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Digital transformation, research and development innovation, and financial performance of new energy automobile industry: Basis for enhanced financial investment framework

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Abstract

The study aimed to examine the digital transformation, research and development innovation, and financial performance in new energy automobile in China to become the basis for developing a strategic plan to enhance financial investment of the new energy automobile industry. The study utilized self-made questionnaire as the data-gathering instrument. Participants of the study were 408 general managers or finance executives as participants of the enterprise which has been listed more than five years. The analysis of digital transformation was discussed from the aspects of artificial intelligence technology, big data technology, cloud computing technology and blockchain technology; Research and Development innovation was analyzed from the aspects of processed innovation, product innovation and marketing innovation; The financial performance was assessed from total assets, net assets and financial profit. Spearman rho was used to test the significant relationships as part of the non-parametric tests. All analyzes were performed using SPSS version 28. The research revealed that respondents agreed the components affecting digital transformation were Artificial Intelligence Technology, Big Data Technology, Cloud Computing Technology and Blockchain Technology. They agreed on the factors affecting Research and Development Innovation were Processed Innovation, Product Innovation and Marketing Innovation. They also agreed that the main factors affecting the financial performance of enterprises were Total Assets, Net Assets and Financial Profit. There was a significant positive correlation between digital transformation and enterprise research and development innovation, and there was also a significant positive correlation between digital transformation and enterprise financial performance. At the same time, research shows that there was a significant positive correlation between Research and Development innovation and corporate financial performance. Basis on this，a strategic framework to enhance financial investment can be developed.

Keywords: digital transformation, research and development innovation, financial performance

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1. Introduction

China's new energy automobile industry is experiencing rapid growth. The Chinese government remains a strong supporter of this industry through subsidies, tax breaks, and infrastructure development. This continues to attract investment. China is the leading market globally for new energy vehicles, with strong year-on-year sales growth. This indicates a potentially lucrative market for investors. Investment in China's NEV industry remains strong, but it's becoming more cautious and selective. Investors are looking for companies that demonstrate a clear path to profitability, a strong focus on R&D and innovation, and a well-defined digital transformation strategy. To attract and sustain financial investment, companies need to demonstrate a strong link between digital transformation, research and development (R&D) innovation, and financial performance.

Bonnet et. al.,(2020) points out that mastering digital technologies is more important than ever because the risk of being left behind is increasing, and advancements in various technologies are creating new opportunities for value creation that leaders are now exploring. China's new energy automobile (NEV) industry is undergoing a rapid digital transformation, driven by factors like intense competition, evolving consumer demands, and government support for technological innovation. Companies are embracing automation and robotics in production lines to improve efficiency, product quality, and consistency. Internet of things implementation allows for real-time monitoring of production processes, equipment performance, and supply chain logistics. This data can be used to optimize operations and identify potential issues before they disrupt production. Creating digital twins of factories allows for virtual simulations of production processes. This enables companies to test and optimize production scenarios before real-world implementation, reducing costs and improving efficiency. Leveraging big data analytics allows companies to optimize their supply chains by forecasting demand, managing inventory levels efficiently, and identifying potential disruptions. Blockchain can be used to ensure transparency and traceability throughout the supply chain, from raw materials to finished vehicles. This is crucial for maintaining quality control and building trust with consumers. New energy automobile companies are increasingly offering online platforms for car configuration, reservations, and even virtual test drives. This caters to the growing trend of online car buying. Medda (2020) states that the intensity of research and development significantly increases the likelihood of introducing product innovations, process innovation or both, China is a powerhouse in the global new energy automobile industry, and R&D is a key driver of its success. The Chinese government heavily invests in R&D through subsidies, tax breaks, and funding for research institutions. This fuels innovation and attracts private sector investment. Collaboration between traditional automakers, tech startups, and research institutions is fostering a vibrant innovation ecosystem. This allows for knowledge sharing and accelerates technological advancements. Chinese companies are heavily invested in developing autonomous driving technologies for new energy automobiles, with the goal of achieving higher levels of automation in the coming years. However, challenges in this industry stull exist. Balancing indigenous innovation with potential reliance on foreign technology and avoiding intellectual property infringement remains a challenge. The industry needs a skilled workforce in areas like battery science, electric motor design, and autonomous driving systems. Talent acquisition and nurturing domestic talent pools are crucial.

In the economic development of enterprises, an important factor to measure economic development ability is financial performance. Therefore, it is very important to understand the basic principle of the performance and the concept of it is that the embodiment of the effect of a company's management and control of its own resources, which is the basic technique for analyzing financial performance (Fatihudin, 2018). China's new energy automobile industry is experiencing rapid growth, but its financial performance presents a mixed picture.

China boasts the world's largest market, with sales figures experiencing significant year-on-year increases. This indicates a potentially lucrative market for investors. The Chinese government provides substantial support through subsidies, tax breaks, and infrastructure development for companies. This can improve profitability in the short term. While not all companies are profitable yet, a few leading manufacturers have demonstrated strong financial performance with increasing revenue and improving profit margins. Many new energy automobile companies rely heavily on government subsidies to achieve profitability. As the government gradually reduces subsidies, it could negatively impact financial performance in the long run. The market is becoming increasingly crowded with both domestic and foreign players. The new energy automobile industry in China is a rapidly growing and dynamic sector with significant global implications. This research would address a critical issue on attracting and sustaining financial investment for long-term growth. While there's existing research on these areas individually, this dissertation would bridge the gap by analyzing the interconnectedness of digital transformation, R&D innovation, and financial performance. This holistic approach can provide valuable insights for investors and policy maker and could lead to the development of a novel investment framework specifically tailored to the new energy automobile industry in China.

Objectives of the Study - This study aimed to assess the digital transformation, research and development innovation, and financial performance of new energy automotive industry in China to come up with enhanced financial investment framework. Specifically, it aimed to describe digital transformation in terms of artificial intelligence, big data, cloud computing, and blockchain technology. It also aimed to assess the research and development innovation in terms of process innovation, product and marketing; Evaluate the financial performance in terms of total assets, net assets and financial. It tested the relationships among data transformation, Research and Development innovation, and financial performance; and developed an enriched financial framework investment.

2. Methods

Research Design - This research used a descriptive research approach. The descriptive method of research, according to Rahi's study (2017), is a style of research that gathers pertinent facts, data, and information about the current condition while giving a detailed sketch of situations, persons, or events. Descriptive research also aims to record and examine emerging sensations that are invisible to objective observers (Polit & Beck, 2014). It was used in this study to describe the digital transformation, research and development innovation and financial performance of new energy automobile companies. The researcher distributed questionnaires to the respondents in an effort to collect information from them. This descriptive research style proved beneficial for rapidly gathering the responses of the respondents and determining the links between the study's variables.

Participants of the Study - In China‘s listed enterprises, there are 607 new energy automobile enterprises after the removal of ST stocks. As the sample needs continuous data, a total of 408 new energy automobile enterprises listed for more than 5 years are selected. I will choose 408 general managers or finance executives as participants. The participants will be asked to collect data on the digital transformation, R&D innovation and the financial performance of the enterprise in the past five years.

Data Gathering Instruments - Questionnaire survey was used as the data collection method in this study, and Likert scale was used to evaluate digital transformation, research & development innovation, and financial performance to different degrees. The questionnaire was self-made based on the literature and published articles on the three variables. Items for each tool were presented as descriptive statements, and respondents indicated how often each statement applied on a four-level Likert scale, with a 4.00 scale indicating strong agreement, a 3.00 scale indicating agreement, a 2.00 scale indicating disagreement, and a 1.00 scale indicating strong disagreement. The questionnaire of digital transformation included 6 items of artificial intelligence technology, with a Cronbach alpha value of 0.761. For 9 big data technology, Cronbach alpha value was 0.875; 6 items of Cloud computing technology, Cronbach alpha value was 0.810; 7 items of Blockchain technology, Cronbach alpha value was 0.706. The questionnaire of research and development innovation included three factors,

including 5 items of processed innovation, and Cronbach alpha value of 0.823; Including 5 items of product innovation, Cronbach alpha value of 0.823; Including 5 items of marketing innovation, CR alpha value of 0.791. The questionnaire of financial performance included three factors, including 10 items of total assets, and CR alpha was 0.842. Including 6 items of net assets, and CR alpha value was 0.848; Including 5 items of financial profit, and CR alpha was 0.739.

Data Gathering Procedure - First, the researcher provided an overview of the research background and current status of digital transformation, R&D innovation, and financial performance through a literature review. In the process, it has found some practical problems and research challenges. These issues may include data acquisition challenges, the choice of indicators, and differences in measurement methods. These problems may affect the reliability of the research results and the accuracy of the interpretation. At the same time, there may also be aspects of the complex relationship between digital transformation, R&D innovation, and financial performance that have not been deeply explored and need more in-depth research to understand and solve. Secondly, the research background and current situation of enterprise digital transformation, R&D innovation and financial performance were summarized in literature review. In the process, some practical problems and research challenges were identified. These issues may include data accessibility challenges, the choice of indicators, and the diversity of measurement methods. These issues may have implications for the reliability of the study and the interpretation of the results. At the same time, there may be aspects of the complex relationship between digital transformation, R&D innovation, and financial performance that are not fully understood and need more in-depth research to explore and resolve. Secondly, the research background and current situation of enterprise digital transformation, R&D innovation and financial performance we summarized in literature review. In the process, we identified some practical problems and research challenges. These issues may include data accessibility challenges, the choice of indicators, and the diversity of measurement methods. These issues may have implications for the reliability of the study and the interpretation of the results. At the same time, there may be aspects of the complex relationship between digital transformation, R&D innovation, and financial performance that are not fully understood and need more in-depth research to explore and resolve. Proponents of the study draw on relevant research papers, books, and published papers that have been found to correlate with the variables studied. The literature was used to construct questionnaires, interpret data, and perform analyses. After the study was passed, experts were invited to verify the contents of the questionnaire, and then conducted a pilot test to ensure the consistency of the three variable indicators. These data were tested for reliability and used to ensure their accuracy. The data collection process is done via email, online and face-to-face. Proponents sought permission from the head of the organization to obtain data from employees.

Ethical Considerations - Throughout the research process, the researcher kept ethical issues in mind to ensure that all data were used only for research purposes, maintaining the objectivity and integrity of the research. By not collecting identifying information from respondents, the researcher guaranteed their confidentiality and anonymity. The researchers also made sure that respondents voluntarily filled out questionnaires. Most importantly, it was assured that no study participants have come to any harm and that their safety and well-being is our utmost concern.

Data Analysis - A weighted mean and rank were utilized to evaluate digital transformation across artificial intelligence technology, big data technology, cloud computing technology, and blockchain technology. Research & Development innovation was assessed in terms of process innovation, product innovation, and marketing innovation. Financial performance was evaluated based on total assets, net assets, and financial profit. The Shapiro-Wilk Test indicated that all variables had p-values below 0.05, indicating non-normal distribution of the dataset. Therefore, Spearman's rho was employed as part of non-parametric tests to determine significant relationships. All analyses were conducted using SPSS version 28.

3. Results and discussion

Table 1 describes the impact analysis of artificial intelligence technology, big data technology, cloud

computing technology and blockchain technology on digital transformation. The composite mean of the data analysis is 3.16, and the verbal interpretation result is agree. From the data results, the impact value of artificial intelligence and cloud computing on digital transformation is the largest, which is 3.17. This was followed by big data technology and blockchain technology, with an impact value of 3.15.

Table 1

Summary Table on Digital Transformation

Key Result Areas	Composite Mean	VI	Rank
Artificial Intelligence Technology	3.17	Agree	1.5
Big Data Technology	3.15	Agree	3.5
Cloud Computing Technology	3.17	Agree	1.5
Blockchain Technology	3.15	Agree	3.5
Grand Composite Mean	3.16	Agree	

Legend:3.50-4.00=Strongly Agree;2.50-3.49=Agree;1.50-2.49=Disagree;1.00-1.49=Strongly Disagree

Under the new situation, digital transformation has become a key solution to improve the quality and efficiency of the oil and gas industry, and the new generation of information technologies such as the Internet of Things, cloud computing, big data, artificial intelligence, and blockchain are the key driving forces to promote digital transformation. The five major information technologies discussed in this paper, namely the Internet of Things, cloud computing, big data, artificial intelligence, and blockchain, represent the main direction and frontier fields of digital transformation. In-depth research on their technical connotation and application effects makes them an essential tool for technical personnel in the oil and gas industry, and the premise and basis for successful digital transformation.

Wang et. al.,(2020) reveled that the establishment of a modern financial system requires a modern financial management model, which serves as the data basis for optimal management, and the digital transformation of finance will greatly improve the real-time, effectiveness and sharing of data. Integrating digital technology into data production and application, creating an intelligent, networked and three-dimensional financial data ecology is increasingly becoming a new engine for financial management optimization. The use of big data technology for real-time monitoring of massive data can greatly compress the time from discovery to processing of problems, achieve dynamic optimization, and realize dynamic real-time monitoring and risk early warning. Big data provides technical support and data support for the normalization of financial supervision and uses big data technology to continuously monitor and assess the risks of institutions and businesses, and dynamically grasp the overall situation such as budget implementation status and risk changes, so as to effectively prevent market risks and continuously optimize the government's service process for market players. The cloud computing platform can process massive data more quickly and in a timely manner, improving the efficiency of financial supervision and management. Unified processing and application of data resources in vertical and horizontal dimensions will further strengthen the reliability and comprehensiveness of information processing results, while reducing the cost of financial supervision in data collection, data processing and data release processes, highlighting the focus of supervision work, and enhancing the accuracy of decision-making.

The advantage of machine learning algorithm is to solve all kinds of complex nonlinear problems, and the application of machine learning to the analysis of mass data can effectively predict the unknown state. For example, in terms of debt risk early warning, through machine learning, the debt structure can be reasonably planned to avoid the centralized repayment of maturing debts caused by too concentrated maturity time, so as to effectively disperse local government debt risks. Important signs of digital transformation include the use of the Internet, big data, artificial intelligence and other technological means, but if its technical capital investment is supported by government finance, it will be more conducive to the formation and application of the technology. Zhou et. al.,(2024) indecated that under the "dual-carbon" goal, corporate green innovation has gradually become a key force for high-quality economic development. However, enterprises are often faced with serious financing constraints, which has a negative impact on green innovation. Financial subsidies and digital economy, as external drivers, play a pivotal role in easing financing constraints and promoting green innovation. By further

exploring the mechanism of the influence between financial subsidies and corporate green innovation, it is found that financing constraints play an intermediary effect between the two, and the digital economy enhances the intermediary effect of financing constraints between financial subsidies and corporate green innovation. In the Fourth Plenary Session of the 19th CPC Central Committee, the Chinese government stated that it would "establish and improve rules and regulations for the use of the Internet, big data, artificial intelligence and other technological means for administrative management." This statement fully affirms the importance of digital technology to government governance. China's digital economy has the advantage of being a latecomer, and emerging digital technologies represented by big data, intelligence, mobile Internet, cloud computing, Internet of Things and blockchain have gradually become an important technical guarantee and support for China's new infrastructure.

Table 2

Summary Table on Research and Development Innovation

Key Result Areas	Composite Mean	VI	Rank
Processed Innovation	3.16	Agree	2
Product Innovation	3.17	Agree	1
Marketing Innovation	3.13	Agree	3
Grand Composite Mean	3.15	Agree	

Legend:3.50-4.00=Strongly Agree;2.50-3.49=Agree;1.50-2.49=Disagree;1.00-1.49=Strongly Disagree

Table 2 describes the impact analysis of process innovation, product innovation and market innovation on R&D innovation. The comprehensive mean value of the data analysis was 3.15, which was consistent with the oral interpretation. According to the data results, the impact of product innovation on R&D innovation is the largest, which is 3.17. The second is process innovation with an impact value of 3.16, and the third is market innovation with an impact value of 3.13.

In addition to improving efficiency, reducing costs, accelerating innovation cycles and promoting collaboration, process innovation also ensures quality stability in product development by establishing strict quality control systems and standardized processes. Reduce the probability of project failure and save resources and time by identifying and managing risk factors in advance; Promote knowledge sharing and learning, improve communication and collaboration efficiency among team members; Create a culture of innovation to stimulate employees' innovation awareness and potential; And help enterprises better understand customer needs, timely adjust the direction of research and development and product design, improve customer satisfaction and market competitiveness. Therefore, process innovation provides a solid support for the continuous innovation of enterprises, which not only plays an important role in improving efficiency and reducing costs, but also plays a key role in quality control, risk management, knowledge management, innovation culture cultivation and customer orientation. Product innovation can become a driving force for innovation in the R&D team, because the demand for new products drives them to constantly seek new technologies and solutions and promote innovation. Product innovation can promote the improvement of the technical level to meet the market demand, the R&D team must constantly explore new R&D paths and methods, and then drive the improvement of the entire technical level. In addition, product innovation may involve new fields and technologies, which encourages R&D teams to conduct cross-field cooperation and research, expanding the boundaries and depth of R&D. Most importantly, product innovation emphasizes market orientation, and the research and development team pays more attention to market dynamics and actively listens to customer needs, so that product development is more practical to better meet customer needs. Therefore, product innovation is not only the innovation of technology, but also the driving force of market orientation and customer demand, which promotes the continuous development of R&D innovation by stimulating innovation power, improving technology level, expanding research and development fields and strengthening market orientation.

Market innovation has a wide and far-reaching impact on R&D innovation. First, market innovation can lead the R&D team to understand the new needs and trends of the market by providing market feedback, providing it

with key guidance and direction. Secondly, market innovation can expand the market space, open up new market areas and user groups, and provide a broader development space and opportunities for R&D innovation. Market innovation can promote the acceleration of product replacement and promote the research and development team to continue to carry out technological innovation and product improvement to better adapt to market changes and needs. Most importantly, market innovation emphasizes user experience and value, urging R&D teams to pay more attention to the actual use effect of products and user satisfaction, so as to continuously optimize product design and function, improve competitiveness and market share. Therefore, by providing market feedback, expanding market space, accelerating product updates and emphasizing user experience, market innovation injects new impetus and direction to R&D innovation, and promotes enterprises to maintain a leading position in a highly competitive market.

Table 3

Summary Table on Financial Performance

Key Result Areas	Composite Mean	VI	Rank
Total Assets	3.14	Agree	3
Net Assets	3.18	Agree	1
Financial Profit	3.16	Agree	2
Grand Composite Mean	3.16	Agree	

Legend:3.50-4.00=Strongly Agree;2.50-3.49=Agree;1.50-2.49=Disagree;1.00-1.49=Strongly Disagree

Table 3 describes the analysis of the impact of total human assets, net assets and financial profits on financial performance. The comprehensive mean value of data analysis was 3.16, which was consistent with the interpretation result. From the data results, the impact of net assets on financial performance is the largest, which is 3.18. Secondly, the impact of financial profit on financial performance is 3.16. Finally, the impact of total assets on financial performance is 3.14.

Wang (2023) noted that business performance can fully represent the effect of cost control carried out by enterprises, such as the effect of asset utilization management, the effect of capital source allocation and the return on shareholders' equity. At the same time, the overall development of the company can be described from the aspects of profitability, solvency, operating capacity and development capacity of the enterprise. The total asset scale has many influences on the profitability, debt paying ability, operation ability and development ability of enterprises. Larger firms may achieve higher profitability and greater solvency through economies of scale, as they have more resources to devote to improving productivity and mortgaging assets. At the same time, larger companies may also have greater operational capacity because they can organize production and manage supply chains more efficiently. In terms of development capabilities, the increase in total asset size usually provides more funds and a more stable development platform for enterprises, thus helping enterprises to expand new business areas or expand existing business scale. Therefore, the total asset size has an important impact on the overall operation and development of an enterprise and needs to be fully considered in strategic planning and operation management.

Higher net assets can improve the earnings stability and financial health of the enterprise, enhance the solvency, and provide more capital investment for the enterprise, which helps to improve the operating capacity and support the business development. The level of net assets reflects the capital structure and financial robustness of an enterprise, and directly affects its financing ability and credit rating, which in turn has a significant impact on the operation and development strategy of an enterprise. Therefore, in financial management and strategic planning, it is essential to fully consider the impact of the level of net assets and its changes on the comprehensive capabilities of enterprises. Financial profit has a key impact on the profitability, debt paying ability, operation ability and development ability of enterprises. First of all, the financial profit directly reflects the profitability of the business activities of the enterprise. High financial profit means that the enterprise has stronger profitability and can provide a stable source of funds for future development. Secondly, the growth of financial profits can also strengthen the solvency of enterprises, making it easier to shoulder debts

and improve credit ratings. In addition, the increase in financial profits can also provide more internal funds for enterprises to invest in operating activities and develop new business areas, thus enhancing the operational capacity and development potential of enterprises. Therefore, financial profit plays a crucial role in the overall operation and development of enterprises and is of great significance for maintaining the competitiveness and long-term steady development of enterprises.

As can be observed from table 4, the calculated rro values range from 0.562 to 0.636, indicating a moderate to strong direct relationship between the subvariables of digital transformation and R&D innovation. The resulting P-value is less than 0.01, meaning that there is a statistically significant association between digital transformation and R&D innovation. From the specific relationship between R&D innovation and digital transformation, the relationship between process innovation, product innovation and market innovation on artificial intelligence technology is HO-values of 0.612, 0.636 and 0.578, respectively, indicating that these three kinds of innovation have positive and positive effects on artificial intelligence technology.

Table 4

Relationship between Digital Transformation and Research and Development Innovation

Variables	rho	p-value	Interpretation
Artificial Intelligence Technology			
Processed Innovation	0.612**	<.001	Highly Significant
Product Innovation	0.636**	<.001	Highly Significant
Marketing Innovation	0.578**	<.001	Highly Significant
Big Data Technology			
Processed Innovation	0.620**	<.001	Highly Significant
Product Innovation	0.565**	<.001	Highly Significant
Marketing Innovation	0.579**	<.001	Highly Significant
Cloud Computing Technology			
Processed Innovation	0.562**	<.001	Highly Significant
Product Innovation	0.622**	<.001	Highly Significant
Marketing Innovation	0.603**	<.001	Highly Significant
Blockchain Technology			
Processed Innovation	0.605**	<.001	Highly Significant
Product Innovation	0.580**	<.001	Highly Significant
Marketing Innovation	0.612**	<.001	Highly Significant

The P value of the relationship between them is all less than 0.01. Therefore, there is a statistically significant relationship between process innovation, product innovation and market innovation and artificial intelligence technology. The relationship between process innovation, product innovation and market innovation on big data technology is the positive relation values of rho-values of 0.562, 0.565 and 0.579 respectively, indicating that these three kinds of innovation have positive and positive effects on big data technology, and the P value of the relationship between them is less than 0.01. There is a statistically significant relationship among process innovation, product innovation, and market innovation and big data technology. The relationship among process innovation, product innovation and market innovation on cloud computing technology is the positive relation values of rho-values of 0.605, 0.622 and 0.603, respectively, indicating that these three innovations have positive and positive effects on cloud computing technology, and the P value of the relationship between them is less than 0.01. Therefore, There is a statistically significant relationship between process innovation, product innovation, and market innovation and cloud computing technology.

As seen in table 5, the computed rho-values ranging from 0.549 to 0.693 indicate a moderate to strong direct relationship among the sub variables of digital transformation and financial performance. There was a statistically significant relationship between digital transformation and financial performance because the obtained p-values were less than 0.01. From the specific relationship between financial performance and digital transformation, the relationship between total assets, net assets and financial profits on artificial intelligence technology is a positive relationship value of rho-values of 0.642, 0.549 and 0.603, indicating that these three elements have a positive effect on artificial intelligence technology. The P value of the relationship between them

is less than 0.01, so there is a statistically significant relationship between total assets, net assets and financial profits and artificial intelligence technology. The relationship among total assets, net assets and financial profits on big data technology is a positive relation value of rho-values of 0.693, 0.606 and 0.595, respectively, indicating that these three elements have a positive and positive influence on big data technology, and the P value of the relationship between them is less than 0.01.

Table 5

Relationship between Digital Transformation and Financial Performance

Variables	rho	p-value	Interpretation
Artificial Intelligence Technology			
Total Assets	0.642**	<.001	Highly Significant
Net Assets	0.549**	<.001	Highly Significant
Financial Profit	0.603**	<.001	Highly Significant
Big Data Technology			
Total Assets	0.693**	<.001	Highly Significant
Net Assets	0.606**	<.001	Highly Significant
Financial Profit	0.595**	<.001	Highly Significant
Cloud Computing Technology			
Total Assets	0.580**	<.001	Highly Significant
Net Assets	0.562**	<.001	Highly Significant
Financial Profit	0.596**	<.001	Highly Significant
Blockchain Technology			
Total Assets	0.583**	<.001	Highly Significant
Net Assets	0.588**	<.001	Highly Significant
Financial Profit	0.600**	<.001	Highly Significant

***. Correlation is significant at the 0.01 level*

There was a statistically significant relationship among total assets, net assets, financial profits and big data technologies. The relationship between total assets, net assets and financial profits on cloud computing technology is the positive relation values of rho-values of 0.580, 0.562 and 0.596, respectively, indicating that these three elements have positive and positive effects on cloud computing technology, and the P value of the relationship between them is less than 0.01. Therefore, there was a statistically significant relationship among total assets, net assets, and financial profit and cloud computing technologies. The relationship among total assets, net assets and financial profits on blockchain technology is a positive relation value of rho-values of 0.583, 0.588 and 0.600, respectively, indicating that these three elements have a positive and positive impact on blockchain technology, and the P value of the relationship between them is less than 0.01. There was a statistically significant relationship between total assets, net assets, and financial profits and blockchain technology.

Table 6

Relationship between Research & Development and Financial Performance

Variables	rho	p-value	Interpretation
Processed Innovation			
Total Assets	0.654**	<.001	Highly Significant
Net Assets	0.570**	<.001	Highly Significant
Financial Profit	0.640**	<.001	Highly Significant
Product Innovation			
Total Assets	0.586**	<.001	Highly Significant
Net Assets	0.539**	<.001	Highly Significant
Financial Profit	0.617**	<.001	Highly Significant
Marketing Innovation			
Total Assets	0.631**	<.001	Highly Significant
Net Assets	0.521**	<.001	Highly Significant
Financial Profit	0.604**	<.001	Highly Significant

***. Correlation is significant at the 0.01 level*

As seen in the table 6, the computed rho-values ranging from 0.521 to 0.654 indicate a moderate to strong

direct relationship among the sub variables of research & development innovation and financial performance. There was a statistically significant relationship between R&D innovation and financial performance because the obtained p-values were less than 0.01. From the specific relationship between financial performance and R&D innovation, the relationship between total assets, net assets and financial profit on process innovation is a positive relationship value of rho-values of 0.654, 0.570 and 0.640, respectively, indicating that these three factors have a positive and positive effect on process innovation, and the resulting P value of the relationship between them is less than 0.01.

Therefore, there is a statistically significant relationship between total assets, net assets, and financial profit and process innovation. The relationship between total assets, net assets and financial profits on product innovation is a positive relation value of rho-values of 0.686, 0.539 and 0.617, respectively, indicating that these three factors have a positive and positive effect on product innovation, and the P value of the relationship between them is less than 0.01. There was a statistically significant relationship between total assets, net assets and financial profit and product innovation. The relationship among total assets, net assets and financial profits on market innovation is a positive relation value of rho-values of 0.631, 0.521 and 0.604, respectively, indicating that these three factors have a positive and positive effect on market innovation, and the P value of the relationship between them is less than 0.01. There was a statistically significant relationship between total assets, net assets and financial profits and market innovation. According to the analysis, both digital transformation and R&D innovation have a positive impact on financial performance. In view of the positive impact of digital transformation and R&D innovation on the financial performance of China's new energy vehicle industry, the strategic framework for strengthening corporate financial investment is formulated as follows:

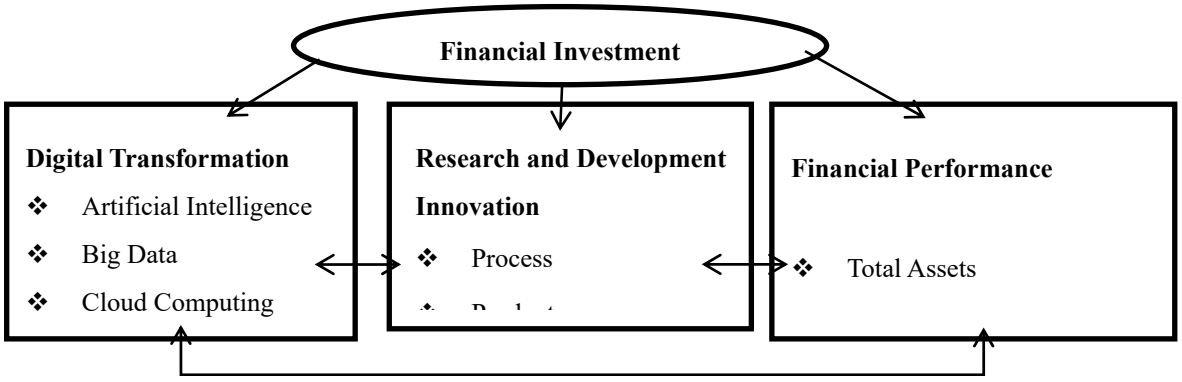

Figure 1. Enhanced Financial Investment Framework

4. Conclusions and recommendations

The respondents generally agreed on the digital transformation of the new automobile companies. The research and development innovations are moderately practiced by the companies. The companies have good financial performance. There is moderate to strong direct relationship between digital transformation, research and development innovation and financial performance. An enhanced financial investment framework for new energy automobile industry was developed.

Top management of new energy automobile companies may continue to increase their investment on digital technologies, including but not limited to areas such as big data analytics, artificial intelligence and blockchain. These companies may ensure adequate funding for research and development of new technologies and products to continuously enhance the competitiveness of the company. The new energy automobile companies may utilize the proposed framework to attract new investors.Future researchers may conduct similar studies using other variables affecting financial investment such as customer preference, government support and sustainability focus.

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