Knowledge Purchase, Absorption Capability and Creative Output Performance: Based on the Empirical Analysis of China's A-share listed Cultural and Creative Enterprises

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Abstract

Based on the perspective of knowledge acquisition, this paper discusses the impact of Chinese cultural and creative enterprises' knowledge purchase and absorption capability on their creative output performance. It reveals how the breadth and depth of the knowledge base adjust the influence of knowledge purchasing strategy on the creative output performance of enterprises from the perspective of knowledge stock. Using 240 cultural and creative listed enterprises as research objects, the least squares (OLS) of the time effect and industry effect were used to conduct an empirical test and analysis of the relationship between knowledge purchase and creative output performance, as well as the intermediary role of knowledge absorption capability and the regulating role of knowledge base. The research results showed that knowledge purchase has a significant impact on the creative output performance of cultural and creative enterprises, and knowledge absorption capability plays a partial intermediary role between knowledge purchase and creative output performance. The breadth and depth of the knowledge base positively regulate the influence of the absorption capability on the creative output performance. The research has provided a practical foundation for cultural and creative enterprises to improve their creative ability and advance relevant policy recommendations and management enlightenment.

Keywords: *Cultural and Creative Enterprises; Knowledge Purchase; Absorption Capability; Knowledge Base; Creative Output Performance.*

1 Introduction

According to the UNESCO report "Reshaping Creative Policy," released in February 2022, the creative economy is one of the world's newest and fastest-growing sectors, accounting for 6.2 percent of jobs and 3.1 percent of global GDP in February 2022. Cultural and creative industries have experienced rapid global development against the backdrop of the knowledge economy and have become a strategic choice for many countries. With the promotion of China's cultural and creative industry to the position of pillar industry, the added value of the cultural and creative industry has risen all the way, and the problem of lack of originality has gradually become apparent(Zhu et al.,2020;Chen et al.,2018).According to UNESCO statistics from 2016 and 2017, the global output value of the cultural and creative industries is $2.2 trillion, with the United States accounting for 43%, Europe for 34%, Japan for 10%, South Korea for 5%, and China and other Asian countries accounting for only 3%. "Lack of creativity" has become a bottleneck in the long-term development of China's cultural and creative industries, as well as the global industrial chain's high-end occupation. As a result[1], in the current stage of economic transition from

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rapid growth to high-quality development, improving the creative and innovative ability to improve the cultural and creative industry has become an important and realistic urgent demand, which is the most important issue to be solved in the industry's healthy and sustainable development. Based on this, how can cultural and creative enterprises improve their creative ability, that is, what factors can drive the development of creative and innovative ability? This paper discovers a breakthrough in knowledge purchase that influences the creative output performance of cultural and creative enterprises.

According to the enterprise knowledge view, knowledge is the main source of enterprise competitive advantage (Grant,1996). With the acceleration of technological updates and iterations, as well as the improvement of product comprehensiveness and complexity, enterprises are finding it difficult to possess all of the knowledge required for technological innovation. They can only create value more calmly by breaking through the limitations of their own resources, establishing an extensive knowledge acquisition network, and effectively utilizing external resources (Chen et al.,2006). More and more academics argue that enterprises should acquire and use knowledge resources more broadly to compensate for a lack of internal technology and market resources. Outside knowledge cannot directly produce creativity in cultural and creative enterprises, and the key to using this new knowledge for high-quality innovation lies in its own absorption capability(Escribano et al.,2009), acquire and digest external knowledge, update and enrich its knowledge base, and consolidate their knowledge base(Zobel et al.,2017), transform and use external new knowledge and technologies to form proprietary technologies, thus promoting the improvement of enterprise innovation quality(Sarkees et al.,2014). An enterprise's existing knowledge stock limits its scope and ability to understand new knowledge and apply it to major innovations (Lyu et al.,2020). As a result, the discussion of knowledge bases as an exploration to improve the ability and level of enterprises in terms of innovation has become an important issue in the field of innovation management.

Existing research has not conducted a substantive and systematic discussion on the performance of creative output and the influencing factors of cultural and creative enterprises, and relevant literature is extremely limited. As a knowledge-intensive enterprise, cultural and creative enterprise creative activities are closely related to knowledge management; however, empirical research on the knowledge management process node empirical influence the cultural creative enterprise creative activity is limited. To form new theoretical cognition and experience summaries, it is necessary to thoroughly investigate and validate the characteristics of creative activities of cultural and creative enterprises.

2. Literature Review and Research Hypothesis

Early creative research believed that the number of ideas was the standard to measure the performance of ideas. It was usually believed that the more ideas in the creative pool, the more high-quality ideas included, and the higher the creative performance (Kang et al.,2015). The process of aggregation of manpower and time is the output of creativity. From the germination and perfection of creativity to the final realization of creativity, a large number of intellectual resources are required (Dew et al.,2009). From the perspective of creative cognition, some scholars have defined creative ability as novel and practical creative products produced by applying basic cognitive processes to knowledge resources, emphasizing the role of knowledge management in the creative process (Ward,2007). External knowledge acquisition is an important way for enterprises to realize knowledge inflow, while R&D cooperation and purchase are typical ways of external knowledge acquisition and an effective channel to obtain external knowledge(Beatriz et al.,2016;Lin and Wu,2010); when the existing capacity of an enterprise is not enough to achieve the

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desired results, the purchase of technical knowledge is a quick solution to improve the internal technical ability. In an industry where new technology is frequently present, the purchase of technical knowledge is an important way to obtain external technical knowledge and deal with environmental changes (Kang K and Kang,2014). Although there is a lack of literature on the impact of knowledge acquisition on the creative performance of cultural and creative enterprises, the correlation between knowledge purchase and enterprise innovation performance has always been the focus of academia at home and abroad.

2.1 knowledge purchase and output creative performance

Hawkins (2002) believes that the creative industry is such an economic sector, and its products are within the protection scope of intellectual property law and are divided into four categories according to the protection form of intellectual property law, including patent, copyright, trademark, and design. Knowledge purchase refers to the acquisition of relevant technical knowledge through the conversion of intellectual property rights such as technology licenses, patents, and copyright. When an enterprise's existing capacity is insufficient to achieve the desired results, technical knowledge purchase, as an effective channel for traditional external knowledge acquisition, provides a quick solution to improve internal technical ability. Technical knowledge purchase is an important method for obtaining external technical knowledge and dealing with environmental changes in industries where new technologies are frequently present (Li et al.,2020). Wang et al. (2012) based on data from 186 enterprises' technology licensing from 2000 to 2003, the introduction of technology licensing encourages enterprises to improve their independent innovation ability. Wang et al. (2013) based on empirical research on 71 Chinese electronic manufacturing enterprises, technology license introduction is correlated with enterprise innovation performance, enterprise (licensee) access and knowledge of other organizations through the technology licensing agreement, transferee enterprise integration licensor part of knowledge to their knowledge base, and the expansion of their own knowledge base and can bring new scale and scope of knowledge. Wang et al. (2014) based on the research of 141 licensed manufacturing enterprises in China, they found that the introduction of technology licenses will promote the diversification of new products by the licensed enterprises. The transferee enterprises can innovate and use the combined knowledge base to produce various new products for commercialization. This demonstrates that the majority of existing studies believe that the implementation of technology licensing is beneficial to the improvement of enterprise performance. Based on this, the following hypothesis about the relationship between knowledge purchase and the creative performance of cultural and creative enterprises are advanced in this paper:

H1: Knowledge Purchase positively affects the creative output performance.

2.2 The mediating role of knowledge absorption capability

Enterprises' acquisition of external knowledge broadens their knowledge base and increases their potential for innovation. The ability to absorb new knowledge is critical in determining whether companies can use it to produce high-quality innovation output (Enkel and Gassmann,2010; Zhang et al.,2018). Knowledge absorptive capacity provides firms with the ability to identify external market opportunities and technological knowledge and to digest them, enabling better renewal of the firm's knowledge base and dynamic adaptation to the environment, leading to high-quality innovation (Wei and Atuahene-Gima,2009). After acquiring external knowledge, the creative organization can screen and digest the acquired external knowledge, extracting the technical information and creative sources required by the organization, in order to provide new materials and basic raw materials for the organization's technological innovation; while the knowledge digestion and transformation ability can digest useful knowledge and information, combining the digested knowledge and information with the existing knowledge and information. Some researchers, for example, investigated the role of absorption capability as an intermediary in the relationship between external technology introduction and enterprise performance

and product innovation. Explore how absorption capacity plays a mediating role in the relationship between key information and technology factors and innovation performance (Chen et al.,2009). Some scholars believe that the internal absorption capability of an enterprise has an intermediary effect on the effect of external technology introduction on enterprise performance (Zhen and Tang,2010). Some scholars also believe that absorption capacity has an intermediary role in the relationship between cooperative research and development and technology introduction and technology and product innovation performance (Zhang et al.,2021); The Fosfuri & Tribo (2008) study found that, potential absorption capacity serves as a partial intermediary in the relationship between internal and external knowledge integration and new product development performance. Zhu et al. (2016) used the relevant data of high-tech listed companies and found that the knowledge absorption ability of the acquisition company has a significant positive impact on the innovation performance of the technology acquisition. The following hypothesis have been established based on this article:

H2: Knowledge absorption capability plays a mediating role between knowledge purchase and creative output performance.

2.3 The regulating role of the knowledge base
The situation of the knowledge base elements involved in the enterprise engaged in economic activities is referred to as the knowledge base (Yang et al.,2017). According to the horizontal coverage and breadth and depth of knowledge to reflect the knowledge base, the views of KATILA and AHUJA (2002) are widely quoted in the academic community. The enterprise requires a specific knowledge base for the acquisition, digestion, transformation, and application of new external knowledge. Without prior knowledge, the enterprise cannot assess the worth of new information or absorb it. Enterprises with a wealth of knowledge resources and experience can respond quickly to the external market environment and technological frontier, accurately position their own situation and future development needs, and then vastly expand the methods and scope of knowledge acquisition, as well as identify and absorb valuable heterogeneous knowledge resources (Zhang et al.2021).

2.3.1 Regulating role of knowledge base breadth
Enterprises with a broad knowledge base can better acquire and understand new knowledge through extensive prior knowledge to form a stronger absorption capability, allowing them to better identify and integrate external knowledge, which is conducive to the realization of achievement transformation (Wu and Shanley,2009). Enterprises with a diverse knowledge base will have more diverse market information, a stronger ability to recognize the potential value of technology, and the ability to identify which new technology in the market will have greater development potential (Zhou and Li,2012). To gain a competitive advantage, businesses can process information more efficiently, identify new market opportunities faster, and timely adjust research and development resources to new and promising product research and development. Simultaneously, the larger the knowledge base, the more difficult it is for enterprises to integrate knowledge and the lower the efficiency. Common knowledge among members is required for members to share and integrate knowledge (Xu,2014). With the expansion of knowledge width, the more difficult it is to establish common knowledge among members, and the less common knowledge it can identify through external knowledge acquisition, the more difficult it is to transfer and learn external knowledge. The wider the knowledge base, the greater the obstacle and the higher the cost for enterprises to achieve innovation success through external knowledge acquisition. Take the purchase of a technology license as an example. Too-wide knowledge may lead to too dispersed enterprise resources; enterprises cannot understand and use the introduced technology license knowledge in a limited time; and competitors may also acquire the same technology, which will lead the enterprise to lose the opportunity to use the licensed

technology for innovation. Companies may also increase their marginal costs as a result of increased management of various complex knowledge and the relationships required to obtain these resources (Leiponen and Helfat,2010), as well as the cost of obtaining technology licenses and introducing knowledge for innovation. The following hypothesis are made as a result of this:

H3: In the influence process of "knowledge purchase-knowledge absorption capability-creative output performance", the breadth of knowledge base plays a significant role in regulating the knowledge absorption capability.

2.3.2 Regulating role of knowledge base depth

Knowledge depth reflects the vertical dimension of knowledge, that is, the familiarity of enterprises with existing knowledge (Cai et al.2013)[. The depth of knowledge represents the repeated utilization of understood knowledge by enterprises. With the repeated use of knowledge, enterprises form rules of knowledge communication and transfer and serialize knowledge utilization programs (Macher and Boerner,2012). The complexity of new technology research and development is increasing in today's era, and enterprises require a deeper knowledge base to make breakthroughs in key technologies. Knowledge acquisition provides enterprises with a large amount of new external heterogeneity knowledge. Enterprises identify and absorb new external heterogeneity knowledge through their own potential absorption capability, and they promote the creation of new ideas and new knowledge. Only after an enterprise's transformation can new knowledge and new technology have a direct impact on its innovation process (Zobel et al.,2017). As a result, as a basic guarantee, enterprises' ability to transform and utilize external knowledge requires a large number of heterogeneous new knowledge.

The deeper the depth of enterprise knowledge, the more mature the common knowledge of the enterprise, the easier it is for the enterprise to code externally received knowledge with existing languages and symbols shared by organizational members (Xu,2014), and the more efficient it is in absorbing and integrating the licensed technology. In addition, increasing knowledge depth enables enterprises to use externally more effectively acquired knowledge to develop new technologies and new products. Knowledge depth shows that enterprises have more knowledge in specific areas, increase the depth of knowledge to better realize the value of new information and technology, and when processing licensed technology, enterprises are more likely to detect and use related technical opportunities, improve the absorption capability (Zhang and Wang,2012), apply licensed knowledge to the process of technology innovation, and improve enterprise performance. Knowledge depth the deeper the enterprise, usually the stronger the new knowledge creation ability, the higher the degree of machine-rational knowledge, not only "know-what" but also "why-know," which is conducive to the technical environment and conditions changing using the existing knowledge base transformation technology orbit, technology, and product breakthrough (Smith,2005). The following hypothesis are made as a result of this:

H4: In the influence process of "knowledge purchase-knowledge absorption capability-creative output performance", the depth of knowledge base plays a significant role in regulating the knowledge absorption capability.

Based on the above research hypotheses, the conceptual model of this paper is derived (Figure 1).
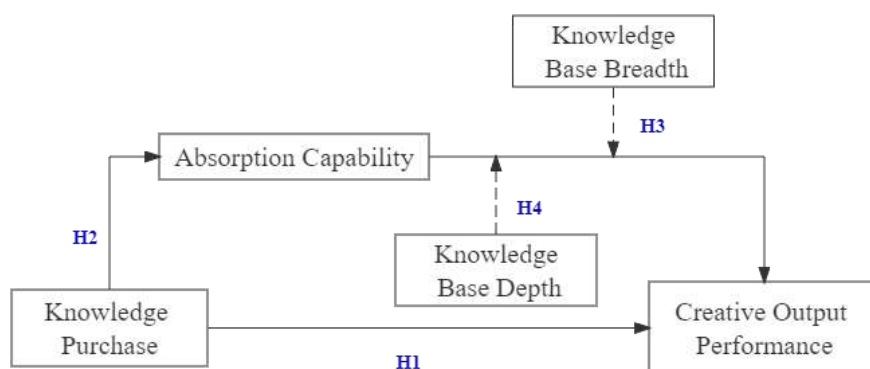
Figure 1. Role relationship and research hypotheses

3. Research methods

3.1 Research samples and data source

The academic community has yet to reach an agreement on the concept of cultural and creative enterprises, and there are numerous statistical categories, such as cultural industry, copyright industry, and content industry. As a result, in order to select research samples, this paper must define the scope of cultural and creative enterprises. Draw lessons from previous scholars research(Chu and GAO,2019;Liu,2022), comprehensive reference " the national economy industry classification (GB/T4754-2002), the Beijing cultural creative industry classification standard, the National Bureau of Statistics, culture and related industry classification (2018) classification basis, the text and the industry coverage industry define the industry mainly includes: culture and art, press and publication, radio, television, film, software, software, network, information technology, advertising, exhibition services, art trading, design services, tourism and entertainment services, and other auxiliary services. The investigation sample includes 240 cultural and creative listed enterprises whose main business scope meets the above classification standards from 2015 to 2021. In the screening process of the samples: ① exclude the companies with incomplete financial data listed after 2015; ② exclude ST and *ST companies; ③ eliminate the samples with missing values and abnormal values; ④ eliminate the samples of cultural and creative enterprises whose main business obviously deviates from the cultural and creative industries. According to the above principles, this study finally obtained A total of 1,680 valid enterprise observation samples of 240 A-share listed cultural and creative enterprises each year in 7 years from 2015 to 2021.

The data involved in this study mainly includes annual report data, financial data, patent data, etc. In the study sample data, the enterprise data is mainly obtained from the WIND database and the CSMAR database. The patent data of the enterprise is manually collected and collated by the Baiteng patent retrieval system; the intellectual property data of the enterprise is obtained from the website of the State Intellectual Property Office and the WIND database; and the intangible asset purchase information of the enterprise is obtained from the 2015–2021 annual report of the company, manually downloaded from the official websites such as Juchao Information and the official website of the enterprise.

3.2 Research variables

Creative performance: Since there is no unified measurement index for the creative output performance, referring to the research of Wei et al. (2015) and Liu et al. (2017), this paper selects the number of intellectual properties and the value of intellectual property to describe the creative output performance in the creative performance of cultural and

creative enterprises. That is, "the log value of the total number of patents, copyrights, and software copyrights granted during the annual reporting period." The existing literature usually takes the activity of patent applications, the number of patents granted, the proportion of invention patents, and the patent maintenance rate as the number and value of intellectual property creation.

Knowledge purchase: knowledge purchase is the behavior of enterprises and institutions in a country or region to obtain advanced patents, technologies, designs, and other knowledge from enterprises, institutions, or other countries or regions in certain ways. Considering the enterprise's need for external knowledge, it often exists in the form of intellectual property rights, this paper reference Xu (2015), Zhang (2020) method, choose the enterprise in the financial report "intangible assets" subjects disclosed in the notes to the purchase of software, technology, patents, and works as a measure of enterprise knowledge purchase.

Knowledge absorption capability: there is no standard, unified measure of the absorption capability. Existing studies measure absorption capacity by designing questionnaires and using proxy variables. The agency variables mainly include the natural logarithm of R & D investment, human capital, per capita R & D expenditure, the ratio of R & D expenditure to the main business income, the annual growth rate of the main business income, the ratio of the logarithm of R & D investment to fixed assets, etc. (Nijkamp,2012; Wei and Huang,2015; Viktor et al.,2019; Xu,2019). This study uses the indicators adopted by Liu et al. (2022) to measure the potential absorption capacity. Namely, knowledge acquisition ability: Technician/Employee.

Knowledge base: Knowledge base is a very broad concept, including explicit and implicit dimensions, and it is almost impossible to make a comprehensive measurement of the enterprise knowledge base itself. Knowledge base breadth: it is the scope of the technical field covered by the enterprise. This paper adopts the measurement method of knowledge width by Liu and Cai (2011), and according to the IPC international patent classification standard, the number of patent classifications successfully applied by the enterprise every year is measured. Depth of knowledge base refers to the familiarity of the enterprise with the knowledge in the technical field, reflecting the complexity and advanced level of the vertical dimension. In this paper, the measurement method of knowledge depth is adopted by Jaideep et al. (2005) and Wu et al. (2009), using the average number of authorized patents in each patent classification of each enterprise per year. First, the patent data of sample enterprises from 2015 to 2021 is collected through manual sorting, then the knowledge width is calculated, and then the knowledge depth is calculated according to the knowledge width.

Control variable: In addition to the independent variable, there are also other factors affecting the creation of intellectual property rights for enterprises. In order to improve the fitting degree of the model in this paper, the following factors are selected as control variables: Enterprise age, asset-liability ratio, operation ability, equity concentration, board size, integration of two duties, growth ability, cash constraints. The specific variables are measured in the table 1 below.

3.3 Empirical model

Table 1 Description of variable selection

Ty pes	Name s	Cod es	Measure

Explained variable	Creative output performance	COP	The logarithm of the total number of intellectual property rights granted;
Explanatory variables	Knowledge purchase	KP	The total of the intellectual property items purchased by the enterprise disclosed in the notes to the subject of "intangible assets"
Mediating Variables	Knowledge absorption capability	Pase	The proportion of technicians
Moderating variable	Knowledge base breadth	KB	Number of classified patents filed per year
	Knowledge base depth	KD	The average number of patents granted in each patent classification
Control Variables	Enterprise age	Age	The difference between the fiscal year and the year of establishment is the natural logarithm
	Asset-liability ratio	Lev	Total liabilities / total assets
	Service power	Roa	turnover of total capital
	Equity concentration	EC	The company's largest shareholder shareholding ratio.
	Board size	Dno	Number of board directors
	Two jobs in one	Dual	Whether the chairman and the general manager are the same person; 0: No;1: Yes.
	Growth ability	Growth	Asset growth rate
	Cash constraints	Cash	Company cash flow / total assets

The research sample for this paper is 240 culturally innovative enterprises listed in Chinese A-shares, and the sample data has typical short-panel data characteristics. Meanwhile, considering the industry characteristics and time effects of the sample, the ordinary least squares (OLS) model with bidirectional fixed effects of time and industry is constructed to conduct parameter estimation. Among them, model (1) examines the influence of knowledge purchase on the performance of creative output, model (2) examines the

influence of knowledge purchase on the knowledge absorption capability of intermediary variables, and model (3) examines the common influence of knowledge purchase and knowledge absorption capability on the performance of creative output. The empirical model is constructed as follows:

$$COP_{i,t} = \alpha_{i,t} + \beta_1 KP_{i,t} + \beta_2 Age_{i,t} + \beta_3 Lev_{i,t} + \beta_4 Roa_{i,t}$$
$$+ \beta_5 Cash_{i,t} + \beta_6 Growth_{i,t} + \beta_7 Dno_{i,t} + \beta_8 Dual_{i,t}$$
$$+ \beta_9 EC_{i,t} + \sum \beta_{10} year_t + \sum \beta_{11} Ind_i + \varepsilon_{i,t}$$

1)

$$Pase_{i,t} = \alpha_{i,t} + \beta_1 KP_{i,t} + \beta_2 Age_{i,t} + \beta_3 Lev_{i,t} + \beta_4 Roa_{i,t}$$
$$+ \beta_5 Cash_{i,t} + \beta_6 Growth_{i,t} + \beta_7 Dno_{i,t} + \beta_8 Dual_{i,t}$$
$$+ \beta_9 EC_{i,t} + \sum \beta_{10} year_t + \sum \beta_{11} Ind_i + \varepsilon_{i,t}$$

2)

$$COP_{i,t} = \alpha_{i,t} + \beta_1 KP_{i,t} + \beta_2 Pase_{i,t} + \beta_3 Age_{i,t} + \beta_4 Lev_{i,t}$$
$$+ \beta_5 Roa_{i,t} + \beta_6 Cash_{i,t} + \beta_7 Growth_{i,t} + \beta_8 Dno_{i,t} + \beta_9 Dual_{i,t}$$
$$+ \beta_{10} EC_{i,t} + \sum \beta_{11} year_t + \sum \beta_{12} Ind_i + \varepsilon_{i,t}$$

3)

In the model, i represents the individual dummy variable, t represents the year dummy variable, α represents the fixed effect variable that does not change over time, β is the regression coefficient of the variable, and ε is the random error term.

4. Empirical Analysis

4.1 Descriptive statistics and correlation analysis

Table 2 reports the descriptive statistics of the whole sample. It can be seen that the observed values of all variables are 1680, and the overall structure is reflected in the balanced panel data. Among them, the average performance of creative output was 3.56 and the variance was 1.39, indicating that there is a certain gap in the performance of sample enterprises in creative output, with a maximum value of 6.83, while some enterprises do not have creative outputs. In terms of independent variables, in terms of the strength of knowledge purchase, the average value of the sample enterprises is 11.75 and the variance is 5.83, indicating that there are great differences between enterprises in the external purchase of intellectual property. Some enterprises may pay more attention to internal research and development without purchasing external knowledge. The mean and variance of absorption capacity are 7.9 and 8.29, respectively, reflecting the large difference between enterprises and indicating that there is a large gap in the knowledge base and knowledge base degree of different enterprises, which also confirms the above situation that some enterprises tend to pursue independent research and development. The breadth and depth of the knowledge base, the data in the mean and variance are very similar, the difference between enterprises is small, and there is no obvious gap.

Table 2 Full sample descriptive statistics

Variable	N	Mean	SD	P25	P50	P75	Min	Max
COP	1680	3.560	1.390	2.770	3.660	4.480	0	6.830
KP	1680	11.75	5.830	11.36	13.82	15.54	0	18.77

PASE	1680	7.900	8.290	1.450	5.110	11.72	0	38.90
KB	1680	1.070	0.670	0.690	1.100	1.610	0	2.200
KD	1680	1.070	0.910	0.690	0.920	1.500	0	4.020
AGE	1680	2.900	0.300	2.710	2.940	3.140	2.080	3.560
LEV	1680	0.350	0.180	0.220	0.330	0.470	0.0500	0.810
ROA	1680	0.530	0.370	0.290	0.440	0.640	0.0900	2.360
CASH	1680	-0.0900	0.280	-0.220	-0.0600	0.0600	-1.020	0.780
GROWTH	1680	0.150	0.390	0.0300	-0.0900	0.240	-0.590	2.240
EC	1680	27.98	14.36	16.91	24.34	36	7.010	67.52
DUAL	1680	0.330	0.470	0	0	1	0	1
DNO	1680	2.210	0.180	2.080	2.300	2.300	1.790	2.710

Table 3 reports the Pearson correlation coefficients between the main variables, indicating that there is a positive correlation between KP and COP that is significant. It can be seen from the table that the correlation coefficient between the variables is lower than 0.5, indicating that there is no serious multicollinearity problem. In order to further solve the multicollinearity problem in the model, this section uses the variance inflation factor (VIF) to verify all the regression models below, and the VIF values are less than the critical value of 10, which again indicates that there is no serious multicollinearity problem in the model.

Table 3 The correlation coefficient of variables

	COP	KP	PASE	KB	KD
COP	1				
KP	0.153***	1			
PASE	0.251***	0.063***	1		
KB	0.458***	0.155***	0.130***	1	
KD	0.408***	0.182***	0.269***	0.449***	1

t statistics in parentheses *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$

4.2 Regression analysis of main effects and mediation effects

Table 4 reports the regression results of the correlation between knowledge purchasing, absorption capacity and creative output performance. As can be seen from the regression results of Model 1), the regression coefficient of KP is 0.03, and passed the significance test at the 1% level, indicating that knowledge purchasing positively promotes the creative output performance of enterprises, and supports the research hypothesis H1: knowledge purchasing has a significant positive impact on the creative output performance.

Model 2) verifies the effect of knowledge purchase on absorption capacity. It can be seen that the regression coefficient of the knowledge purchase is 0.058, and it passed the significance test at the 10% level. Combined with the regression results of the model 3), The regression coefficients for Knowledge Purchase and absorption capacity were all positive and passed the significance test at the 1% level. The regression coefficient of absorption capacity is consistent in the positive and negative directions in models 2) and 3), as well as in the positive and negative direction of the regression coefficient of knowledge purchase. And in model 1), the regression coefficient of 0.03 for knowledge purchase is greater than 0.028 for that in model 3). Therefore, it can be determined that absorption capacity has a partial intermediary between knowledge purchase and creative output performance, support the research hypothesis H2: Knowledge absorption capability plays a mediating role between knowledge purchase and creative output performance.

Table 4 Regression results of KP, Pase, COP

	Model (1)	Model (2)	Model (3)
	cop	pase	cop
KP	0.030***	0.058*	0.028***
	(5.30)	(1.91)	(5.09)
PASE			0.028***
			(5.64)
AGE	-0.189*	-0.656	-0.171
	(-1.69)	(-1.14)	(-1.54)
LEV	0.034	-9.409***	0.299
	(0.16)	(-8.85)	(1.27)
ROA	-0.237**	-4.345***	-0.115
	(-2.10)	(-10.15)	(-1.00)
CASH	-0.311**	-0.117	-0.308**
	(-2.07)	(-0.17)	(-2.08)
GROWTH	-0.130	-1.085**	-0.100
	(-1.20)	(-2.52)	(-0.93)
EC	0.006**	-0.058***	0.008***
	(2.41)	(-5.63)	(3.06)
DUAL	-0.183***	-0.045	-0.182***
	(-2.74)	(-0.12)	(-2.75)
DNO	0.842***	1.601*	0.797***
	(4.22)	(1.72)	(4.07)
CONSTANT	0.967*	5.086**	0.824
	(1.66)	(1.98)	(1.43)
N	1680	1680	1680
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
R^2	0.144	0.441	0.160

t statistics in parentheses $^*p < 0.1,$ $^{**}p < 0.05,$ $^{***}p < 0.01$

4.3 Robustness test

By changing the measurement method of the dependent variable, this section measures the proportion of the sum of the final balance of patent rights, trademark rights (including brand), copyright, software copyright, and trade secrets (or technical secrets) in the total assets of the enterprise. Table 5 reports the results of the robustness test, which shows the regression results and correlations between the variables. The above verification results are basically consistent, proving the robustness of the empirical results.

Table 5 Robustness test of KP, Pase, COP

	Model (1)	Model (2)	Model (3)
	cop	pase	cop
KP	0.036***	0.058*	0.035***
	(3.62)	(1.91)	(3.52)
PASE			0.019**

			(2.24)
AGE	-0.317*	-0.656	-0.305*
	(-1.76)	(-1.14)	(-1.70)
LEV	0.508	-9.409***	0.688*
	(1.33)	(-8.85)	(1.79)
ROA	-1.076***	-4.345***	-0.993***
	(-6.43)	(-10.15)	(-5.54)
CASH	-0.092	-0.117	-0.089
	(-0.37)	(-0.17)	(-0.36)
GROWTH	-0.075	-1.085**	-0.055
	(-0.49)	(-2.52)	(-0.35)
EC	0.007	-0.058***	0.008*
	(1.63)	(-5.63)	(1.91)
DUAL	-0.006	-0.045	-0.005
	(-0.05)	(-0.12)	(-0.04)
DNO	-0.077	1.601*	-0.108
	(-0.27)	(1.72)	(-0.38)
CONSTANT	1.920**	5.086**	1.823**
	(2.37)	(1.98)	(2.26)
N	1680	1680	1680
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
R^2	0.197	0.441	0.200

t statistics in parentheses *p < 0.1, **p < 0.05, ***p < 0.01

4.4 Test of the regulatory effect

This section verifies the regulatory effect of the knowledge base by adding interaction terms to the model. Table 6 reports the regression results. From the model (1–1), both the Knowledge Purchase and absorption capacity maintained a positive and significant impact on the creative output performance after the introduction of regulatory variables (knowledge base breadth). The regression results of model (2-1) show that on the basis of model (1-1), the product interaction term of knowledge base breadth and potential absorption capability was introduced, and the regression coefficient of the interaction term was positive and passed the significance test at the 10% level. Thus, it can be judged that knowledge base breadth plays a positive regulatory role on absorption capability, support the research hypothesis H3. As can be seen from the regression results of model (1-2) and model (2-2), the regression coefficient of the product interaction term of knowledge base depth and absorption capability is positive and passed the significance test at the 1% level. Thus, it can be judged that the knowledge base depth plays a positive regulator of absorption capacity, that H4 is supported: In the influence process of "knowledge purchase-knowledge absorption capability-creative output performance", the depth of knowledge base plays a significant role in regulating the knowledge absorption capability.

Table 6 Moderating effect of knowledge breadth of KP-AC-COP

	Model (1-1)	Model (2-2)	Model (1-2)	Model (2-2)
	cop	cop	cop	cop
KP	0.015***	0.014***	0.013***	0.013**
	(2.88)	(2.85)	(2.64)	(2.58)
PASE	0.030***	0.019**	0.020***	0.043***
	(6.82)	(2.02)	(4.34)	(5.99)
KB	0.873***	0.801***		
	(16.25)	(10.93)		
KD			0.664***	0.878***
			(19.41)	(16.51)
K B *PASE		0.010*		
		(1.81)		
K D *PASE				0.019***
				(5.47)
AGE	-0.267**	-0.262**	-0.237**	-0.276***
	(-2.57)	(-2.54)	(-2.33)	(-2.73)
LEV	0.068	0.074	0.168	0.207
	(0.32)	(0.35)	(0.77)	(0.94)
ROA	-0.023	-0.030	-0.056	-0.023
	(-0.23)	(-0.30)	(-0.55)	(-0.23)
CASH	-0.290**	-0.283**	-0.261*	-0.287**
	(-2.19)	(-2.13)	(-1.91)	(-2.12)
GROWTH	-0.085	-0.079	-0.066	-0.059
	(-0.86)	(-0.79)	(-0.69)	(-0.62)
EC	0.005**	0.005**	0.004*	0.003
	(2.16)	(2.27)	(1.78)	(1.36)
DUAL	-0.148**	-0.143**	-0.121**	-0.121**
	(-2.45)	(-2.37)	(-1.97)	(-1.98)
DNO	0.371*	0.380**	0.390**	0.310*
	(1.95)	(2.00)	(2.18)	(1.72)
CONSTANT	1.818***	1.830***	1.867***	2.010***
	(3.34)	(3.37)	(3.56)	(3.83)
N	1680	1680	1680	1680
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
R^2	0.290	0.291	0.307	0.317

t statistics in parentheses $^*p < 0.1,$ $^{**}p < 0.05,$ $^{***}p < 0.01$

4.5 Results and Discussion

This study aims to explore the influence of knowledge purchasing on the creative performance of cultural and creative enterprises, the intermediary role of absorption ability and the regulating effect of knowledge base. Using the balanced panel data of the sample, the multiple linear regression according to the three-step mediation test method, obtained the empirical results, and tested the hypotheses proposed in this paper:

The hypothesis H1 is supported: knowledge purchase positively affects the performance of creative output, that is, knowledge purchase can provide the professional knowledge and technology required by cultural and creative enterprises, and enterprises can purchase the professional knowledge absorbed by the industry through the latest ideas and technology, expand the ideas, and improve the quality and quantity of creative output. For example, an animation company has purchased the latest animation production software and technology, which can better demonstrate its ideas and improve the quality of

its animation works. This result is consistent with the research of Deng (2019), Li et al. (2020) on technology purchase positively affecting enterprise creative performance, and Zhang et al. (2019) found that technology acquisition has a significant promoting effect on enterprise innovation performance.

The hypothesis H2 is supported: absorption capacity plays a mediating role in the impact of knowledge buying on creative performance. This also confirms the conclusion that Dong Ping and Zhou (2018), based on the theory of dynamic ability and knowledge absorption ability, empirically test the intermediary relationship between knowledge absorption ability in technology acquisition and the dynamic ability of enterprise technology innovation; And Chen (2020) conducted empirical research on relevant data of high-tech enterprises, and found that after technology acquisition, the knowledge absorption ability of enterprises was significantly enhanced, so as to promote the improvement of technological innovation performance. External knowledge acquisition is the basis of the enterprise absorption ability, the quantity and quality of the absorption ability of positive influence, enterprises by continuous knowledge from the external environment, increased the heterogeneous and diversified knowledge, thus enhancing the enterprise of knowledge identification, digestion, absorption and application ability (Winborg, 2001), visible absorption ability can help and enterprises to identify, screening and integration from external purchase of knowledge resources, integrate it into the internal creative production and development process, eventually into valuable creative output.

In the test of knowledge base, hypothesis H3 and H4 are supported: In the influence process of "knowledge purchase-knowledge absorption capability-creative output performance", the breadth and depth of knowledge base both play a significant role in regulating the knowledge absorption capability. This is consistent with Tan's (2019) research found that the larger the knowledge scale of the main and parallel enterprise, the stronger the ability to identify the technical resources of the target enterprise, and the higher the technological innovation output level of the enterprise; Zeng and Liu (2021) found that the technology stock of the target enterprise has a positive adjustment effect on the technology innovation performance of the acquisition enterprise; Wu et al.(2020) found that enterprises can enhance the depth and breadth of their knowledge through technology acquisition, and then enhance the innovation performance of enterprises are consistent. In the cultural and creative industry, the depth of knowledge base is usually related to the degree of specialization and technical level of enterprises, which plays a decisive role for enterprises to provide high value-added products or services. It can be seen that having depth rather than breadth of knowledge can help enterprises to improve the competitiveness of human resources, shorten the product research and development cycle, and reduce the cost of product research and development, so as to promote the rapid development of cultural and creative industries. Enterprises have a strong knowledge base, which enables enterprises to better integrate the knowledge obtained from outside with internal knowledge, form cross-field thinking and innovation ability, and then apply knowledge to the actual creative process.

5. Conclusion

This paper examines the relevant relationship between Knowledge Purchase and absorption capability and cultural and creative performance, as well as the regulating role of knowledge base, using 240 cultural and creative listed enterprises as the research object. The empirical findings indicate that knowledge acquisition has a significant impact on the creative output performance of cultural and creative enterprises, and knowledge absorption capability serves as a partial intermediary between the two. The breadth and depth of one's knowledge base have a positive influence on the performance of one's creative output. Based on the findings of the preceding research, this paper proposes the following management implications for cultural and creative enterprises:

First and foremost, enterprises should focus on and constantly improve their

knowledge absorption capability. Knowledge and technologies from various fields are frequently integrated in the cultural and creative industries to create products or services with unique value. To promote the development of innovation ability, enterprises should establish an open learning organizational culture, cultivate employees' keen perception and understanding of external knowledge, and integrate and cross-field knowledge resources through internal communication and collaboration. To ensure that exogenous knowledge can play the most important role in creative output within the enterprise, enterprises should establish an efficient knowledge management system, strengthen communication and collaboration between knowledge transformation and application, optimize the innovation process and decision-making mechanism.

In addition, enterprises should actively cultivate and expand their knowledge base through continuous learning and collaboration with external partners in order to obtain diverse innovation resources and deepen their knowledge base in order to improve core competitiveness. In practice, businesses must strike a balance between breadth and depth. They can not only maintain a wide range of interdisciplinary and integration through reasonable and flexible organizational structure and talent training plan, but also focus on professional deep cultivation in the core fields, so that the knowledge base will become an important pillar to support the long-term sustainable development of enterprises. This paper makes the following suggestions on relevant policies: 1) Policies can encourage cross-sector collaboration and knowledge sharing among cultural and creative enterprises. The government can establish special funds and projects to promote cooperation and exchanges among different fields and to foster an environment conducive to innovation. Furthermore, platforms and mechanisms for cultural and creative enterprises to conduct knowledge sharing and cooperation, as well as promote cross-field innovation practices, can be established. These policy measures will effectively promote the knowledge acquisition and creative performance of cultural and creative enterprises. 2) Policies can encourage managers to engage in cross-disciplinary collaboration and exchanges, thereby broadening their professional networks and horizons. Policies can establish incentive mechanisms to encourage managers to attend industry exchange meetings, seminars, and other activities, as well as support them in communicating and cooperating with managers from other industries. These policy measures assist managers in learning about innovative practices and knowledge in other fields, broadening their thinking and vision, and improving their creative performance. 3) Government policies that promote the long-term development of cultural and creative industries can help. The government can help improve the creative performance of cultural and creative enterprises, increase their market competitiveness, and thus promote the industry's long-term healthy development by encouraging knowledge acquisition.

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