	←	ATN	0.772		

ATR15	←	ATR	0.752		
ATR14	←	ATR	0.736	0.838	0.563
ATR13	←	ATR	0.769		
ATR12	←	ATR	0.745		
DIG5	←	DIG	0.783		
DIG6	←	DIG	0.815	0.871	0.628
DIG7	←	DIG	0.800		
DIG8	←	DIG	0.770		
CHN9	←	CHN	0.736		
CHN10	←	CHN	0.636	0.746	0.500
CHN11	←	CHN	0.736		
TRNS13	←	TRNS	0.766		
TRNS14	←	TRNS	0.815	0.845	0.645
TRNS15	←	TRNS	0.827		
CC1	←	UVCC	0.812		
CC2	←	UVCC	0.708	0.836	0.562
CC3	←	UVCC	0.812		
CC4	←	UVCC	0.653		
CPN1	←	CPN	0.722		
CPN2	←	CPN	0.824		
CPN3	←	CPN	0.729	0.856	0.543
CPN4	←	CPN	0.699		
CPN5	←	CPN	0.704		
CPN1	←	CPN	0.722		
CPN2	←	CPN	0.824		
CPN3	←	CPN	0.729	0.856	0.543
CPN4	←	CPN	0.699		
CPN5	←	CPN	0.704		

Confirmatory factor analysis was conducted using AMOS 26.0 software to examine the relationships among independent, dependent, mediating, and moderating variables, thus validating the questionnaire's alignment with the anticipated theoretical framework and assessing the degree to which the measurement items significantly loaded onto their corresponding factors.

The results of the analysis revealed that the Average Variance Extracted (AVE) for each variable exceeded 0.5, while the Composite Reliability (CR) values ranged from 0.826 to 0.904. The confirmatory factor analysis results indicate a well-fitting model with high convergent validity, providing reliable measurement tools for subsequent research.

4.2. Hypothesis Testing

4.2.1. Construction of Structural Equation Model

The research model was constructed using AMOS 26.0, with the Maximum likelihood method being employed to test the model fit and verify research hypotheses. The model, comprising 11 latent variables and 43 observed variables, provided a comprehensive framework for analyzing the complex relationships in cross-border alliances within the elderly care real estate sector (see Figure 3 and Table 5).
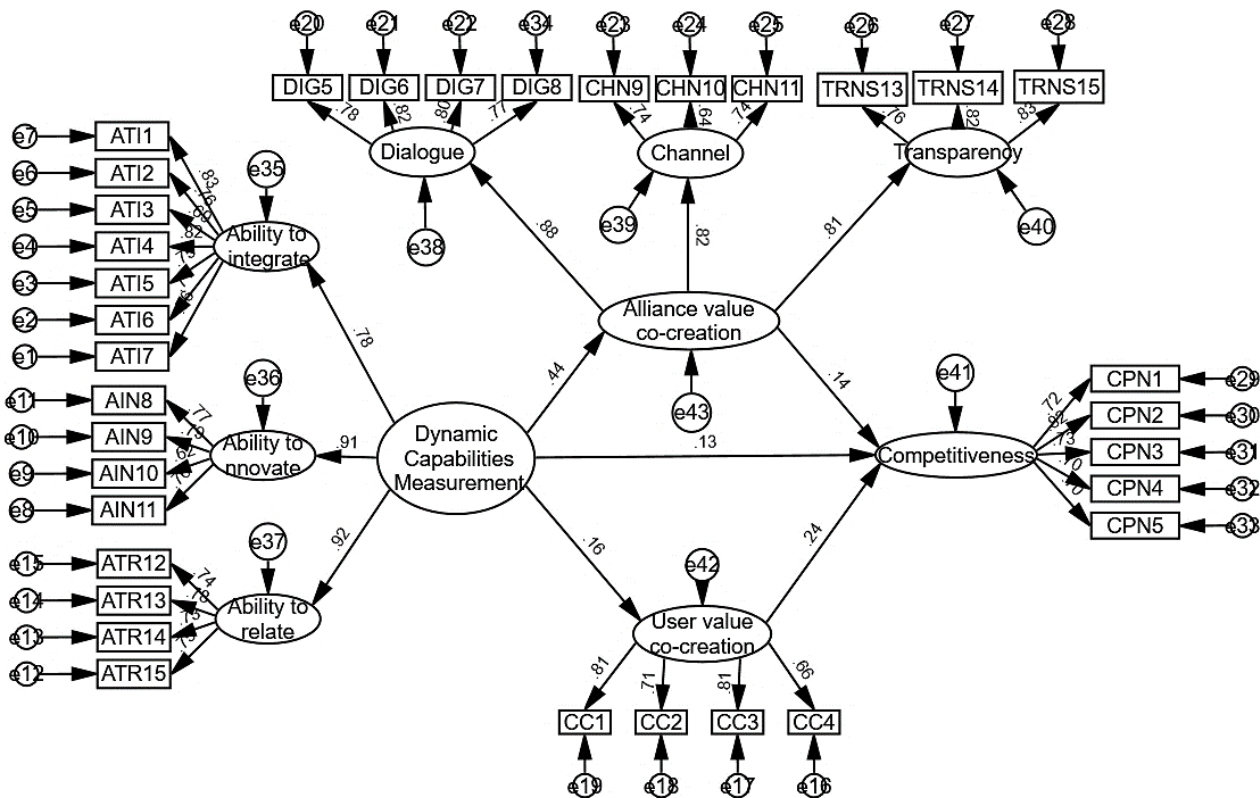
Figure 3. Structural equation model

Table 5. Model Fit Coefficient Table

Common Indicators	χ2/df	RMSEA	GFI	CFI	NFI	IFI
Judgment criteria	<3	<0.05	>0.9	>0.9	>0.9	>0.9
Value	1.6	0.035	0.911	0.911	0.907	0.963

The model fitting coefficients demonstrated exceptional statistical robustness. The χ²/df ratio of 1.600, which is less than the accepted threshold of 3, signifies an optimal model fit. Furthermore, the Root Mean Square Error of Approximation (RMSEA) was recorded at 0.035, further confirming the model's excellent fit. Additional indices, including the Goodness of Fit Index (GFI) at 0.911, the Normed Fit Index (NFI) at 0.907, the Comparative Fit Index (CFI) at 0.911, and the Incremental Fit Index (IFI) at 0.963, all surpassed the ideal threshold of 0.9.

These comprehensive fit indices collectively suggest that the structural equation model is statistically significant and exceptionally well-fitted, providing a reliable analytical framework for exploring the dynamics of competitiveness in elderly care real estate cross-border alliances.

4.2.2. Research Hypothesis Test

To ensure the validity of the measurement relationships, this study employed prior reliability and validity analyses. A structural equation model diagram was constructed to investigate the influence relationships among multiple latent variables, providing a holistic understanding of the complex interactions occurring in cross-border alliances in the elderly care real estate industry.

From a measurement perspective, the second-order model of dynamic capabilities clarifies the importance of each dimension and their mutual promotion mechanism. The analysis reveals that dynamic capabilities are realized through a holistic approach of optimizing resources, innovating services, and strengthening cooperation. This multifaceted approach enables enterprises to adapt and respond effectively to the dynamic elderly care real estate market.

Similarly, the second-order model of alliance value co-creation highlights key values of dialogue, channels, and transparency. Value co-creation emerges as a critical mechanism for enhancing alliance effectiveness. Specifically, alliance co-creation demonstrates potential to reduce costs and increase operational efficiency, while user co-creation provides a strategic pathway to optimize products and services, ultimately enhancing overall user satisfaction (see Tables 6 and 7).

Table 6. Summary of parameter estimation for second-order models

			Unstandardized Estimate	S.E.	C.R.	P	Standardized Estimate
	←	ATI	1				0.778
DCM	←	ATN	1.154	0.092	12.572	***	0.915
	←	ATR	1.111	0.089	12.423	***	0.916
	←	DIG	1				0.883
AVC	←	CHN	0.896	0.079	11.279	***	0.818
	←	TRNS	0.917	0.079	11.652	***	0.808

Table 7. Summary of model parameter estimates

			Unstandardized Estimate	S.E.	C.R.	P	Standardized Estimate
AVC	←	DCM	0.526	0.072	7.277	***	0.437
UVCC	←	DCM	0.196	0.065	3.003	0.003	0.162
CPN	←	AVC	0.146	0.064	2.277	0.023	0.137
CPN	←	UVCC	0.252	0.057	4.394	***	0.237
CPN	←	DCM	0.173	0.077	2.254	0.024	0.134

The parameter estimations and model estimates yield empirical support for the intricate relationships that exist between dynamic capabilities, value co-creation, and competitiveness in the elderly care real estate sector.

4.2.3. Mediation Effects

This study utilized the mediation effect testing method proposed by Preacher & Hayes (2008) [65], incorporating 5000 iterations. This approach generates a bias-corrected 95% confidence interval estimation for the mediation effect. If the interval estimation of the indirect effect includes zero, it suggests a lack of significance for the mediation effect; conversely, if it does not include zero, the mediation effect is deemed significant (see Table 8).

Table 8. Analysis of mediating effects

	Effect size	SE	Z	Lower	Upper
Dynamic capabilities measurement - Total effect of competitiveness	0.300	0.080	3.750	0.150	0.450
Dynamic capabilities measurement-Direct effects of competitiveness	0.170	0.070	2.429	0.000	0.340
Dynamic capabilities measurement- Indirect effects of competitiveness	0.130	0.040	3.250	0.050	0.230
Dynamic capabilities measurement-Alliance value co-creation - Indirect effect of competitiveness	0.077	0.039	1.974	0.012	0.167
Dynamic capabilities measurement-User value co-creation - indirect effect of competitiveness	0.049	0.023	2.130	0.015	0.108

The overall mediating effect accounted for 43.3%. Notably, the contribution ratios of alliance value co-creation (AVC) and user value co-creation (UVCC) were found to be 59:41. This finding suggests that, within cross-border alliances in the elderly care real estate sector, internal collaboration serves as the foundation, while user demands guide the process. It is essential for these two elements to operate in a "dual-wheel drive" manner.

Importantly, these findings differ significantly from the "internal process optimization dominates the mediating effect" pattern observed in the manufacturing industry, thereby underscoring the distinctiveness of the service sector.

4.2.4. Moderation Effects

The study adopted regression analysis to verify the moderating effect of perceived value, analyzing coefficient estimates, t-values, and significance levels.

Table 9. Moderating effects of perceived value on dynamic capability measurement and value co-creation

	Unnormalized coefficient			t	Significance	B has a 95.0% confidence interval	
	B	Standard error	Beta			Floor	Upper limit
Gender		-15.212	0.000	-3.311	-2.553		-15.212
Education background	0.009	0.697	0.486	-0.025	0.052	0.009	0.697
Work Experience	-0.011	-0.898	0.370	-0.036	0.013	-0.011	-0.898
Dynamic Capabilities Measurement	-0.024	-1.975	0.049	-0.034	0.000	-0.024	-1.975
Perceived value scale	0.737	13.711	0.000	0.556	0.742	0.737	13.711
Dynamic Capabilities Measurement*Perceived value scale	0.902	21.337	0.000	0.921	1.108	0.902	21.337

a. Dependent variable: Value co-creation

Key findings revealed several significant relationships in the model. The dynamic capability measurement demonstrated a substantial positive impact on value co-creation, with a standardized coefficient of 0.737 and a t-value of 13.711, indicating statistical significance. The perceived value showed an even stronger influence, with a standardized coefficient of 0.902 and a t-value of 21.337, suggesting that higher perceived value significantly increases stakeholders' enthusiasm for participating in value co-creation activities. Additionally, the interaction term between dynamic capability measurement and perceived value yielded a standardized coefficient of 0.229 with a t-value of 5.151, confirming that perceived value plays a significant moderating role in the relationship between dynamic capabilities and value co-creation outcomes (see Table 9 and Figure 4).
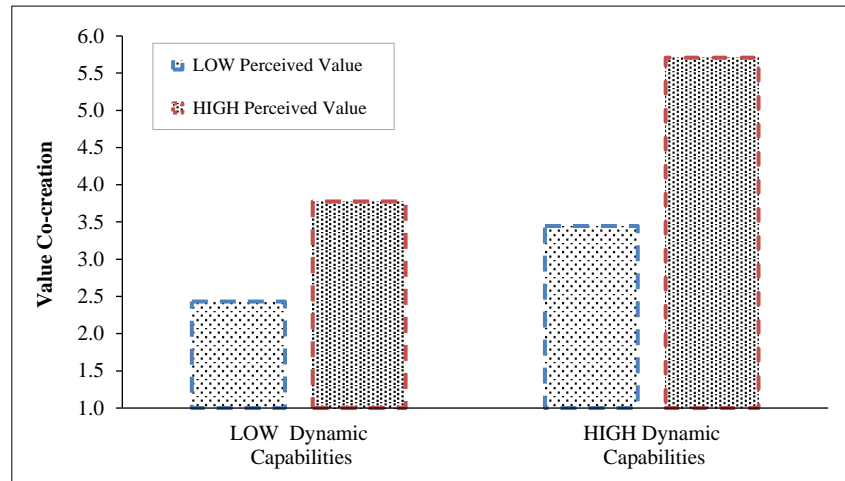

Figure 4. Moderating effects of perceived value

The findings validate the critical moderating effect of perceived value on the relationship between dynamic capability measurement and value co-creation. Elderly care real estate enterprises should focus on enhancing dynamic capabilities and optimizing perceived value to promote value co-creation.

4.3. Hypothesis Testing Summary

Based on theoretical foundations, the study examined relationships among dynamic capabilities, value co-creation, competitiveness, and perceived value in the elderly care real estate industry (see Table 10).

Table 10. Hypothesis Testing Results

Research Hypothesis	Hypothetical scenarios	Test Results
H1	Dynamic capabilities positively influence the competitiveness of cross-border alliances in elderly care real estate.	Support
H2	Dynamic capabilities have a positive impact on value co-creation.	Support
H2.1	Dynamic capabilities have a positive impact on alliance value co-creation.	Support
H2.2	Dynamic capabilities have a positive impact on user value co-creation.	Support
H3	Value co-creation positively influences the competitiveness of cross-border alliances in elderly care real estate.	Support
H3.1	Value co-creation within cross-border alliances positively influences the competitiveness of elderly care real estate.	Support
H3.2	User value co-creation positively influences the competitiveness of cross-border alliances in elderly care real estate.	Support
H4	Value co-creation plays a positive mediating role in the dynamic capability-competitiveness relationship.	Support
H4.1	Alliance value co-creation has a positive mediating effect in the relationship between dynamic capabilities and competitiveness.	Support
H4.2	User value co-creation has a positive mediating effect in the relationship between dynamic capabilities and competitiveness.	Support
H5	Perceived value has a positive moderating effect on dynamic capability and value co-creation.	Support

5. Conclusions and Recommendations

This study explores the sustainable development of cross-border alliances in the elderly care real estate sector. By constructing a theoretical model based on dynamic capabilities and value co-creation theories through a survey of senior executives, the research systematically examined the complex interactions driving alliance competitiveness [11].

Breaking away from traditional single-factor analysis, the study reveals a multi-factor transmission logic of "capability construction - activation of co-creation - value increment", providing a comprehensive research paradigm for enhancing industry competitiveness.

5.1. The Three-Dimensional Driving Effect of Dynamic Capabilities

- The Core Leading Role of Ability to Innovate

The ability to innovate emerged as a critical driver of competitiveness [31]. In service-oriented contexts, such as elderly care real estate, innovation is often realized through iterative service models—exemplified by initiatives like the "time bank" mutual assistance system—rather than through disruptive technological advancements. This observation highlights the industry-specific adaptability inherent in dynamic capabilities.

- The Synergistic Reinforcing Effect of Relationship Ability

Relationship ability indirectly enhances competitiveness by improving trust among alliance members and emotional connections with users. This supports the view that relationship capital serves as the "adhesive" of cross-border alliances [66].

- The Foundational Supporting Role of Integration Ability

While the direct effect on competitiveness may not be immediately apparent, integration ability functions as the "infrastructure" for dynamic capabilities. Through pathways that facilitate alliances and value co-creation among users, integration ability plays a vital supporting role that underpins the effectiveness of innovative and relational strategies [36].

5.2. The Dual-Path Mediating Mechanism of Value Co-Creation

- The Internal Synergy Path of Alliance Value Co-Creation

Alliance value co-creation demonstrates potential to reduce transaction costs and enhance response speed [59]. In the highly regulated elderly care sector, transparency is a particularly influential factor compared to dialogue and channel dimensions.

- The Demand-Driven Path of User Value Co-Creation

User value co-creation highlights the "user-centered" attribute of elderly care services [67]. When user participation reaches a significant level, it can substantially amplify the effect of dynamic capabilities on competitiveness, creating a positive cycle of high participation and conversion.

- The Comparative Analysis of Mediating Effects

The mediating effects reveal a nuanced interplay between internal collaboration and user demands. This approach differs from traditional manufacturing industry models, underscoring the unique characteristics of service-oriented alliances [11].

5.3. The Three-Dimensional Moderating Effect of Perceived Value

- The Core Enhancing Role of Functional Value

Functional factors consistently serve as primary considerations in elderly care consumption [54]. Practical aspects like adaptive facilities and medical service accessibility significantly influence user decision-making.

- The Situational Supplementary Role of Social Value

In alliances with a higher proportion of elderly populations, the significance of social value becomes increasingly evident. This reflects the significance of intergenerational interaction needs [68].

- The Long-Term Growth Effect of Emotional Value

Emotional connections demonstrate potential to continuously enhance the co-creation efficacy of dynamic capabilities, supporting the notion that emotional capital drives service sustainability [47].

5.4. Research Contribution

The comprehensive analysis of dynamic capabilities, value co-creation, and competitiveness in cross-border alliances within the elderly care real estate sector reveals complex, multidimensional interactions that transcend traditional research boundaries. These nuanced findings not only address existing research gaps but also pave the way for significant theoretical and practical contributions to the field.

- *Theoretical Contribution*

In the field of elderly care real estate research, this study addresses a significant gap by developing a novel conceptual model based on value co-creation theory [19-21]. Unlike prior studies that predominantly focused on the integration of single enterprises, this research delves into the complex interrelationships among key variables, presenting a fresh perspective on the competitiveness of cross-border alliances within China's elderly care real estate sector.

Moreover, the study enriches the theoretical framework by unveiling the intricate interactions that exist, thereby challenging conventional analytical approaches. Nonetheless, given the interdisciplinary complexities and limitations encountered in the research, only a selection of factors were analyzed. Future investigations should seek to refine the theoretical framework by incorporating additional elements and exploring broader perspectives.

- *Practical Contribution*

The practical implications of this research are significant, as it provides empirical evidence that enhances the understanding of sustainable development within cross-border alliances in China's elderly care real estate industry [20, 21]. By confirming the practicality of the influencing factors framework, the study contributes to the knowledge system of related literature, offers insights for enhancing global elderly care real estate alliance competitiveness, and assists enterprises and governments in making scientific decisions.

The findings effectively bridge theoretical understanding with practical implementation, serving as a valuable resource for stakeholders in the elderly care real estate ecosystem.

5.5. Recommendations

5.5.1. Recommendations for the Elderly Care Real Estate Industry

The empirical findings reveal four critical insights that necessitate coordinated actions from both the Chinese government as "Market Enabler" and Cross-Border Alliances as "Active Implementers." These insights form the foundation for the following integrated recommendations:

(1) The study findings reveal that Dynamic Capabilities are vital for enhancing competitiveness, with Ability to Innovate having the highest direct impact on Competitiveness. Meanwhile, the Ability to Relate and the Ability to Integrate contribute indirectly through Value Co-creation mechanisms. The lack of these capabilities is the main cause of the "high investment, but low returns" problem found in the industry.

Recommendations for the Chinese Government: The government should establish digital information platforms to improve Integration Ability. This can be achieved by implementing intelligent systems for real-time tracking of elderly needs, publishing quarterly White Papers on the elderly industry, and developing data connectivity systems that link hospitals, real estate, and services.

Recommendations for Cross-Border Alliances: Cross-Border Alliances should systematically cultivate Dynamic Capabilities systematically by creating Market Monitoring Systems to enhance Innovation Ability, such as tracking trends in elderly care technology, establishing joint innovation funds, and developing new service models like "Time Bank" mutual elderly care assistance.

To foster Relationship Ability, initiatives may encompass regular partners' meetings, personnel and knowledge exchange programs, and transparent joint decision-making processes. For Integration Ability, potential actions could include joint procurement to minimize costs, shared use of specialized personnel, and the establishment of common operational standards.

(2) Research findings indicate that Value Co-creation plays a critical mediating role in linking Dynamic Capabilities and Competitiveness. Alliance Value Co-creation can reduce operational costs through joint procurement, while User Value Co-creation enhances responsiveness to needs.

Recommendations for the Chinese Government: The government should design incentive policy packages to bolster Alliance Value Co-creation through possible measures such as tax reduction benefits for qualified Cross-border Alliances, deferred payment of land transfer fees for elderly projects, and special subsidies for creating multi-sector Alliances. Additionally, mechanisms should be created to ensure cooperation within the industry supply chain, such as the formulation of Cross-border Alliance elderly service standards, quality certification and evaluation systems, and management subsidies for leading companies.

Recommendations for Cross-Border Alliances: Cross-Border Alliances should leverage technology to amplify the outcomes of Value Co-creation. Approaches might include applications connecting elderly-families-service providers, AI systems for analyzing and predicting individual needs, and Blockchain platforms for secure care data sharing.

For User Value Co-creation, measures could encompass point accumulation programs for service improvement participation, ongoing satisfaction surveys, and the establishment of online communities.

(3) The study demonstrates that Perceived Value serves as a critical amplifier, with Function Value having the highest amplifying effect on Dynamic Capabilities enhancement when User Participation exceeds a certain level. Additionally, Social Value becomes increasingly important in areas where elderly aged 80+ have high proportions.

Recommendations for the Chinese Government: The government should create dynamic policy adjustment mechanisms, potentially including systems to monitor policy effectiveness and facilitate continuous improvement, implementing differentiated regional support, and rewarding Alliances that expand into underdeveloped areas.

Recommendations for Cross-Border Alliances: Cross-Border Alliances should manage Perceived Value comprehensively. For Function Value, measures to consider include service quality assurance, satisfaction guarantee or refund systems, and continuous care outcome monitoring.

For Social Value, initiatives could incorporate family participation in elderly care, establishing elderly community networks, and promoting intergenerational activities as well as volunteer programs.

For Emotion Value, possible approaches include developing "Silver-haired Community" identity, personalized services based on memories and life experiences, and legacy creation and intergenerational storytelling activities.

(4) Findings from the research show that the importance of Multi-factor Transmission Logic reveals how the "Dynamic Capabilities → Value Co-creation → Competitiveness" model demonstrates that viewing single factors is insufficient. It necessitates multi-level operational mechanisms wherein both direct and indirect effects function cohesively.

Recommendations for the Chinese Government: The government should adopt a holistic perspective towards industry development by creating interconnected policies at all levels. Possible approaches include digital infrastructure development, cooperation incentives, standard setting, and dynamic adjustment mechanisms.

Recommendations for Cross-Border Alliances: Cross-Border Alliances should recognize that developing competitive capabilities requires integrative execution, where Dynamic Capabilities development must connect with Value Co-creation and Perceived Value management simultaneously. Organizations are encouraged to develop work systems that interlink all components and adopt a holistic approach to performance measurement.

5.2.2. Limitations and Further Research

The research acknowledges inherent limitations in exploring cross-sectoral alliance competitiveness within the elderly care real estate sector. Given the complex and multidisciplinary nature of the study, only a subset of relevant factors could be analyzed, which may result in the omission of critical elements such as cultural backgrounds and the evolution of policies.

The temporal applicability of the research presents another challenge, as social environments, elderly care concepts, and technological developments continuously evolve. Future research should focus on optimizing the theoretical framework, integrating more comprehensive factors, and conducting longitudinal studies to improve the depth and relevance of findings.

6. Declarations

6.1. Author Contributions

Conceptualization, X-H.Z. and P.N.; methodology, X-H.Z.; software, P.N.; validation, X-H.Z. and P.N.; and W-W.Z. and R-F.Z.; formal analysis, X-H.Z.; investigation, X-H.Z.; resources, X-H.Z.; data curation, P.N.; writing—original draft preparation, X-H.Z.; writing—review and editing, H.B.; visualization, X-H.Z.; supervision, P.N.; project administration, W-W.Z. and R-F.Z. All authors have read and agreed to the published version of the manuscript.

6.2. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

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6.4. Institutional Review Board Statement

Not applicable.

6.5. Informed Consent Statement

Not applicable.

6.6. Declaration of Competing Interest

The authors declare that there are no conflicts of interest concerning the publication of this manuscript. Furthermore, all ethical considerations, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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