

Article

Sun tzu's art of war five virtues leadership and innovation in leveraging the efficiency of Chinese brand passenger-vehicle industry in China

Yan Yu, Burin Santisarn*, Chalermkiat Wongvanichtawee, Chanchai Chitlaoarporn

Siam University, Bangkok 10160, Thailand * Corresponding author: Burin Santisarn, burin@siam.edu

CITATION

Yu Y, Santisarn B,

Wongvanichtawee C, Chitlaoarporn C. (2024). Sun tzu's art of war five virtues leadership and innovation in leveraging the efficiency of Chinese brand passenger-vehicle industry in China. Journal of Infrastructure, Policy and Development. 8(15): 9913. https://doi.org/10.24294/jipd9913

ARTICLE INFO

Received: 28 October 2024 Accepted: 13 November 2024 Available online: 12 December 2024

COPYRIGHT



Copyright © 2024 by author(s). Journal of Infrastructure, Policy and Development is published by EnPress Publisher, LLC. This work is licensed under the Creative Commons Attribution (CC BY) license. https://creativecommons.org/licenses/ by/4.0/ Abstract: Objectives: This study aims to examine the impact of Sun Tzu's Art of War Five Virtues Leadership on innovation and the efficiency of the Chinese brand passenger vehicle industry, explore the role of innovation in enhancing industry efficiency, and propose strategies for leveraging the Five Virtues Leadership to improve operational performance and competitiveness in the sector. Methodology: A mixed research method using quantitative research (questionnaire survey) as the main method and qualitative research (in-depth interview) as the auxiliary method. Result: Quantitative and qualitative research results confirm the positive correlation between the Five Virtues Leadership, innovation, and the efficiency of Chinese brand passenger vehicle companies. And through effective data analysis, it explains the importance of the five virtues of leadership in traditional Chinese culture. Further understanding of the effectiveness and competitiveness of China's passenger car brands, with leadership references. Conclusion: Five Virtues Leadership can foster a favorable environment for innovation, enhance time utilization, optimize resource allocation, and strengthen brand image. By developing and validating a measurement for Five Virtues Leadership, this study enhances the understanding of its role and significance in modern management, paving the way for future research.

Keywords: five virtues leadership; innovation; efficiency; Chinese brand passenger vehicle industry

1. Introduction

According to International Organization of Automobile Manufacturers (OICA), China has become the country with the most significant global automobile production since 2009. China's annual automobile production accounted for 32% of the global automobile production in 2022 (OICA, 2022). Passenger vehicles are a crucial segment of the automotive industry and refer to vehicles with fewer than or equal to nine seats (including the driver's seat). Chinese Brand Passenger Vehicle refers to passenger vehicles produced by Chinese-owned companies. Representative brands include Geely, Chang'an, Jianghuai, Chery, Hongqi, BYD, and Lifan. In 2022, Chinese brand passenger vehicle sales reached 11.77 million, 49.9% of the domestic market share.

The development of the Chinese passenger vehicle industry has long relied on joint ventures, which only provide manufacturing technology without design technology as Liu and Zhang (2020), Tan and Wu (2023), Zhang et al. (2023) pointed out that the main problems faced by Chinese Brand Passenger Vehicle Industry including limited innovation capabilities, management issues, talent shortage, unstable quality, low service level and poor brand image. Chinese brand passenger vehicle

industry is at a critical stage of transformation, and the quality of management talents will determine the future development trajectory of the industry.

The knowledge system of Chinese management is mainly based on the construction, development, and improvement of management theories and research paradigms in Western developed countries. For a long time, many Chinese scholars have followed and researched the Western management theory system. However, managers in practice engage in management work based on their experience and actual conditions. Disobedience to local conditions often occurs. Five Virtues Leadership (wisdom, faith, benevolence, courage, strictness) derived from Sun Tzu's Art of War provides a leadership model that centers on strategic thinking and balances execution and innovation.

2. Literature review

2.1. Resource-Based View (RBV)

Wernerfelt (1984) defined firm resources as anything that can contribute to the organization's core competitive capabilities, emphasizing the significance of internal resources for the sustained development of the firm. Hall (2009), Itami and Roehl (1991), and Wernerfelt (1984) have categorized resources into two main types: tangible resources and intangible resources. Tangible resources primarily include financial, physical, and organizational structural resources. Intangible resources mainly include human resources, innovation resources, and reputational resources. Competitors can imitate tangible resources, but intangible resources are difficult to imitate and learn from.

Barney (1991) proposed that resources must meet the "valuable, rare, imperfectly imitable, and non-substitutable (VRIN)" criteria to provide a competitive advantage to the firm. Internal resources of a firm are crucial sources guiding the strategic development and profitability of the firm. Assensoh-Kodua (2019) stated that RBV is vital in helping organizations create, nurture, and maintain competitive advantage and understand the collective resources needed to compete favorably in a globalized and highly competitive market. The core of RBV lies in the belief that different firms possess resources that exhibit heterogeneity, leading to competitive advantages.

2.2. Sun tzu's art of war five virtues leadership

Sun Tzu's Art of War, known as The Art of War, consists of around 6000 Chinese characters and was written during China's Spring and Autumn Period. It is the earliest military work in the world. The author is Sun Wu, whom the Chinese reverently call Sun Tzu. Huang (2017) and Xiong (2023) said that the basic principles and ideological methods of Sun Tzu's Art of War have been widely valued and applied in commercial competitions, enterprise management, sports competitions, diplomatic negotiations, and other activities.

Sun Tzu's Art of War records: "A general is wise, trustworthy, benevolent, brave, and strict." Later generations call it "the five virtues of generals". These are the five dimensions of leadership summarized by Sun Tzu: wisdom, faith, benevolence, courage, and strictness. Chen (2020), Dimovski et al. (2012), and Sengupta (2020) agreed that the Five Virtues Leadership can apply to enterprise or government leaders.

Chan (2024) and Hlavatý and Ližbetin (2021) stated that Five Virtues Leadership provides guidance on making correct and quick strategic decisions for managers. Wisdom enables leaders to foresee potential challenges and opportunities, making informed decisions that enhance efficiency. Piper (2021) and Zhang and Nasir (2022) noted that Faith and Benevolence help companies to actively fulfill their corporate social responsibilities and help corporate management to shape a good brand image, thereby improving corporate efficiency. Chatterjee et al. (2020) and Giaccone and Magnusson (2022) argued that courageous leadership is critical in initiating and sustaining innovative projects, particularly in the face of resistance or failure. Wang et al. (2023) said that there should be a balancing act between kindness and strictness, and they believed strictness could help improve a firm innovation capability and performance.

Early 20th-century researchers in leadership theory believed that leadership traits are inherent, suggesting that only individuals born with these inherent traits could become leaders. Bass and Stogdill (1990) believed that leadership personality traits include integrity, honesty, independence, and emotional stability. Intellectual traits include good cognitive ability, judgment ability, decision-making ability, and wisdom. Northouse (2021) pointed out that although the traits of leaders may vary from person to person, wisdom, honesty, courage, and competence are fundamental traits that can help leaders succeed in different situations.

Although Five Virtues Leadership and Trait Theory Leadership originate from different cultural backgrounds and academic traditions, they share several connections and similarities. First, both emphasize the importance of core traits in leaders. The wisdom, faith, benevolence, courage, and strictness outlined in Five Virtues Leadership resonate with the key traits of integrity, decisiveness, empathy, and self-discipline identified in Trait Theory. Second, they focus on the central role of leaders within organizations, positing that leaders' traits and behaviors can directly influence team success.

2.3. Innovation

Taylor (2017) said that innovation can be considered as being a product or process that is new or existing but has been improved. Pelenk (2023) found out that innovation refers to both a process and an outcome, it can happen in the company's products or services.

Afum et al. (2021) and Qiu et al. (2020) highlighted that product innovation can streamline business operations, reduce waste, and improve production processes. By introducing innovative products, firms can achieve higher economies of scale and optimize their production lines, thereby reducing costs and enhancing efficiency. Casidy et al. (2020) said that service innovation is essential, particularly for companies operating in highly competitive environments, as it can lead to innovation adoption behaviors, which in turn influence overall business performance. Shao et al. (2020), Wang et al. (2021) emphasized that technological innovation, through continuous improvement and upgrades, reduces production costs and increases operational efficiency. They found that technology innovation plays a key role in driving efficiency improvements across various industries. Eisner (2016) studied ten signature traits among leaders who lead innovation, including intelligence and integrity, which closely align with the "Wisdom" and "Faith" principles of Sun Tzu's Five Virtues Leadership. Bibi and Afsar (2020) stated that innovation often comes with risks and uncertainties, and courage plays an important role in taking risks. He examined the relationship between behavioral courage and innovative work behavior, and the results showed that behavioral courage was positively associated with innovative work behavior.

2.4. Efficiency

Efficiency is a multifaceted concept broadly defined as the ability to achieve maximum productivity and desired outcomes with minimal waste of resources, time, and effort. Burches and Burches (2020) said efficiency is doing things in the most economical way. Dabab (2020) defined efficiency as the ratio of actual output to effective capacity. Berrett (2020) pointed out that efficiency is often associated with costs, and the quality of human capital is one of the biggest determinants of efficiency.

Gkouskos et al. (2014) noted that efficiency is often associated with time efficiency, particularly in the context of automation in the automotive industry. Jagtap et al. (2021) and Liu et al. (2021) emphasized that resource optimization is a key aspect of enterprise efficiency because it enables organizations to maximize output while minimizing input, ensuring that every resource is used to its fullest potential without excess waste. Pynatih et al. (2024) found that a strong brand can make a significant contribution to a company's revenue, profit margins, and valuation. Brand enhancement is a crucial indicator of efficiency as it reflects a company's ability to strategically optimize its market presence and reputation.

2.5. Conceptual framework and hypothesis

This study constructs a conceptual framework through a comprehensive literature review to explore the relationship between Sun Tzu's Art of War Five Virtues Leadership, innovation, and efficiency. As shown in **Figure 1**.



Figure 1. Conceptual framework.

From the above framework, three hypotheses can be listed as follows:

Hypothesis 1: Sun Tzu's Art of War Five Virtues Leadership is positively related to the efficiency of Chinese brand passenger vehicle industry in China.

Hypothesis 2: Sun Tzu's Art of War Five Virtues Leadership is positively related to innovation.

Hypothesis 3: Innovation is positively related to the efficiency of Chinese brand passenger vehicle industry in China.

3. Research methodology

In this research, a mixed-methods approach will be employed, utilizing both quantitative and qualitative research methodologies to investigate the efficiency of Chinese brand passenger vehicle industry comprehensively.

3.1. Population and sample

The population of this study comprises Chinese brand passenger vehicle companies in China registered with the China Association of Automobile Manufacturers as of 2023. There are a total of 68 such enterprises. The stratified sampling technique will be applied to divide the population into seven regions: North, Northeast, East, Central, South, Southwest, and Northwest. Subsequently, a quota sampling technique will be used to select companies from the majority regions—North, East, Central, South, and Southwest—accounting for 91.18% of the total population, or 62 companies, as the final sample. For each of these 62 companies, eight questionnaires will be distributed to managers and middle managers using a purposive sampling technique.

In addition to the quantitative research, qualitative methods will also be employed. A total of 15 individuals will be interviewed: 10 from the business sector, two from government sectors, and three experts.

3.2. Data collection and data analysis

For the quantitative data, the WJX Platform (n.d.), a professional online survey platform in China, will be used to collect responses, using SPSS 23 and AMOS 26 to analyze. For the qualitative data, semi-structured interviews with open-ended questions will be conducted using content analysis, triangulation, and in-depth analysis techniques.

4. Research result

4.1. Sample selection and data description

In this study, 495 valid questionnaires were collected, the respondents represented diverse genders, age groups, educational levels, years of work experience, and work departments, providing strong representativeness for the research.

The results indicate that most respondents are male, comprising 71.31%, while females represent 28.69%. Respondents aged 31–40 years account for over 40% of the total, while those aged 41–50 years make up 31.72%. Regarding educational level, the highest proportion is 45.05% for those with a postgraduate degree. In terms of work

experience, most respondents fall into the "4–6 years" category, accounting for 45.05%. As for work departments, the production, research and development, human resources, and sales departments account for 24.44%, 27.68%, 19.60%, and 19.39% respectively. Finally, the majority of respondents are from the eastern region of China, because the eastern region hosts the largest proportion of Chinese brand passenger vehicle companies.

4.2. Reliability testing

Reliability testing will establish a set of scientific and complete evaluation system to make an accurate evaluation of the validity of the questionnaire. In the evaluation process, it is also necessary to determine the weight of each evaluation index, a reasonable weight can improve the reliability and correctness of the final evaluation results. The questionnaire used in this study consists of 11 dimensions with a total of 55 items, measured on a 5-point Likert scale ranging from "1-Strongly disagree" to "5-Strongly agree".

To assess the reliability of each variable, Cronbach's alpha, Corrected Item-Total Correlation (CITC), and Cronbach's alpha after item deletion are used. The criteria for evaluation are as follows: Cronbach's α coefficient greater than 0.7, CITC values greater than 0.50, and Cronbach's α after item deletion should not exceed the Cronbach's α of the overall scale.

Using SPSS, the reliability testing results show that Cronbach's alpha for each dimension exceeds 0.7. As for "Cronbach's alpha after item deletion", the reliability coefficient does not significantly increase with the deletion of any item, suggesting that none of the items should be removed. Regarding the "CITC," all CITC values are greater than 0.5, indicating good correlations among the items. In summary, the reliability testing results confirm that the data is highly reliable and suitable for further analysis.

4.3. Confirmatory factor analysis (CFA)

4.3.1. CFA for sun tzu's art of war five virtues leadership model

Validation factor analysis is mainly used to assess the degree of agreement between the expected theory and the actual data, to evaluate whether the structure of the questionnaire or scale is reasonable, and also to measure the correlation between the factors, and to evaluate the aggregation or discriminant validity of the questionnaire or scale. Sun Tzu's Art of War Five Virtues Leadership model (Model X) includes 5 dimensions. A CFA was conducted for Model X using AMOS, the structural equation model was tested using AMOS software to examine the parameters and goodness of fit. In the standardized estimation model, the criteria for model matching to reach the desired level are that each estimated parameter within the model needs to reach the significant level and the factor loading reaches 0.5. And the detailed results are outlined below.

The factor loading coefficients for Model X show that the absolute values of the standardized loadings for each measurement relationship are all greater than 0.6 and statistically significant, indicating a strong measurement relationship. The Average Variance Extracted (AVE) and Composite Reliability (CR) results for Model X

demonstrate that all five factors have *AVE* values exceeding 0.5 and *CR* values greater than 0.8, confirming good convergent validity of the data. Additionally, the results for discriminant validity indicate that each factor in Model X exhibits strong discriminative validity. As for Model fit statistics, the x^2 /df is 1.061, which is below 3, indicating an acceptable fit. The RMSEA is 0.011, which is below 0.1, indicating a minimal model error. The *CFI* and *NFI* are 0.997 and 0.958, respectively, both above 0.90, suggesting a good fit for the model. Additionally, the AGFI was 0.948, further supporting the model's fit.

4.3.2. CFA for innovation model

Innovation model (Model M) includes 3 dimensions. The absolute values of the standardized loading for each measurement relationship are all greater than 0.6 and show significance, indicating a good measurement relationship. All five factors have *AVE* values exceeding 0.5, and *CR* values greater than 0.8, confirming good convergent validity of the data. Additionally, each factor in Model M exhibits strong discriminative validity. As for Model fit statistics, the x^2 /df is 1.164, indicating an acceptable fit. The RMSEA is 0.018, indicating a minimal model error. The *CFI* and *NFI* are 0.997 and 0.979, suggesting a good fit for the model. Additionally, the AGFI was 0.963, further supporting the model's fit.

4.3.3. CFA for efficiency model

Efficiency model (Model Y) includes 3 dimensions. The absolute values of the standardized loading for each measurement relationship are all greater than 0.6 and show significance, indicating a good measurement relationship. All five factors have *AVE* values exceeding 0.5, and *CR* values greater than 0.8, confirming good convergent validity of the data. Additionally, each factor in Model Y exhibits strong discriminative validity. As for Model fit statistics, the x^2 /df is 1.076, indicating an acceptable fit. The RMSEA is 0.012, indicating a minimal model error. The *CFI* and *NFI* are 0.999 and 0.980, suggesting a good fit for the model. Additionally, the AGFI was 0.965, further supporting the model's fit.

4.4. Hypothesis verification

Using AMOS 26 to perform structural equation analysis on hypothesis 1, hypothesis 2, and hypothesis 3, the results are shown in **Table 1**.

Hypothesis	Path Relationship	Non-standardized loading	Std. Error	Р	Standardized loading	Supported
H1	$Y \leftarrow X$	0.546	0.066	< 0.001	0.569	Yes
H2	$\mathbf{M} \leftarrow \mathbf{X}$	0.821	0.081	< 0.001	0.653	Yes
Н3	$\mathbf{Y} \gets \mathbf{M}$	0.403	0.052	< 0.001	0.544	Yes

Table 1. SEM output results of hypothesis verification.

According to **Table 1**, the path coefficient between Model X and Model Y is 0.569, the path coefficient between Model X and Model M is 0.653, and the path coefficient between Model M and Model Y is 0.544. All coefficients have *P*-values less than 0.001, indicating statistical significance, which supports the previously proposed H1, H2, and H3. This data can effectively support the findings of this paper.

4.5. Final model evaluation

In this study, the researcher developed and tested a Structural Equation Model (SEM) to explore the complex relationships among various variables. As shown in **Figure 2**.



Figure 2. Final structural equation model (standardized estimates).

The model provides significant insights into how latent variables influence each other and their respective observed variables. The path coefficients and fit indices indicate that the model fits the data well, supporting the proposed theoretical framework. The specific model fitting data is detailed in **Table 2**.

Common Indices	x^2	df	x^2/df	GFI	RMSEA	CFI	NFI
Judging Criteria	-	-	< 3	> 0.9	< 0.10	> 0.9	> 0.9
Value	1494.203	1416	1.055	0.905	0.011	0.995	0.915
Other Indices	TLI	AGFI	IFI	PGFI	PNFI	PCFI	SRMR
Judging Criteria	> 0.9	> 0.9	> 0.9	> 0.5	> 0.5	> 0.5	< 0.1
Value	0.995	0.897	0.995	0.832	0.872	0.949	0.0368

Table 2. The fit indices of final structural equation model.

As shown in **Table 2**, most indices meet the judging criteria, most of the evaluation criteria are greater than 0.9, the vast majority of values are greater than 0.8, indicating that the model fits well with the observed data.

4.6. In-depth interviews

The Art of War of Sun Tzu is the treasure of ancient military books in China, and the thought and influence of the Art of War of Sun Tzu has gone beyond the military field to politics, economy, education, management and other aspects, and has been widely concerned by managers of various industries, especially respected by the leaders. Economy, education, management and other aspects, by the managers of various industries, especially by the leaders of the widespread concern. Sun Tzu put forward the standards of leadership quality: "wisdom, faith, benevolence, courage, and strictness", Cao Cao called this "five virtues", the note said: "will be appropriate to five virtues prepared". This passage shows that: the general must have wisdom and resourcefulness, reward and punishment have faith, kindness and fraternity, bravery and decisiveness, strict law and discipline and other five aspects of talent, character and temperament.

This study interviewed 10 managers from Chinese brand passenger vehicle companies, two government officers, and three experts with relevant experience in the industry. A total of 15 interview transcripts were collected. The interviews confirmed the questionnaire results, with all participants agreeing that the Five Virtues (wisdom, faith, benevolence, courage, and strictness) are integral to leadership. For example, Interviewee No. 11 emphasized that "wisdom involves understanding market trends and technological developments," while Interviewee No. 8 noted that "faith helps establish strong cooperative relationships."

The interviewees also agreed on the importance of product, service, and technological innovation for corporate innovation. Interviewee No. 5 highlighted that "product innovation is essential for maintaining market competitiveness," and Interviewee No. 8 pointed out that "service innovation directly impacts customer satisfaction and loyalty."

All interviewees identified time utilization, resource optimization, and brand enhancement as key indicators regarding corporate efficiency. Interviewee No. 2 mentioned that "effective time management improves resource and staff productivity," while Interviewee No. 14 stated that "efficient resource allocation reduces costs and enhances production and service quality." Additionally, all interviewees believed in a positive correlation between Five Virtues leadership, innovation, and the efficiency of the Chinese brand passenger vehicle industry.

4.7. Relationship between the five virtues and leadership

4.7.1. Wisdom

There are various interpretations of "wisdom" in the Chinese meaning of the word, as a leader element, obviously wisdom is crucial, but intelligence is the basis of wisdom, but these are two different concepts, so wisdom obviously includes intelligence and wisdom, of which the definition of wisdom is more difficult to define, but it does not prevent people from giving their own definitions of wisdom.

Wisdom, and generals and marshals should be knowledgeable, resourceful, able to recognize things correctly, foresee changes in the state of affairs, and have the ability to overcome difficulties, solve problems and defeat hostile forces. Sun Tzu puts "wisdom" at the top of the "five virtues" of a general, paying great attention to the knowledge, wisdom and talent of a leader. This is because since ancient times to the present day, man and nature, man and man in the fight are "fight wisdom" first war victory or defeat is not only the soldiers of the "fight courage" is the two generals and marshals "fight wisdom" of the results.

4.7.2. Faith

"Faith" is also a complex concept in Chinese, which can have many semantic meanings, such as credibility, trust, credit, conviction, confidence, -belief, . The author reasoned that as a leader's faith lies in three important points: confidence (self-confidence), other faith (convince others, believe), trust (trust subordinates and others). Thus, it is summarized as: self-confidence, people believe, believe people three elements. One of the important responsibilities of a leader is to encourage the generation of trust, and in order to gain prestige among his subordinates and to exercise command and control functions effectively, the leader must establish prestige by being credible to his subordinates.

4.7.3. Benevolence

"Benevolence" is a broad term in the Chinese definition, and Confucius explained different concepts of benevolence to different students. There are different meanings for benevolence as in "benevolence to the end of righteousness", benevolence as in "succeed or become benevolence", and benevolence as in "the benevolent see benevolence and the wise see wisdom". To have a heart of love for subordinates is one of the basic qualities that a leader must have. Leaders need to rely on people to achieve the cause of a good plan, through the people to realize the decision-making without the support of the people nothing can be done. How much love you have determines how much success you will have.

4.7.4. Courage

"Courage" mainly refers to bravery. Courage is commonly categorized into three levels: first, courage in the face of danger; second, courage to assume responsibility, especially for major difficulties; and third, courage to sacrifice one's life.

"Courage" in the major issues on the bold decision-making courage to adhere to the truth; when encountered in difficult circumstances and non-sense, the leader should not be afraid of difficulties and obstacles and always adhere to the correct direction; when encountered in the unexpected event of the leader should be in a crisis not chaotic, not panic calmly to cope with changes in the fastest possible time to take the best program to solve the problem.

4.7.5. Strictness

"Strictness" is also relatively clear in its Chinese meaning, which is mainly strict and rigorous (severe, stern), serious. The author for their own strict, for others strict, for things strict will be divided into three concepts: strict discipline, strict and clear treatment of people, rigorous work, in order to constitute the three independent aspects of strict.

From the above analysis, it can be seen that Sun Tzu believes that a general should have all the "five virtues", and should not lose one of the five virtues, namely, wisdom, faith, benevolence, courage and strictness. Sun Tzu's idea of "five virtues" plays an extremely valuable role as a reference for the content and requirements of modern leaders' own quality. Leaders should endeavor to cultivate their own "wisdom" as the top of the leadership ability to establish "faith", "benevolence" for the benevolent thought, to develop "courage" and "strict" as the standard leadership style.

5. Discussion and recommendation

5.1. Theoretical contribution

The global business environment has become increasingly dynamic and complex due to rapid advancements in science and technology, along with continuous economic and social progress. This volatility presents new challenges and requirements for top managers navigating their companies. While Western management methods offer valuable guidance, they often need to be adapted to the specific conditions of Chinese companies. Five Virtues Leadership, rooted in Chinese traditional culture, can be viewed from a Resource-Based View (RBV) perspective as a set of intangible resources that are rare, inimitable, and valuable for organizational success. These virtues influence leaders' decision-making processes and shape organizational culture, improving operational efficiency. By developing and validating a measurement for Five Virtues Leadership, this study enhances the understanding of its role and significance in modern management, paving the way for future research.

5.2. Limitations of the study

(1) Depth of Interviews

While the interviews provided rich qualitative data, their depth varied, interviews with experts and government officials were more detailed and in-depth, whereas interviews with some business managers were relatively brief due to industry regulations.

(2) Cultural Context

The study is grounded in traditional Chinese culture and values, which may limit the generalizability of its findings to organizations in other cultural settings. The effectiveness of Five Virtues Leadership in driving innovation and efficiency might vary in environments where cultural norms and values differ from those in China.

5.3. Recommendation

5.3.1. Recommendations for industry practitioners

1) Implement Micro-Learning Modules on Five Virtues Leadership: Rather than relying on traditional training programs, introduce short, on-demand micro-learning sessions (5–10 minutes each) accessible via mobile devices.

2) Establish a "Five Virtues Challenge" Platform: Create an internal online platform where employees can submit ideas or projects that apply the Five Virtues to enhance innovation and efficiency.

3) Launch an "Efficiency Champions" Program: Develop a peer-nominated program where employees can nominate colleagues who demonstrate outstanding performance in time utilization, resource optimization, or brand enhancement and provide frequent rewards.

5.3.2. Recommendations for government

1) Facilitate Research and Development in Five Virtues Leadership: Provide targeted research grants and promote cross-sector collaboration.

2) Strengthen Brand and Market Development: Support global brand expansion and reduce market entry barriers.

5.3.3. Recommendations for next research

1) Larger and More Diverse Samples: Future research should consider incorporating other companies in the Chinese automotive industry, such as imported brand passenger vehicle companies and commercial vehicle companies.

2) Cross-Cultural Comparative Studies: Future research could examine the applicability of Five Virtues Leadership in various cultural contexts.

Author contributions: Conceptualization, YY, BS and CW; methodology, YY, BS and CW; software, YY; validation, YY, BS, CW and CC; formal analysis, YY; investigation, YY and BS; resources, YY; data curation, YY; writing—original draft preparation, YY; writing—review and editing, YY and BS; visualization, YY; supervision, BS, CW and CC; project administration, YY, BS, CW and CC; funding acquisition, YY. All authors have read and agreed to the published version of the manuscript.

Conflict of interest: The authors declare no conflict of interest.

References

- Afum, E., Zhang, R., Agyabeng-Mensah, Y., & Sun, Z. (2021). Sustainability excellence: the interactions of lean production, internal green practices and green product innovation. International Journal of Lean Six Sigma, 12(6), 1089-1114.
- Assensoh-Kodua, A. (2019). The resource-based view: A tool of key competency for competitive advantage. Problems and Perspectives in Management, 17(3), 143.
- Barney, J. (1991). Firm resources and sustained competitive advantage. Journal of management, 17(1), 99-120.
- Bass, B. M., & Stogdill, R. M. (1990). Bass & Stogdill's handbook of leadership: Theory, research, and managerial applications. Simon and Schuster.
- Berrett, J. L. (2020). Burying the Overhead Myth and Breaking the Nonprofit Starvation Cycle: Identifying More Valid Measures and Determinants of Nonprofit Efficiency [Doctoral thesis, North Carolina State University]. Company of China Science Publishing GroupProQuest Dissertations and Theses Full-text Search Platform database.
- Bibi, A., & Afsar, B. (2020). Behavioural courage and its effect on innovative work behaviour of public sector employees: the role of managerial position and gender. International Journal of Public Sector Performance Management, 6(1), 124-142.
- Burches, E., & Burches, M. (2020). Efficacy, effectiveness and efficiency in the health care: The need for an agreement to clarify its meaning. Int Arch Public Health Community Med, 4(1), 1-3.
- Casidy, R., Nyadzayo, M., & Mohan, M. (2020). Service innovation and adoption in industrial markets: An SME perspective. Industrial Marketing Management, 89, 157-170.
- Chan, V. K. (2024). Analogy between Modern Project Management Theory and Sunzi Art of War: Chapters 1 to 4. Procedia Computer Science, 239, 1998-2005.
- Chatterjee, S., Moody, G., Lowry, P. B., Chakraborty, S., & Hardin, A. (2020). Information Technology and organizational innovation: Harmonious information technology affordance and courage-based actualization. The Journal of Strategic Information Systems, 29(1), 101596.
- Chen, D. Z. (2020). Research on Entrepreneur Quality Model Based on Sun Tzu's Art of War. Journal of Binzhou University, 36(5), 28-34.
- Dimovski, V., Maric, M., Uhan, M., Durica, N., & Ferjan, M. (2012). Sun Tzu's " The Art of War" and implications for leadership: Theoretical discussion. Organization, 45(4), 151-158.
- Eisner, S. (2016). The" In-Factor": Signature Traits Of Innovation's Leaders. Journal of Applied Business Research (JABR), 32(1), 185-200.
- Giaccone, S. C., & Magnusson, M. (2022). Unveiling the role of risk-taking in innovation: antecedents and effects. R&D Management, 52(1), 93-107.
- Gkouskos, D., Normark, C. J., & Lundgren, S. (2014). What drivers really want: Investigating dimensions in automobile user needs. International Journal of Design, 8(1), 59-71.

Hall, R. (2009). The strategic analysis of intangible resources. In Knowledge and strategy (pp. 181-195). Routledge.

- Hlavatý, J., & Ližbetin, J. (2021). The Use of the Art of War Ideas in the Strategic Decision-making of the Company. Transportation Research Procedia, 55, 1273-1280.
- Huang, P. M. (2017). Sun Tzu's Art of War. National Library Press.
- Itami, H., & Roehl, T. W. (1991). Mobilizing invisible assets. Harvard University Press.
- Jagtap, S., Garcia-Garcia, G., & Rahimifard, S. (2021). Optimisation of the resource efficiency of food manufacturing via the Internet of Things. Computers in Industry, 127, 103397.
- Liu, C., Gao, M., Zhu, G., Zhang, C., Zhang, P., Chen, J., & Cai, W. (2021). Data driven eco-efficiency evaluation and optimization in industrial production. Energy, 224, 120170.
- Liu, H., & Zhang, H. (2020). The essence of high-quality development of China's automobile trade. Business Culture, (15), 49-58. Northouse, P. G. (2021). Leadership: Theory and practice. Sage publications.
- Pelenk, S. E. (2023). The effect of strategic leadership on product and service innovation: the moderator role of perceived organizational support. International Academic Research and Reviews in Social, Human and Administrative Sciences.
- Piper, M. (2021). Between virtuous and effective leadership. Journal of Character Education, 17(2), 93-102.
- Pynatih, N. M. N., Amrita, N. D. A., & Aripin, Z. (2024). Financial impact of brand strategy: an analysis of key findings and future research prospects. kriez academy: Journal of development and community service, 1(3), 33-46.
- Qiu, L., Jie, X., Wang, Y., & Zhao, M. (2020). Green product innovation, green dynamic capability, and competitive advantage: Evidence from Chinese manufacturing enterprises. Corporate Social Responsibility and Environmental Management, 27(1), 146-165.
- Sengupta, C. (2020). Contextualizing Lessons on Public Leadership in Kautilya's Arthshastra and Sun Tsu's The Art of War: A Comparative Analysis. International Journal of Studies in Public Leadership, 1(1), 1-15.
- Shao, S., Hu, Z., Cao, J., Yang, L., & Guan, D. (2020). Environmental regulation and enterprise innovation: a review. Business strategy and the environment, 29(3), 1465-1478.
- Stogdill, R. M. (1948). Personal factors associated with leadership: A survey of literature. Journal of Psychology, 25, 35-71.
- Tan, L. L., & Wu, S. (2023). Exploring the Pillar Role of China's Automobile Industry in the National Economy. Automotive Industry Research, (01), 10-14.
- Taylor, S. P. (2017). What is innovation? A study of the definitions, academic models and applicability of innovation to an example of social housing in England. Open Journal of Social Sciences, 5(11), 128-146.
- Wang, H., Wang, Y., Ji, X., & Ji, M. (2023). Dialectical leadership behavior and its impact on firm innovation capability and performance: An exploration based on the Chinese culture. Acta Psychologica Sinica, 55(3), 374.
- Wang, M., Li, Y., Li, J., & Wang, Z. (2021). Green process innovation, green product innovation and its economic performance improvement paths: A survey and structural model. Journal of environmental management, 297, 113282.
- Wernerfelt, B. (1984). A resource-based view of the firm. Strategic. Management Journal, 5(2), 171-180.
- WJX Platform. (n.d.). Available online: https://www.wjx.cn/ (accessed on 20 October 2024).
- Xiong, J. P. (2023). New Research on The Art of War: Centered on the Bamboo Slips from the Yinque Mountains. Zhonghua Book Company.
- Zhang, T., Li, S., Li, Y., & Wang, W. (2023). Evaluation of technology innovation efficiency for the listed NEV enterprises in China. Economic Analysis and Policy, (80), 1445-1458.
- Zhang, X., & Nasir, M. H. B. M. (2022). How to Use Sun Tzu's The Art of War to Help Businesses Fulfil Their Corporate Social Responsibility? Journal of World Economy, 1(2), 12-19.