

Evaluation Index System of Enterprise Digital Transformation Based on Balanced Scorecard

Xiaobo Fang^{1*}, Fangxin Zhang², Minoo Ghoreishi³

¹School of Business, Xinyang Normal University, Xinyang, Henan, China

²School of Traditional Chinese Medicine, Beijing University of Chinese Medicine, Beijing, China

³Department of Management and Marketing Lombardo College of Business, Millersville University of Pennsylvania, Lancaster, PA, USA

*Corresponding Author.

Abstract:

In order to overcome the shortcomings of only relying on financial indicators to measure the performance of digital transformation of enterprises, this study is based on the Balanced Scorecard, according to the digitization of financial management, customer service digitization, internal process digitization, learning and growth digitization, determine the operational definition and framework of the digital transformation balanced scorecard, an evaluation index system is designed. Through literature review, this study sorts out the relevant theories of enterprise digital transformation and the balanced scorecard, uses the expert fuzzy Delphi method to discuss the performance evaluation indicators of digital transformation, and revises it through the fuzzy Delphi method. A digital transformation performance evaluation index system with 14 indicators, and this evaluation index system is verified through case studies. In the digital transformation evaluation index system, the customer service digital aspect is a relatively important dimension; the investment strategy is a relatively important indicator in the financial digital transformation dimension; customer satisfaction is a relatively important indicator in the customer service digital dimension; The digital full-time department is a relatively important indicator in the digital dimension of internal processes; there is no particularly prominent indicator in the digital learning and growth dimension. In terms of digital transformation, companies should focus on digitizing customer service, focus on information and data related to investment strategies, and pay more attention to improving customer service quality. The problems arise in digital transformation, and then avoid the occurrence of events that lead to ineffective digital transformation. This article expands the research on the Balanced Scorecard. Previous studies have examined the impact of the Balanced Scorecard on managers' judgment and decision-making performance. Based on case evidence, this paper examines the application of the Balanced Scorecard at different levels within a diversified enterprise. This enriches the researchers' understanding of the applicability of the Balanced Scorecard.

Keywords: *Digital Transformation, Balanced Scorecard, Evaluation Index System.*

I. INTRODUCTION

In the current business environment, it is difficult for companies to rely solely on financial information to assess the success of corporate transformation, because such information often focuses on short-term goals and often ignores factors that affect the company's long-term development. Qualitative business indicators can help manager comprehensive evaluation of business performance.^[1] If an enterprise is to face changes in the economy and society as a whole, it needs to introduce strategic performance evaluation tools.^[2] Therefore, some scholars have pointed out that since the connotation of the company's continuous operation performance has many possibilities, the research conclusions of scholars present various viewpoints. Some scholars believe that the Balanced Scorecard (BS) should be used as a performance measurement standard, and its related framework should be incorporated into the main management system to effectively support the design and implementation of business strategies of enterprises.^[3,4]

In the process of digital transformation, enterprises currently face more or less similar obstacles and bottlenecks, and most relevant enterprises lack the knowledge and skills of digital transformation management and evaluation. Therefore, we plan to use the Balanced Scorecard as a theoretical basis, construct an expert questionnaire through literature research, and propose a digital transformation evaluation index system that can be referenced by enterprises. This research mainly through the literature review, sorts out the relevant theories of enterprise digital transformation and the balanced scorecard, and uses the expert fuzzy Delphi method to discuss the performance evaluation indicators of digital transformation, hoping to serve as a reference for companies to evaluate the performance of digital transformation.

II. LITERATURE REVIEW

2.1 Digital Transformation

Digital Transformation (DT) is not a new concept; it is constantly evolving with technological progress and innovation. Digital transformation means that various organizations, including enterprises, take advantage of the opportunities brought about by digital technology to cope with changes and impacts in the political, economic and social environment.^[5] Digitization is the technological and management innovation that accompanies digital products. Digital transformation is the use of digital technology to change traditional business models and processes, thereby creating new value.^[6]

The development of digital transformation can be divided into two categories. One is based on application-driven and strategic perspectives. From the perspective of corporate strategy, digital transformation emphasizes the overall transformation with customer-driven as the core. In addition to the application of digital technology, it pays more attention to cross-departmental transformation.^[7] Second, the impact level is broader, emphasizing the large-scale use of digital technology to drive systemic reconstruction at the economic, institutional and social levels.^[7]

On the other hand, digital transformation has recently emerged as a way for businesses to gain a competitive advantage. Many studies have found that digital transformation can help companies develop better and more sustainably by analyzing the influencing factors of enterprises' digital transformation and their evaluation of innovation and performance.^[8] The digital transformation strategy of an enterprise consists of four elements: intelligent technology use, value creation, organizational structure change and financial management.^[9] For smaller companies, system hosting guarantees and the flexibility of cloud infrastructure can serve their digital needs well.^[10]

Therefore, digital transformation emphasizes the integration of multiple technologies, which requires the integration of a variety of different technologies into a feasible overall solution. This proposition helps clarify the current business philosophy and business model that enterprises should advocate for digital transformation. Therefore, we use the Balanced Scorecard to discuss the digital transformation of enterprises, and expect to get specific strategic suggestions.

2.2 Balanced Scorecard

Balanced Scorecard (BSC), first proposed by Kaplan and Norton (1993) as a measurement tool of business performance^[11], and then was improved according to the needs of enterprises^[12]. Kaplan and Norton (1993) believe that the BSC measurement is derived from the vision and strategy of the enterprise organization.^[12] It evaluates and measures the performance of the enterprise organization through four aspects: finance, customers, internal processes, and learning and growth.^[13] By virtue of the principles of the Balanced Scorecard, the process of distinguishing the four strategic actions and proceeding according to the process will be able to implement the measurement method of the Balanced Scorecard more completely. It has been applied and fruitful^[14], and it can have the effect of following the roadmap for the strategic construction of enterprises^[15].

The four dimensions of the Balanced Scorecard are Financial Dimension, Customer Dimension, Internal Business Dimension and Learning and Innovation Dimension. .

The management level of the organization should use the balanced scorecard to implement the entire strategy and resource allocation process, and integrate the resource allocation with the strategy. Whether it is long-term budget, strategic action plan, annual budget and human capital investment, the balanced scorecard should be used.^[16] The Balanced Scorecard is a tool that connects the entire organization towards common organizational goals.^[17]

We focus on how to use the Balanced Scorecard to combine strategy and resource allocation in digital transformation.

2.3 Fuzzy Delphi Method

The Delphi method is a prediction method that relies on expert opinions, which can collect opinions

from various aspects and also take into account the independent judgment of experts.^[18] However, in the process of obtaining the opinions of experts, the traditional Delphi method may cause the opinions of experts to be distorted, and may systematically weaken conflicting opinions and suppress different ideas.^[19] Compared with the traditional Delphi method, the fuzzy Delphi method has the following advantages: First, it reduces the number of investigations; Second, it clearly clarifies the individual opinions of experts; Ambiguity was taken into account during the interview^[19]. There are many analysis forms of the fuzzy Delphi method. This study mainly adopts the Fuzzy Delphi Method (FDM) step proposed by Hsu, Lee, & Kreng (2010)^[19].

III. STUDY DESIGN

3.1 Operational Definition and Framework of the Balanced Scorecard for Digital Transformation.

Based on literature review, we adopt the fuzzy Delphi method to design expert questionnaires, collect the opinions of relevant professionals in business and academia through in-depth interviews, and then design the dimensions and indicators of the balanced scorecard for digital transformation of Chinese enterprises. For simplicity of presentation, we abbreviated the four dimensions of the Balanced Scorecard as follows.

Dimension of financial management digitalization is abbreviated as FM. Dimension of customer service digitalization is abbreviated as CS. Dimension of internal process digitization is abbreviated as IP. Dimension of learning and growing digitization is abbreviated as LG. Digital Transformation balanced scorecard framework is abbreviated as BSF.

In order to facilitate filling in the name of the index into the table, we use the abbreviation of its English name as the representative of the evaluation index. The specific abbreviation is shown in Table I. The content of the summary operational definition is shown in Table II and Table III. In addition to establishing the research structure, it will also be used in the next stage of the Fuzzy Delphi analysis.

TABLE I. The abbreviations of evaluation index

| EVALUATION INDEX | AB | EVALUATION INDEX | AB |
|-----------------------------------|-----|--|-----|
| Growth rate of operating revenue | GRR | Number of digital enterprises certified | NDC |
| Investment strategy | IS | Number of internal process digitization projects | ECP |
| Business risk and cost management | BRM | Digitalization degree of management system | DMS |
| Asset utilization | AU | Establishment of internal communication platform | ICP |

| | | | |
|--|-----|---|-----|
| Research and development investment | RDI | Establishment of digital special department | ESD |
| Market share | MS | Employee digital learning effectiveness | ELE |
| Customer satisfaction | CS | Employee satisfaction | ES |
| Customer adhesion | CA | Employee performance | EP |
| Customer Profitability | CP | Human capital accumulation | HCA |
| Customer communication platform utilization rate | CCU | Digitalization of job knowledge management | JKM |

Note: AB = Abbreviation

Table II. Operational definition contents 1

| DM | INDEX | MEANING | PL |
|----|-------|--|------------------|
| FM | GRR | The growth rate of the company's annual operating income after digital transformation. | [4,12,14,20] |
| | IS | Whether the company has a short-, medium- and long-term investment strategic plan for digital transformation, and the investment amount in the past three years. | |
| | BRM | Whether the enterprise has an assessment mechanism for the risks and costs of digital transformation. | |
| | AU | After digital transformation, whether the asset utilization rate is improved as expected is measured by the actual utilization time of the asset/planned asset utilization time × 100%. | |
| | RDI | The amount of R&D spending that the company expects to spend on digital transformation each year. | |
| CS | MS | The proportion of the company's products or services in the same market after digital transformation. | [21,22,23,24,25] |
| | CS | Perceived customer satisfaction with a product or service after digital transformation. | |
| | CA | Whether the customer experience can be improved through digital transformation, which is reflected in the increased trust of customers in the enterprise and the increase in continuous consumption. | |
| | CP | Use digital transformation to reduce the cost of customer service and further increase the profit of a single transaction. | |

| | | | |
|--|-----|---|--|
| | CCU | Build a digital platform for communicating with customers, and through this platform can communicate with customers in real time and effectively, and the usage rate reflects the closeness of the interaction between customers and enterprises. | |
|--|-----|---|--|

Notes: DM = Dimension, PL = Pertinent literature

Data source: This paper organized

Table III. Operational definition contents 2

| DM | INDEX | MEANING | PL |
|----|-------|---|--------------------|
| IP | NDC | The number of domestic and foreign digital transformation related certifications or awards that companies receive each year. | [2,20,25,26,27,28] |
| | ECP | The number of digital projects or new digital projects converted from internal processes of the company each year. | |
| | DMS | The extent to which enterprises use digital management systems to improve management efficiency. | |
| | ICP | Enterprises build and improve effective communication mechanisms between departments and employees through digital transformation. | |
| | ESD | Whether the company has established a dedicated department to be responsible for digitalization | |
| LG | ELE | Number of employee training programs (e.g. educational training hours) or number of employees with relevant professional certifications that facilitate digital transformation. | [16,25,29,30] |
| | ES | Employee satisfaction with the change in personal interests involved in the digital transformation of their company. | |
| | EP | Employees assess whether the digital transformation of the company has a positive impact on their current jobs and improves their job performance. | |
| | HCA | Enterprises can enhance and create employee value through digital transformation, and digital transformation can enable enterprises to cultivate and retain talents for a long time and form human capital. | |
| | JKM | Through digital transformation, enterprises can form a systematic knowledge management system according to the relevant functions of the enterprise. | |

Notes: DM = Dimension, PL = Pertinent literature

Data source: This paper organized

2.1 Materials and Methodology

Based on the operational definition, we construct a balanced scorecard research framework for the digital transformation of Chinese enterprises, as shown in Fig 1.

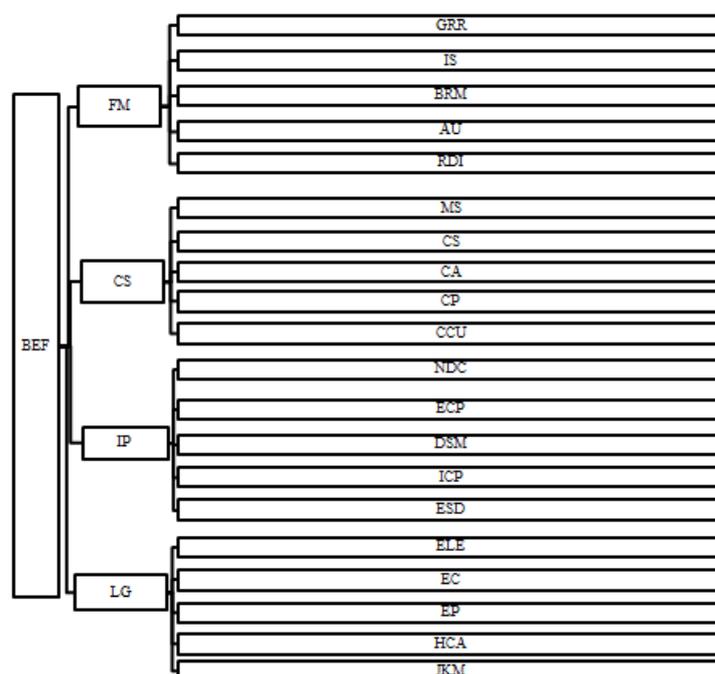


Fig 1: Digital transformation balanced scorecard research framework

3.2 Questionnaire Design and Research Objects

3.2.1 Questionnaire design

The first part is the basic information, which is used as the basis for the reliability of the questionnaire. The main purpose is to improve the feasibility of enterprise digital transformation measurement indicators through expert discussions.

The second part is to discuss the dimension and the degree of the importance of the measurement index. The evaluation value of the questionnaire is designed according to the steps of the fuzzy Delphi method.

3.2.2. Research subjects

A total of 56 experts from industry and academia were interviewed for this study. The interviewed experts are familiar with digital transformation, so they are very suitable as interview subjects; and

interviews and interviews were conducted from October 1, 2021 to October 31, 2021.

3.3 Fuzzy Delphi Analysis Method

In this paper, the fuzzy Delphi method was used to calculate the evaluation index W_i of expert consensus, and based on this, the predicted value Y^* of the index was discussed.

For the calculation of the index evaluation value, the Max-Min Fuzzy Delphi Method^[31], proposed by Ishikawa et al. (1993) was also used in research by many scholars^[18, 32, 33], the operation steps are as follows:

1) Calculate the cumulative degree function $D1(y)$ of the maximum identity degree and the cumulative degree function $D2(y)$ of the minimum identity degree.

2) Mark the "first quartile" "median" and "third quartile" of $D1(y)$ and $D2(y)$ with (Q_{F1}, M_1, Q_{T1}) and (Q_{F2}, M_2, Q_{T2}) represents.

3) The intersection point generated by connecting (Q_{F1}, M_1, Q_{T1}) and (Q_{F2}, M_2, Q_{T2}) is the importance value Y^* of the target.

As shown in Fig. 2, in the distribution function $D2(y)$ of the minimum cumulative number of times of identity of the interviewed experts and the function $D1(y)$ of the maximum cumulative frequency of the degree of identity of the interviewed experts, they are determined by the respective first quartile, the overlap between the median and the third quartile

(Q_{F1}, Y^*, Q_{T2}) is called the gray-scale area intersection point Y^* is the predicted value.

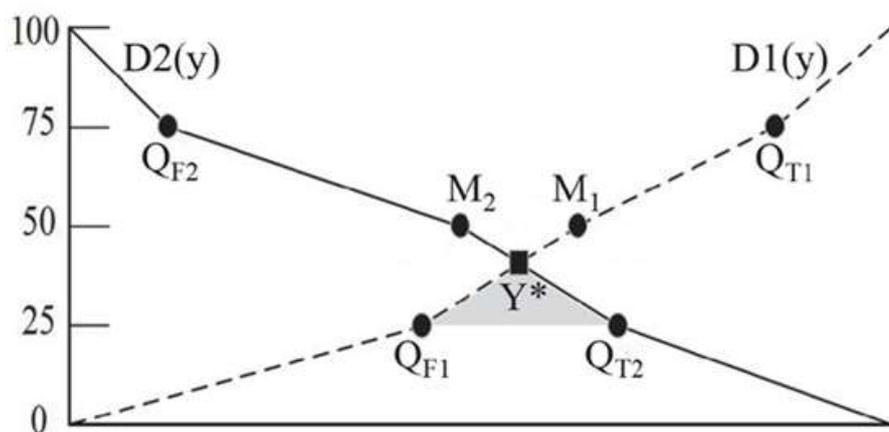


Fig 2: Max-Min fuzzy delphi membership functions and predictions

Notes: the vertical axis is the percentage, the horizontal axis is the evaluation value

Data source: Compiled from Ishikawa et al. (1993) ^[20]

IV. RESEARCH ANALYSIS AND DISCUSSION

4.1 Digital Transformation Balanced Scorecard Analysis Results

This study summarizes the evaluation values of the importance of each aspect and index as shown in Table IV. The overall W_i calculation result suggested by the fuzzy Delphi method is used as the threshold value for screening, and the calculation result is "6.89" as an evaluation value.

TABLE IV. The evaluation value of the importance degree of aspects and indicators

| DIMENSION | INDEX | Q _{F1} | Q _{T1} | Q _{F2} | Q _{T2} | Y* |
|-----------|-------|-----------------|-----------------|-----------------|-----------------|------|
| FM | | 7.5 | 7.5 | 8.5 | 6.5 | 7 |
| | GRR | 7.5 | 7.5 | 9 | 6.5 | 7 |
| | IS | 8 | 8.5 | 9.5 | 6.5 | 7.25 |
| | BRM | 8 | 7.5 | 8.5 | 6 | 7 |
| | AU | 7 | 8.5 | 9.5 | 6 | 6.5 |
| | RDI | 7.5 | 8.5 | 9.5 | 6.5 | 7 |
| CS | | 8.5 | 8.5 | 9.5 | 7.5 | 8 |
| | MS | 7.5 | 8 | 9.5 | 6 | 6.75 |
| | CS | 8.5 | 8 | 9.5 | 7.5 | 8 |
| | CA | 8.5 | 8.5 | 9.5 | 7 | 7.75 |
| | CP | 6.5 | 7 | 8 | 5.5 | 6 |
| | CCU | 7.5 | 7.5 | 8.5 | 6.5 | 7 |
| IP | | 7.5 | 8 | 9 | 6.5 | 7 |
| | NDC | 6 | 7 | 8 | 4.5 | 5.25 |
| | ECP | 7.5 | 7 | 8.5 | 6 | 6.75 |
| | DMS | 7.5 | 8 | 9.5 | 6.5 | 7 |
| | ICP | 7.5 | 7.5 | 9 | 6.5 | 7 |
| | ESD | 8.5 | 8.5 | 9.5 | 7.5 | 8 |
| LG | | 7.5 | 8 | 9 | 6.5 | 7 |
| | ELE | 6.5 | 7 | 8 | 5.5 | 6 |
| | ES | 7.5 | 8.5 | 9.5 | 6.5 | 7 |
| | EP | 7.5 | 8.5 | 9.5 | 6.5 | 7 |
| | HCA | 7.5 | 7.5 | 8.5 | 6.5 | 7 |
| | JKM | 7.5 | 8.5 | 9.5 | 6.5 | 7 |

The data in Table IV shows that a total of 6 indicators did not pass the fuzzy Delphi method. The

indicators "AU" of "FM" failed the screening threshold; the indicators "MS" and "CP" of "CS" failed the screening threshold; the indicators "NDC" and "ECP" of "IP" failed the screening threshold; The indicator "ELE" failed to pass the screening threshold.

According to the results in Table IV, we found that in the digital transformation balanced scorecard, the score of "customer digital service dimension" is 8, which is higher than that of the other three dimensions, and the scores of the other three dimensions are all 7. Showing a fuzzy Delphi method the experts interviewed generally rated the "digital dimension of customer service" as the most important.

After screening by the Fuzzy Delphi method, we reduced the 4 dimensions and 20 indicators of the digital transformation Balanced Scorecard we originally constructed to 4 components and 14 indicators, and revised the digital transformation using the Fuzzy Delphi method. The structure of the balanced scorecard is shown in Fig 3.

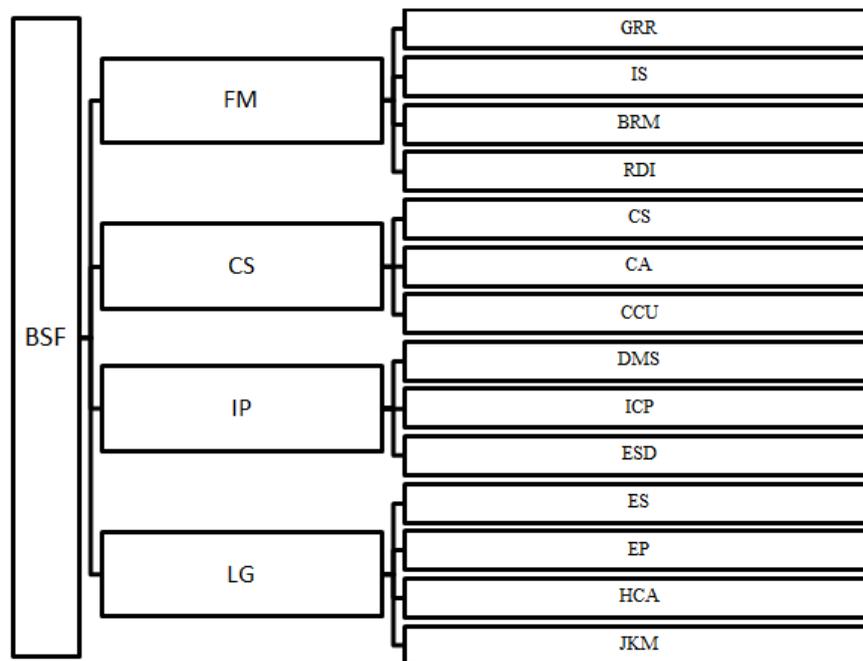


Fig 3: framework of the balanced scorecard for digital transformation modified by the fuzzy Delphi method

V. CASE STUDT OF DIGITLIZATION OF HUACHANG TAXI COMPANY

5.1 Financial Management Digitalization

5.1.1 Growth rate of operating income

Huachang Taxi Company (HTC) has been committed to digital transformation for nearly 10 years. In addition to the continuous growth of operating income, the profit structure has also undergone a qualitative

change. HTC's 2021 operating income is 389million Chinese Yuan (RMB), and after-tax profit is 54 million RMB. Compared with 2020, the operating income will increase by only 3%, but the after-tax profit will increase by 18%. In addition to operating taxis, HTC has also developed various businesses to form a diversified operation pattern, and has built 95688 (the number for calling a taxi) through the APP into an information service platform for citizens to provide food, clothing, housing and transportation. So far, in 2021, the company's taxi operating income will only account for 35% of the overall operating income.

5.1.2 Investment strategy

With the popularity of mobile payment, HTC continues to improve the customer service APP, trying to learn the simple design and user-friendly operation of the competitor's service platform, adding functions such as assistance in finding lost items and security guarantees for sharing paths. The target of the competition is Didi Taxi's customer service application APP, which allows customers to clearly know the location of the vehicle, arrive in a few minutes, estimate the fare amount to the destination, and record the ride information and fare receipt on the APP. Secondly, passengers can also make multiple mobile payments through the APP. As of December 2021, the proportion of non-cash charges has reached 70% of HTC's cash flow. On the other hand, passenger consumption data can be further mined to provide personalized services refer to.

5.1.3 Operational risk and cost management

In the process of digital transformation, different changes have been made to HTC's fee structure. Generally, yellow taxis charge a fixed monthly fee of 1,000 RMB, and 1 RMB for each dispatch task, and the driver will take 15% of the actual fare of the meter as a service for a diversified taxi team established. Fee (DIDI TAXI charges 25-30% to the driver). This move has brought continuous operating income to the company.

5.1.4 R&D expenses

HTC took the lead in launching APP for car-hailing in 2011. At that time, it already understood the development trend of smart phones in the future. Although in the past, passengers made 95688 service calls from their mobile phones, they were answered manually and shared profits with telecom companies. HTC has a higher income every month. . The APP version 2.0 was launched in 2014. Although Didi Taxi had been in Hubei Province for a year at that time, the design concept was still based on the car-hailing function. In 2016, the third year after Didi Taxi entered Hubei Province, it has been widely praised in the market, and HTC is under tremendous pressure at this time. HTC officially transformed into a platform organization in 2018 to build a travel service ecosystem for citizens. At present, HTC's IT R&D department has reached 70-80 people, making it the department with the largest number of employees in the company.

5.2 Customer Service Digital Dimension Analysis Analyses

5.2.1 Customer satisfaction

In response to the competition from Didi Taxi, HTC has relaxed the qualifications and models of drivers to join, and provided more models and colors of taxis for passengers to choose from. HTC has launched a diversified taxi APP platform for car-hailing services, and the car still needs to be equipped with digital Taximeter, billed by meter, the difference between diversified taxis and ordinary taxis is: (1) the car is not yellow, (2) it is not allowed to cruise without passenger, (3) the appearance of the vehicle does not need to hang taxi lights and identification signs. Although there is no flexible rate pricing, it provides passengers with more choices, including providing high-end cars and coach rentals. The average age of diversified drivers is also lower than that of ordinary taxi drivers, with an average of 30-45 years old, and the degree of mastery of new technologies is also higher. Since the launch of the diversified taxi service, the net increase of about 100 units has been achieved every month. From the initial provision of services in Wuhan city area, it has expanded to all parts of Hubei Province, and has grown to 1,700 cars by 2021.

5.2.2 Customer stickiness

HTC's flexible tariff strategy for Didi Taxi is limited by the government's price control and cannot make price adjustments, and can only charge fares by meter. HTC's countermeasures are to improve service quality, make APP operation more convenient, and strengthen the manual service of the call center. For example, the search for lost items, the efficiency and satisfaction of handling complaints from passengers, and the provision of more diversified non-cash payment methods to provide passengers with some discounts on rides. In addition, HTC installed cash registers in taxis, from the first generation of cash registers to the sixth generation of cash registers in 2020, they are all physical machines. When Diversified Taxi was launched in May 2020, the cash register was replaced by an APP interface on the diversified taxi. It is expected that in December 2022, the traditional cash register will be fully replaced by an APP. Didi Taxi entered Hubei Province and did not provide manual online services, but HTC turned the manual service of its own customer service center into a special service. In addition to vigorously promoting the online service of robots, it also retains the manual services that some passengers like, strengthens the handling of passenger complaints and the search for lost items, and helps drivers solve problems in online order dispatch in a timely manner to further improve service quality.

5.2.3. Utilization rate of customer communication platform

In response to the competition brought by Didi Taxi's entry into Hubei Province, China, HTC designed an APP with multiple functions in its APP 7.0 version, so that passengers can clearly know the location of the vehicle, arrive in a few minutes, and estimate the destination. The fare amount of the place is recorded, and the ride information and fare receipt are recorded in the APP. Second, passengers can pay directly with their mobile phones when they get off the bus. According to current statistics, the proportion of passengers

using APP platform services has exceeded the previous 95688 telecom code service, reaching 70%.

5.3 Analysis of Internal Process Digitalization Facet

5.3.1 Degree of digitalization of management system

In April 2016, HTC followed up with Didi Taxi to launch mobile phone binding credit cards. At this time, taxi drivers no longer objected, but believed that it was an irreversible trend in the future, and it was also a must-have tool for them to make a living. HTC's APP provides not only credit cards, but also third-party payment services such as WeChat and Alipay in terms of binding credit cards to mobile phones, making it a multi-payment platform. As of December 2021, the monthly non-cash fare payment amounted to nearly RMB 60 million. Didi Taxi has swept the world with disruptive innovation, subverting the thinking of some traditional taxi operations. For HTC, instead, it has found an opportunity for reform in the crisis. Through the non-cash charging system, it can grasp the operating status of each taxi in real time.

5.3.2 Internal communication platform

Increasing non-cash income, exchange procedures will indeed increase the settlement time between drivers and companies, so HTC has launched a driver version of the e-wallet to solve this problem. The driver version of the e-wallet has a variety of options, which can be directly transferred to your own bank account through the APP, or deducted related to the company's payment, or directly to the company to receive cash, or transfer to the supplier that cooperates with the company. For example, at a Sinopec gas station, drivers do not need to pay cash and banknotes for refueling, but can be deducted from the amount of the electronic wallet, and they can also enjoy the discounts provided by the gas station. In the face of technological innovation and the process of subversive thinking, it moderately retains its original advantages, and adopts a gradual integration of old and new in some aspects, overcoming the difficulties of digital transformation.

5.3.3 Establishment of a full-time enterprise digital department

HTC set up a full-time enterprise digital department in 2001. The department's main task in 2001 was to introduce the Singapore Cablink satellite dispatch system. At that time, the brand-new taxi dispatch mode (i Call system) replaced the traditional business mode of roadside parking, telephone taxi and radio taxi call, and applied advanced technology development to expand the source of passengers, improve service efficiency, and avoid drivers. Taking too long to wait for passengers increases the driver's productivity. Through the application of satellite dispatch technology and other related technologies, at that time, HTC's empty rate was only 40%, while the average empty rate of taxis in Wuhan was about 70% during the same period. Subsequently, due to the implementation of the APP upgrade and digital transformation strategy, HTC's IT department has now become the department with the largest number of employees. In addition to maintaining the original business, it has also revised the APP for service innovation and further increased platform functions. HTC has always built its own the digital full-time

department has not outsourced this part of the business to ensure that the company's operating data will not be leaked to the outside world, and the accumulated data can provide support for the company's digital transformation.

5.4 Analysis of Digital Dimensions of Learning and Growth

5.4.1 Employee satisfaction

HTC has made improving employee satisfaction one of its digital transformation tasks. For example, car maintenance, which accounts for a large amount of driver operating expenses, HTC will use its existing vehicle maintenance operation experience to set up a subsidiary to provide vehicle maintenance services for taxis. Another example is the group purchase of labor protection products. Because the company has a large number of drivers, the company can obtain more discounts by virtue of the larger purchase volume, which reduces the purchase cost, so it can be sold to drivers at a very low price. Compared with the general public, drivers are very price-sensitive, and the labor protection products provided by the company are very popular among drivers because of their low prices.

Last but not least, because drivers are self-employed and lack credit data such as income certificates recognized by banks, it is difficult for them to establish a credit record in the financial system to obtain bank loans. In view of the pain points of drivers, HTC applied data analysis technology to the digital transformation platform, built a credit scoring model, and launched "driver credit points". Using the long-term accumulation of big data on the driver's work behavior, including service quality evaluation, passenger capacities, and the amount of non-cash payment by passengers, as well as the driver's monthly payment record, etc., are incorporated into the credit evaluation model to help drivers obtain credit scores. And then obtain a reasonable loan amount and interest rate in the banking system. This maximizes the advantages of local operations and assists taxi drivers in defending against competition from foreign taxi companies in the powerful platform industry, which is a model for the digital transformation of local enterprises.

5.4.2 Employee performance

HTC's APP also provides a passenger evaluation mechanism. Passengers can rate the service after the ride, giving five stars to the most satisfied, one star to the least satisfied, and openly allow passengers to provide opinions. The main thing is to hope that passengers can click on the four options to encourage drivers (good service attitude/good in-car environment/comfortable ride/convenience of payment) when they give good reviews. HTC can use these options to judge the driver's work performance. And the six options of negative comments (poor service attitude/poor in-car environment/poor driving behavior/disputed fare amount/driver refuses to swipe the card/abnormal card swipe device) can help the company understand the deviation of the driver in the service process Or passengers are dissatisfied, and based on this, the abnormal driver will be recalled for special education and training, and communication and correction of their service concept will be carried out.

5.4.3 Human capital accumulation

HTC emphasizes that employee training is an important part of digital transformation. Through training, it accumulates human capital education and cultivates the company's competitive advantage. While Didi Taxi manages drivers in a platform model and uses a scoring mechanism to eliminate drivers or decide the dispatch rate, it seems to save a lot of management costs, but the essence of the service is human nature. When drivers are regarded as a computer-controlled tool, they rely entirely on computer programs. , and does not include management of emotional factors, ignoring that technology always comes from human nature. Drivers still need human care in the end, and work has enthusiasm.

In addition, HTC also conducts E-based management through electronic Internet devices (computers, mobile phones, tablet computers), including online education and training, notification of policies and regulations, and two-way communication with managers.

5.4.4 Digitalization of job knowledge management

In the process of digital transformation, HTC has subtly turned disadvantages into opportunities, learned from competitors, continuously improved service quality, and made good use of the advantages of having many local partners to carry out horizontal cross-industry cooperation and vertical value chain integration, from the original business The model has been transformed from a "taxi company" to a "life platform", leveraging the economies of scale of the "unilateral market" of drivers, and driving a one-stop car-hailing service industry chain; leveraging bilateral network externalities, binding passengers' mobile phones to credit cards Cash flow strengthens the lock-in effect of drivers and passengers, builds high exit barriers, and successfully retains the supply side (drivers) and the user side (passengers). Finally, in recent years, HTC has used the 95688 car-hailing APP to drive the "multi-sided platform" business of Life Manager to provide customers with multiple services.

In the beginning, HTC responded to Didi Taxi's competition by responding to many innovations in APP technology and service processes, and instead got an opportunity for digital transformation and development. While HTC has made a number of changes, it also maintains the vertical integration advantage that Didi Taxi does not have, which is the so-called localization advantage, maintaining its market leadership, and its platform business model also lays a good foundation for digital transformation.

VI. CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

This research constructs a preliminary research structure through literature research, designs balanced scorecard dimensions and indicators, and sorts out a total of 4 major dimensions and corresponding 20 digital transformation balanced scorecard indicators. In addition, we interviewed industry-academia experts in the fuzzy Delphi method to obtain more accurate digital transformation indicators, and finally

adjusted to 14 indicators, a total of 6 evaluation indicators were deleted. This study summarizes the following research conclusions.

6.1.1 The customer digital service aspect is an important aspect of the digital transformation balanced scorecard

This study found that experts generally pay attention to the aspects of customer digital services, with an importance level of 8. We speculate that the reason for this is that, as the consumer market becomes increasingly digitized, experts may believe that the digitization of customer service is the most helpful in capturing customer value.

6.1.2 Investment strategy is an important indicator in the dimension of financial digital transformation

The results of the study point to an important indicator of "investment strategy" in the dimension of financial digital transformation (importance level of 7.25). Digital transformation is a major decision and investment in business operations. Since it is to transform, companies must increase their investment in digitalization.

6.1.3 Customer satisfaction is a relatively important indicator in the dimension of customer digital services

This study found that "customer satisfaction" is an important indicator for creating digital transformation effects in the dimension of customer digital services (the importance level is 8). Therefore, it is necessary to pay more attention to the opinions of customers in order to facilitate the success of digital transformation.

6.1.4 The establishment of a digital professional department in an enterprise is a relatively important indicator in the digital aspect of internal processes

This study found that "the establishment of a full-time enterprise digitalization department" is an important indicator in the internal process digitalization dimension (the importance level is 8). This shows that the digital professional department plays an important role in the digital transformation of enterprises.

6.1.5 The importance of each indicator in the digital dimension of digital learning and growth is consistent

The results of the study point out that, except for the deleted "employee digital learning effectiveness", the importance of each indicator in the digital learning and growth dimension is consistent, in other words, there is no particularly prominent indicator. It may be that the digital learning level of employees in Chinese enterprises is generally not high, so the experts we interviewed did not pay much attention to digital learning of employees.

6.2 Recommendations

Based on the research conclusions, we have compiled the following suggestions, which we hope to provide reference for enterprises to implement digital transformation strategies.

In terms of digital transformation, enterprises should focus on the digitization of customer services, such as the digitization of customer relationship management, and the provision of customized product services based on digital platforms to customers. It is suggested that when planning digital transformation, enterprises should pay more attention to the relevant information and data of investment strategy, and design a strategic map accordingly, so that enterprises can achieve good performance in the aspect of financial digital transformation.

Customer satisfaction is an important indicator of digital transformation. Therefore, it is suggested that when enterprises implement digital transformation, they should pay more attention to the quality of customer service to ensure that the goal of digital transformation can be successfully achieved.

This study found that "the establishment of a professional digital department in an enterprise" is the most important indicator that can create the success of digital transformation of an enterprise in the aspect of internal process digitalization. Therefore, it is suggested that if enterprises plan to carry out digital transformation, they should establish a professional digital department of the enterprise to effectively and real-time grasp the problems arising from the digital transformation of the enterprise, so as to avoid the occurrence of events that lead to low digital transformation effect.

6.3 Study Limitations

When constructing the dimensions and indicators of the digital transformation Balanced Scorecard, we use the method of literature induction to collect indicators, and rely on the opinions of experts in the industry and academia to focus, which may result in imperfect consideration of indicators. It is recommended that future research include other possible important indicators make the overall research structure more complete. This study uses the fuzzy Delphi method to interview experts, and it is recommended that follow-up research target company executives and collect data through questionnaires. Use these data to validate our designed evaluation metrics.

ACKNOWLEDGEMENTS

This research was supported by Science and Technology Planning Project of Henan Province of China (soft science research), grant number 212400410095.

REFERENCES

- [1] Poister, T. H., Pasha, O. Q., & Edwards, L. H. (2013). Does Performance Management Lead to Better Outcomes? Evidence from the U.S. Public Transit Industry. *Public Administration Review*, Vol. 73(4), pp.625-636.
- [2] Pérez, C. Á., Montequín, V. R., Fernández, F. O., & Balsera, J. V. (2017). Integration of Balanced Scorecard (BSC), Strategy Map, and Fuzzy Analytic Hierarchy Process (FAHP) for a Sustainability Business Framework: A Case Study of a Spanish Software Factory in the Financial Sector. *Sustainability*, Vol. 9(527). doi:10.3390/su9040527
- [3] Figge, F., Hahn, T., Schaltegger, S., & Wagner, M. (2002). The sustainability balanced scorecard linking sustainability management to business strategy. *Business Strategy and the Environment*, Vol.11, 269-284.
- [4] Falle, S., Rauter, R., Engert, S., & Baumgartner, R. J. (2016). Sustainability management with the sustainability balanced scorecard in SMEs: findings from an Austrian case study. *Sustainability*, Vol. 8(6), pp.1-16.
- [6] i-SCOOP (2018). "Digital transformation: online guide to digital business transformation". Available at <https://www.i-scoop.eu/digital-transformation/>
- [7] Correani, A., De Massis, A., Frattini, F., Petruzzelli, A. M., & Natalicchio, A. (2020), "Implementing a Digital Strategy: Learning from the Experience of Three Digital Transformation Projects", *California Management Review*, Vol. 62(4), pp.37-56.
- [8] Bedell-Pearce, J. (2018), "Safe digital transformation for SMEs", *Network Security*, Vol.11, pp.6-7.
- [9] Matt, C., Hess, T., & Benlian, A. (2015). Digital Transformation Strategies. *Business & Information Systems Engineering*, Vol.57, pp.339-343.
- [10] Schuchmann, D., & Seufert, S. (2015). Corporate learning in times of digital transformation: a conceptual framework and service portfolio for the learning function in banking organisations. *International Journal of Advanced Corporate Learning*, 8(1).
- [11] Kaplan, R. S. & Norton, D. P. (1993). Implementing the Balanced Scorecard at FMC Corporation: An Interview with Larry D. Brady. *Harvard Business Review*, Vol.Sep-Oct, pp.143-147.
- [12] Kaplan, R. S. & Norton, D. P. (1996).*The Balanced Scorecard: Translating Strategy into Action*. Boston, MA: Harvard Business School Press.
- [13] Kaplan, R. S. & Norton, D. P. (1993). Implementing the Balanced Scorecard at FMC Corporation: An Interview with Larry D. Brady. *Harvard Business Review*, Vol. Sep-Oct, pp.143-147.
- [14] Chung, C. C., Chao, L. C., Chen, C. H., & Lou, S. J. (2016). A Balanced Scorecard of Sustainable Management in the Taiwanese Bicycle Industry: Development of Performance Indicators and Importance Analysis. *Sustainability*, Vol. 8(6), pp.518-538.
- [15] Möller, A. & Schaltegger, S. (2013). The Sustainability Balanced Scorecard as a Framework for Eco-efficiency Analysis. *Journal of Industrial Ecology*, Vol. 9(4), pp.73-83.
- [16] Benlemlih, M. & Cai, L. (2019). Corporate environmental performance and financing decisions. *Business Ethics: A European Review*. doi:10.1111/beer.12257.
- [17] Green, W. J. & Cheng, M. M. (2019). Materiality judgments in an integrated reporting setting: The effect of strategic relevance and strategy map. *Accounting, Organizations and Society*, Vol.73, pp.1-14.
- [18] Martini, L. K. B. & Suardanab, I. B. R. (2019). Company Performance Measurement Applying Balanced Scorecard Approach. *International Journal of Social Sciences and Humanities*, Vol. 3(1), pp.7-13.
- [19] Hsu, Y. L., Lee, C. H., & Kreng, V. B. (2010). The application of Fuzzy Delphi Method and Fuzzy AHP in lubricant regenerative technology selection", *Expert Systems with Applications*, Vol. 37(1), pp.419-425.
- [20] Sebastian, I., Ross, J., Beath, C., Mocker, M., Moloney, K., & Fonstad, N. (2017). How Big Old Companies Navigate Digital Transformation. *MIS Quarterly Executive*, Vol. 16(3), pp.197-213

- [21] Keramati, A. & Shapouri, F. J. (2016). Multidimensional appraisal of customer relationship management: integrating balanced scorecard and multi criteria decision making approaches. *Information Systems and e-Business Management*, Vol. 14(2), pp.217-251. doi: 10.1007/s10257-015-0281-8
- [22] Nouicer, H., Zaim, I., & Abdallah, L. B. (2017). Explaining the impact of a customer-oriented strategy on the small and medium-sized enterprises' (SMEs) global performance: Lessons from the Balanced Scorecard and the CUSTOR scale model. *International Journal of Technology Management & Sustainable Development*, Vol. 16(3), pp.249-270.
- [23] Abagissa, J. (2019). The assessment of Balanced Scorecard Implementation in the commercial bank of Ethiopia: the case of the three branches in east addis. *Journal of Public Administration, Finance and Law*, Vol.16, pp.75-87.
- [24] Dinçer, H., Bozaykut-Buk, T., Emir, Ş., Yuksel, S., & Ashill, N. (2019). Using the fuzzy multicriteria decision making approach to evaluate brand equity: a study of privatized firms", *Journal of Product & Brand Management*, Vol. 29(3), pp.335-354.
- [25] Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *Journal of Strategic Information Systems*, Vol.28, pp.118-144.
- [26] Kopecka, N. (2015). The balanced scorecard implementation, integrated approach and the quality of its measurement. *Procedia Economics and Finance*, Vol.25, pp.59-69.
- [27] Hu, B., Leopold-Wildburger, U., & Strohhecker, J. (2017). Strategy map concepts in a balanced scorecard cockpit improve performance. *European Journal of Operational Research*, Vol.258, pp.664-676.
- [28] Modak, M., Ghosh, K. K., & Pathak, K. (2019). A BSC-ANP approach to organizational outsourcing decision support—A case study", *Journal of Business Research*, Vol.103, pp.432-447.
- [29] De Andrade, J. B. S. O., Garcia, J., De Andrade Lima, M., Barbosa, S. B., Heerdt, M. L., & Berchin, I. I. (2018). A proposal of a balanced scorecard for an environmental education program at universities", *Journal of Cleaner Production*, Vol.172, pp.1674-1690.
- [30] Zhang, Q., Cao, M., Zhang, F., Liu, J., & Li, X. (2018). Effects of corporate social responsibility on customer satisfaction and organizational attractiveness: A signaling perspective", *Business Ethics: A European Review*. doi:10.1111/beer.12243.
- [31] Ishikawa, A., Amagasa, M., Shiga, T., Tomizawa, G., Tatsuta, R., & Mieno, H. (1993).The Max-Min Delphi Method and Fuzzy Delphi Method via Fuzzy Integration. *Fuzzy Sets and Systems*, Vol. 55(2), pp.241-253.
- [32] Kuo, Y. F. & Chen, P. C. (2008). Constructing performance appraisal indicators for mobility of the service industries using Fuzzy Delphi Method. *Expert Systems with Applications*, Vol.35, pp.1930-1939.
- [33] Brunelli, M. & Mezei, J. Z. (2013). How different are ranking methods for fuzzy numbers? A numerical study. *International Journal of Approximate Reasoning*, Vol. 54(5), pp.627-639.