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ARTICLE

A Talk on the Essence of Circular Cities

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ABSTRACT

Research on the essence of policy implementation is the basis for finding solutions. A circular city is founded on the concept of a circular economy, extending from the recycling of single substances to regional resource recycling development. Given limited energy and resource conditions, the emphasis lies in considering right from that source that at the end of a product's service life substances can continue to enter their cycle of re-use and re-utilization. Meanwhile, residual substances can return to the industry and organisms as basic nutrients. The development of circular cities has to be multi-faceted synergetic promotion. Otherwise, it will be deviating from the meaning of the circular essence. In this study, the sustainable development of environment, economy, society and governance aspects were adopted as the starting point for exploring the connotation of the promotion of circular cites. The semi-structured expert interview was adopted as the research method. The pyramid principle was employed to carry out logical inference. The Fishbone Diagram was used to carry out time series analysis in order to ensure relevant requirements do not deviate from the mindset of circular essence during circular city planning. Finally, the 13 circular city planning solutions proposed in the research results and contribution can be specifically provided to agencies engaged in circular city planning and governance. They shall also serve as a reference for circular city solutions.

1. Introduction

The promotion of circular cities starts from defining the essence of circular economies. With essence as the starting point, it can ensure the research and analysis process does not deviate in direction. Circular economies emphasize that right from the product design phase consideration must be given to regarding the materials of different product parts as completely "recyclable" resources (hereinafter referred to as resources) at the end of the product's service life. They can also return to the biological or industrial circular system through decomposition, splitting and reduction procedures, which is the "Cradle to Cradle." C2C mindset. With the concepts and practices of circular economies gradually receiving attention from countries around the world, many countries and cities have begun proposing solutions suitable for the development of their cities.

The concept of circular economies in the narrow sense only takes into consideration transforming a previous

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linear economic model into a circular model. That is, the basic mindset of short-term circulation is gradually converted into a continuously recycled long-term mindset. To achieve sustainable development, considerations from products alone will result in limited promotion effectiveness. The promotion of circular economies is a synergetic and integrative strategy involving multi-layer participation. It has to start from the concept of circular economies in the broad sense. The scope also involves the formulation of circular city-related laws and regulations, geographical environment, industrial R&D momentum, disposal technology, supply chain, the public's consumption quality, market supply and demand and other collaborative operations-related issues. To achieve the long-term goal of sustainable development, we must have more extensively incorporated the circular economy mind into the connotation of sustainable development.

From personal consumption behaviors, group awareness, procurements of enterprise organizations, supply chain integration, city resource recycling, to national policy level, the direction of circular city implementation is an issue involving the overall integrative planning of a city. This study pointed out such an existing problem. The discussion focused on returning circular cities to their "essence." Multi-faceted synergetic package policies and synergetic links must take different aspects into multi-layer consideration in order to bring out synergistic effects. As shown in Figure 1, the complete-cycle circulation of resources must be measured from the source. It is the main core significance that motivated this research.

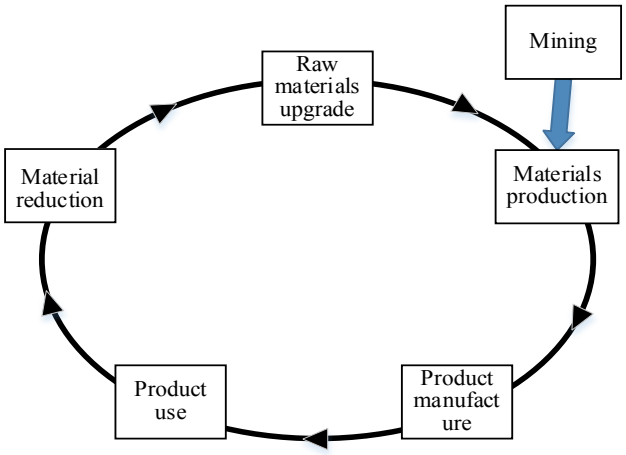

Figure 1. Schematic diagram of a complete cycle of circulation

2. Literature Review

2.1 Circular Economy

The idea of circular economies is the anticipation that various products in use can be more robust, durable, and long-lasting. Moreover, it is the development of renewable energy and the concept of synergy among business, and social actors. Through economic models, positive social and environmental effects can be provided [1]. The circular economy is a sub-issue under eh green economy issue. The United Nations Environment Programme launched the Green Economy Initiative in 2010. The production and consumption patterns in four aspects listed below are taken into account: (1) Improve human welfare; (2) cater to social justice; (3) Avoid the depletion of natural resources; (4) Control environmental risks. The Toward the Circular Economy Report was released at Davos World Economic Forum in Switzerland in 2014. The opportunities and challenges of future global economies terraformed into circular economies were discussed. The report's focuses are as follows: (1) The concept of circulation not only promotes economic growth, but also creates long-term employment opportunities; (2) The circular economy is gradually achieving growth and moving towards globalization; (3) Supply chains will play a vital role in circular economies [2]. A "circular economy" is conceptualized by designing a recoverable and regenerative industrial system, replacing the end of a product's service life with recycling and regeneration and redefining products and services. At the same time, the negative impacts of waste on the environment can be minimized[3]. Waste disposal remains the most important challenge in global waste management. One of the most important objectives of the European Union is to achieve the sustainable development of waste management [4]. Therefore, legal norms and executions are necessary for reducing or stopping the landfill disposal of organic waste [5].

2.2 Circular Cities

There has been a trend towards the development of circular cities in recent years. In 2017, the Ellen MacArthur Foundation specifically pointed out several benefits of a circular economy on a city's policy objectives in the article "Cities in the circular economy: an initial exploration:" (1) it alleviates municipal budgetary pressure; (2) it increases disposable income; (3) it encourages an innovative urban economy; (4) it reduces carbon emissions; (5) it increases urban livability; (6) It produces positive effects especially for increasing employment opportunities [6]. Amsterdam in the Netherlands has incorporated the concept of circular economy into its city governance. Transitioning from the traditional economy towards a circular economy,

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seven principles are complied with, including: Closed loop, Reduced emissions, Value generation, Modular design, Innovative business models, Region-oriented reverse logistics, and Natural systems upgradation. They are used to define the vision of circular cities and action road map [7], which encourage the use of a systematic mindset to provide economic, social and environmental benefits. At the same time, the quality of life is also expected to be improved. In recent years, the circular economy in Taiwan has achieved rapid development, which has been implemented in the livelihood industry. Taiwan's active involvement in the promotion is no less than other countries or regions. Taiwan's Ministry of Economic Affairs, R.O.C. (MOEA) proposed the circular economy promotion plan at the end of 2018 to promote circular technology and material innovation R&D and special zones, construct circular demonstration parks, promote resource integration and industrial symbiosis, and promote green consumption and transactions, four strategies in all. In addition, the two focuses of circular industrialization and industrial circulation serve as the core of the overall governance strategy in Taiwan's circular economy [8]. Taiwan's Taipei City Government officially proposed the Circular Taipei Planning White Paper in July, 2018. With moving towards four environmental, social, economic, and cultural aspects as the sustainable development objective, eight development routes were developed, including: Water Recycling, Energy Optimization, Ecosystem Enhancement, Zero Waste, Shared Mobility, Sustainable Housing, Industrial Innovation and Civic Education. In conjunction with the 17 items of contents, Taipei City's 2018-2022 governance policy blueprint underwent planning to actively head towards circular city promotion.

4. Research Method

4.1 Expert Interviews

The semi-structured expert interview method was adopted. Compared to structured questionnaires, the semi-structured expert interview method can better obtain respondents inner thoughts, thereby accurately understanding their semantics and making up for the inadequacy of the questionnaire contents and scope. In particular, in policy and evaluation system research, the semi-structured interview method is used to play a role in guiding respondents' professional discussion, allowing them to focus on the research objectives. During the expert interview process, the expert interviews were conducted in a relaxing manner as much as possible. The interviewer needed to actively lead the entire interview process to avoid deviating from the research topic and avoid making the interview process too rigid or overcautious.

4.2 Mind Mapping

Mind mapping has been widely applied in various fields. The author in this paper used this method to engage in the hierarchical analysis of smart green building evaluation operations in 2015. The research contents and results were clearly demonstrated by means of mind mapping [9]. Therefore, this study also applied this method to compile the analytical operation hierarchies mad help the team to more explicitly gather collective wisdom and elicit the ideas of each member during research issue discussion.

4.3 Essential Analysis Method

The Essential Analysis Method (EAM) is applied in exploring the hidden causes behind the representation of various problems or variables that possibly exist. Dr. Chang used the EAM method in 2018 to conduct a comprehensive analysis of essential fusion problems faced in cross-strait education systems, teaching models, cultural backgrounds, and mindsets[10]. In 2019, the EAM was applied to conduct an essential research on industrial circular economy [11]. In the article, it is clearly pointed out that if a product fails to include greenhouse gases into the resource recycling life cycle system for review during the process of recycling or use, it will not only result in more resource consumption, but will also increase environmental loads. EAM can be applied in discussing whether or not policy implementation and a system are deviating from the original set goal essence to find the key problems. EAM is a multi-faceted in-depth discussion targeting the main issues. Impact factors possibly related are proposed to effectively review possible causes behind problems. This will help a team more precisely propose solutions targeting existing problems. In particular, when effective solutions for existing problems fail to be proposed, a more balance solution can be employed.

5. The Analysis of the Essence of Circular Cities

5.1 The Basic Mode of Circulation

Based on the essence of life cycle and recycling, from the mining of raw ore (or raw materials) to the end of a product's service life, it can be divided into six stages as the basis for subsequent analysis. The basic model of the life cycle of resource recycling is as shown in Figure 2. The initial essential goal of a circular economy is to reduce resource mining, and the final goal is to ensure all

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substances enter the cycle maximally. The respective stages of a product life cycle, in principle, cannot be detached from six stages. The mining stage can be regarded as the source of raw materials acquisition. Finally, in the final stage at the end of a product's service life, maximum substance recycling and re-use need to be achieved.

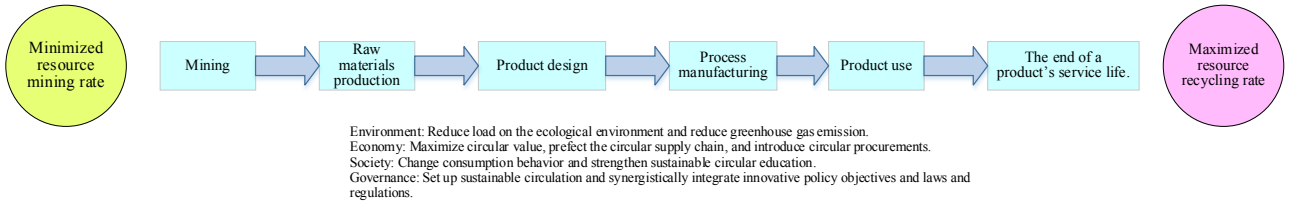

Figure 2. The life cycles of various substance cycles

A life cycle is way of expression in time series. With objectives from four aspects, namely, environment, economy, society, and governance, the analysis contents in different stages can be defined. Subsequently, through expert questionnaires and interviews, the key and secondary factors possibly arising in each stage were analyzed. These impact factors will aid us in discussing factors that actually affect the environment during the process of materials recycling.

5.2 The Conduction of Semi-structured Expert Interviews

Compared to essential researches circular economies, circular cities cover a wider range of discussions. In addition to referring to the current global research data on circular city planning, the research team also invited experts from industry, government, academia, and research related fields to provide professional insights. The interview process and description are as shown in Figure 3. The distribution ratios of expert respondents' fields. Classification was carried out according to the natures of the respondents' units and professional fields. In order to meet the requirements in this research, the education and work qualifications of the invited respondents are limited to those with at least a master's degree or a degree in engineering and related qualifications. Moreover, they must have more than eight years of experience in practical operations at their professional posts or related research. As shown in Figure 4, in response to the research requirements, 32 experts and scholars accepted the invitation to undergo expert interviews. Those working in government agencies and industrial units accounted for up to 58%; the ratio of those serving in academe, scientific research, societies and professional industrial associations accounted for 42%. For the distribution ratios of respondents' professional fields, refer to Figure 5.

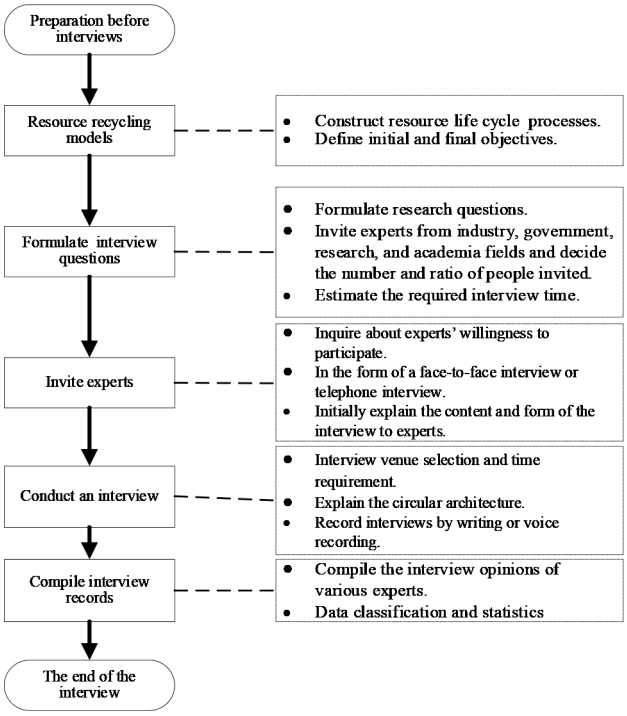

Figure 3. Expert interview flowchart

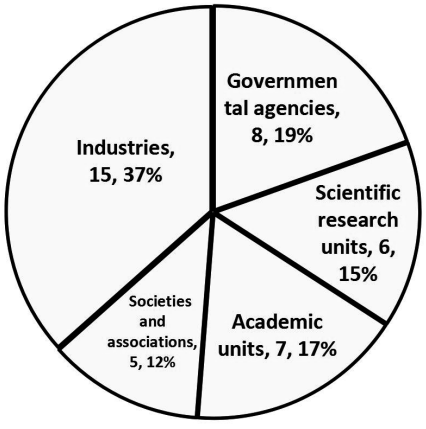

Figure 4. shows the ratios of the natures of the respondents' service units

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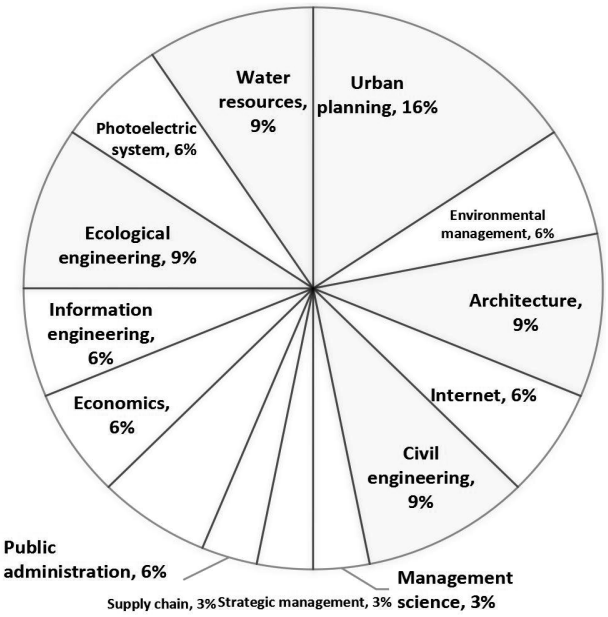

Figure 5. shows the distribution of the respondents' professional fields

5.3 Pyramid Principle

The resource life cycle affects molecular analysis. Under the premise of the same objective, the study made inferences targeting the main key factors. In this paper, the raw materials in the raw materials production stage were used as examples in explaining the pyramid inference process. Pyramid inference is similar to the analytical structure of hierarchical decomposition. For each subs-item under the topic discussed, correlational decomposition items must be carried out according to the set goals. In other words, it takes the support of the various sub-item operations to achieve the primary item goals. Apply the essential analysis method to review and clearly define the input and output under the key image factors are consistent with the original goal and ensure that each support operation meets the set purpose. The inspection content should include elements in the environmental aspect that must be taken into account during the production stage. The checked elements are considered in accordance with the following steps:

(1) The Review or Revision of the Definitions of Nouns:

The definitions of nouns is crucial to the correctness of subsequent operational items. If they are unclear or biased, the correctness of subsequent operational inferences will be affected.

(2) This study is a conclusion-oriented inference process where each task is regarded as an independent sub-system in the inference. As shown in Figure 6 using the raw material in the raw material production stage as the example, the raw materials factors in the raw materials production stage should ensure that the inference direction is based on the final goal (complete recycling, reuse). At the same time, consideration should be given to the executability of the impact factors.

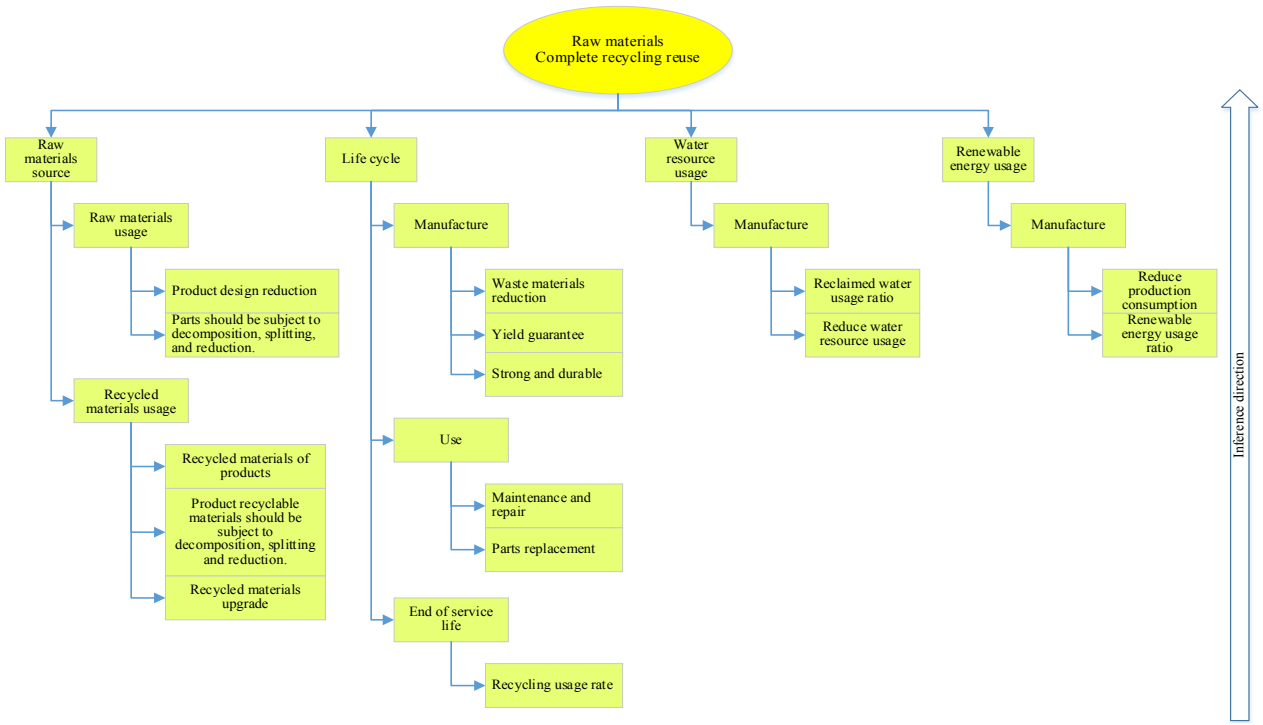

Figure 6. Raw materials production stage-raw materials key factor inference diagram

(3) Time series analysis:

Time series represents a process and time issue analysis. As shown in Table 1 below, the raw materials time series checklist is used as the example. Through group discussion, the review scope must take into account the entire life cycle. Through repeated debates on problems and causes, hierarchical operations must have direct relevance and meet the essential goals of circulation. The review items should be able to reflect their necessity and cover the entire cycle as much as possible.

Table 1. Time series checklist

Life cycle Checking operations		Mining	Product design	Raw materials production	Process manufacturing	Product use	End of service life
Raw materials	Raw materials usage		Reduce raw materials usage through design.	The by-products used for refining raw materials must not cause environmental loads.	In raw materials processing and production, they must not waste additional resources or cause environmental loads.		The parts should be subject to decomposition, splitting and reduction under the natural environment.
	Recycled materials usage		Increase recycle materials use through design?	When reducing or upgrading recycled materials to the expected performance of raw materials, it should not consumption additional resources and cause environmental loads.	Raw materials processing and production should not consume additional resources and cause environmental loads.		Product recycled materials should be subject to decomposition, splitting, and reduction under the natural environment.
	Life cycle		Ensure all product parts can achieve sustainable recycling through design.	Raw materials production and waste reduction	The processing and manufacturing process ensures high yield rates and strong and durable products.	Extend a product's service life through means, technology, and methods.	Increase the recycling and reuse ratio and increase recycling value.
	Water resource usage	The water usage of water resources and the usage of recycled water during raw materials mining?		Reclaimed water usage ratio Reduce water resource usage	Reclaimed water usage ratio Reduce water resource usage		
	Renewable energy usage			Reduce production consumption Increase the renewable energy usage ratio.	Reduce production consumption Increase the renewable energy usage ratio.		

(4) The review of possible reversal points:

When there is not just one cause arising and that problems formed are due to multiple factors, it is possible the true essence of an issue or problem is discussed.

(5) Strategic change or revision model:

When the entire model and essential analysis contradict each other, are not directly correlated, or presents a difference in causal correlation, the system architecture has to be reviewed or the hierarchical structure in the planning criteria must be corrected.

(6) Measurability:

The operations of essential analysis one the one hand serve as a reference during circular city planning; on the other hand, they must be quantifiable to serve as a basis for future planning and performance measurement.

Through the essential analysis method, the purpose of this study is to more clearly present the contents and relevant operations of the respective key impact factors. The realization of the objective of sustainable circular development depends on international cooperation and the active involvement of the government, private society, and private industries.

5.4 Impact Factor Analysis

According to the circular goals, the key impact factors in respective stages of the life cycle are defined. For example, during the mining stage, the goal of achieving sustainable circular development is defined. Energy and water resources are the key impact factors. In view of this, 12 main key impact factors were established and then underwent key factor analysis.

First, based on the corresponding product life cycles, the impact factors in respective stages were listed. The "fishbone diagram" clearly shows the key impact factors in different stages. On the far right is the substance recycling disposal method. The disposal method involves turning substances into materials for final recycling and

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reuse through splitting, decomposition, reduction and auxiliary methods. The analysis of impact factors will aid in finding circular city solutions from environmental, economic, social and governance aspects.

Based on the expert questionnaire results, the secondary impact factors of the key impact factors in respective stages of the life cycle were shown. From the secondary impact factors, the common impact factors were discussed, based on which the highly similar and common impact factor "greenhouse gases" was found. This common impact factor is a key problem that needs to be resolved and prevented from occurring during the resource recycling process, as shown in the red text in Figure 7.

Of course, the issues that need to be resolved in different stages also include other problems conjunctively reviewed and solved. For instance, during the raw materials production stage, the issues also include reducing additive use during raw materials production and adopting low energy consumption technology. It is harder for recycled and manufactured renewable resources to revert to their original physical or chemical properties. Therefore, they must undergo downgrading and upgrading procedures to restore their original performance. In this process, if considerations fail to be fully given during design, more resources will be consumed, leading to more greenhouse gas emissions.

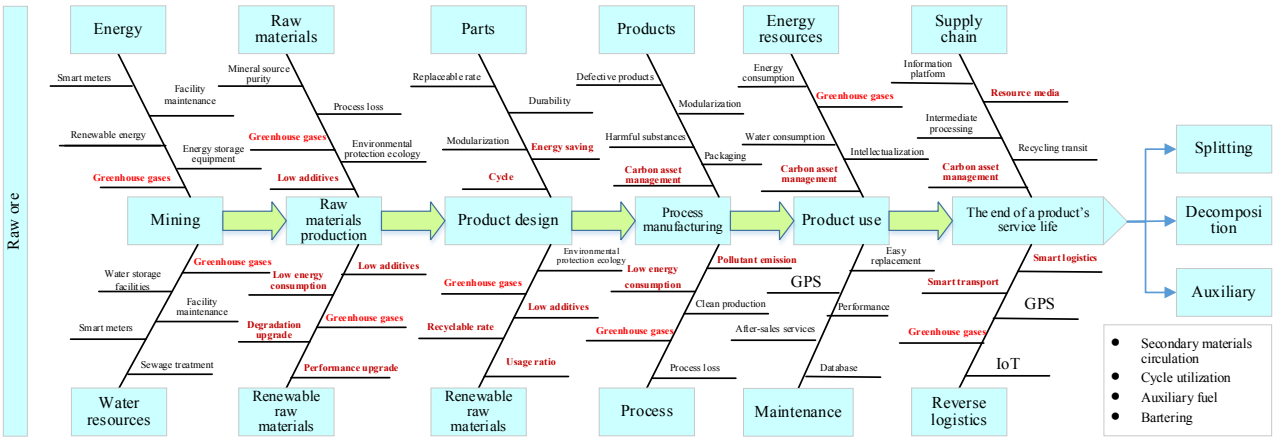

Figure 7. Analysis of resource life cycle impact factors

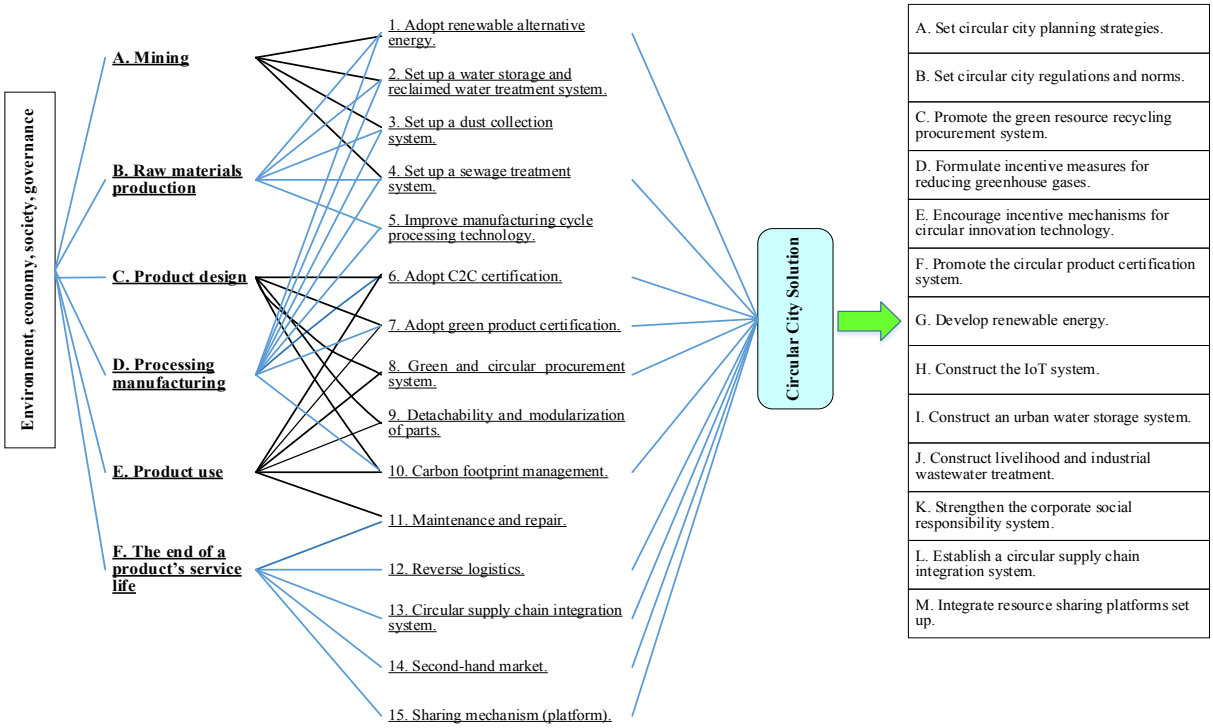

Figure 8. Circular city solutions

5.5 Recommendations for Circular City Solutions

As shown in Figure 8, after a series of inferences and analysis procedures, the sustainable development aspects of the environment, society, economy, and governance were found to be the very beginning. Through impact factor analysis, in addition to explicitly finding the essential causes, corresponding solutions were obtained. Finally, recommendations for 13 circular city solution plans were put forth.

6. Conclusion

The term "circular economy" not only takes the economic interests aspect into account, but also gives overall consideration to the environmental, social, and governance aspects to achieve synergistic results. In this paper, an important conclusion was found from research inferences. Whether it is new manufacturing or recycling, the essence of a circular economy must achieve the condition of "recycling and re-use of materials of different product parts" right from the source. More importantly, each cycling process must emphasize on the greenhouse gas emission problem and avoid wasting more resources to achieve the original quality requirements and for objects to be recycled. This act not only wastes more resources but also aggravates environmental loads.

With the essential concept of circular economy as the basis and extension into the construction of circular cities, it is conducive to the republic infrastructure of circular cities and the search of more accurate solution, instead of simply getting lost in the economic aspect or sacrificing environmental protection for economic interests. It is especially so for the process of remanufacturing substances where the deviation in environmental destruction does not decrease but increase, which is the second focus mentioned in this article.

The four aspects of sustainable development are combined to construct sustainable circular cities, thereby achieving the essential goals of resource mining reduction and reducing greenhouse gas emissions. From the impact factors of the respective stages of the resource life cycle, 15 corresponding plans were analyzed. Relative to the solutions for constructing circular cities, 13 solutions were proposed in this study. Covering renewable energy and resources, public infrastructure, formulation and cooperation of regulations and norms, circular innovation technology development, and other solutions, the solutions proposed in this study will serve as a substantive reference for constructing circular cities. This is the most important contribution of this research. It shall serve as a helpful reference for circular city planning related units and professionals during development.

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REVIEW

The Impact of Democratization on "FDI" in Tunisia-A Comparison of Pre and Post Revolution Periods

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ABSTRACT

The study examined the impact of democratization on foreign direct investment in Tunisia and has done a comparison of the pre and post revolution periods. The paper has used secondary data for the variables GDP per capita, FDI, Gross Fixed Capital Formation (GFCF), Current health expenditure (% of GDP) for the period 2001-2018. The study aims to provide arguments of the favorable political conditions for FDI, the purpose is to understand; whether, democracy and autocracy attract FDI in the Pre and Post-event of revolution in Tunisia. In addition, this investigation discusses the key elements for path dependency in democratic transitions from autocracy to democracy. The study found that there is a correlation between the adoption of a democratic regime and the FDI evolution. A democratic regime creates the right political circumstances to improve macroeconomic performance. It can stimulate growth if it is conducted in a stable political environment.

1. Introduction

Political environment in a country has great impact on its economy. Some countries have democratic form of government and some have nondemocratic. In a democratic form of government people have authority to choose their ruler. The rulers are accountable to the people. People have right to vote and have freedom of expression. On the contrary in nondemocratic form of government, people have no such right. Power lies in the hands of government. Government takes decisions for the people. Monarchy, oligarchy, aristocracy, anarchy, feudalism and theocracy are the different forms of nondemocratic government [1]

2. Transition in the Tunisian Economy

The political environment in Tunisia has transformed from the non democratic to democratic government system. Below is the detailed discussion on the political environment in Tunisia.

2.1 Political Climate: Introductory Background

Tunisia is one of the successful uprisings of "Arab Spring" (2011) especially that other states plunged into disintegration, war and political upheaval. There are many factors that contributed in the revolution due to structural advantages,

(1) Homogenous Population

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(2) Politically weak Military cadre

(3) A mature Civil Society

(4) Balance of power between Islamists and Secularists [2].

These are key points for which Tunisia has become an essential case study for the democratization and the birthplace of "Arab Spring" [3], which allowed masses to break the chains of dictatorship and directed them to attain autonomy. The initial objectives of the revolution were mainly employment, freedom and restoration of democracy [4]. The Ben Ali regime fell on January 14, 2011 and has raised questions about the objectives of the revolution, and the government oppression in the making of Tunisian uprisings [5]. The progress can be indicated by the democratic transition, as:

(1) The first three reform commissions (2011).

(2) First free elections (October 2011).

(3) National Constituent Assembly (NCA) formation (November 2012).

(4) The promulgation of the new constitution (February 2014).

(5) First free legislative elections (October 2014).

(6) Presidential elections (November, December 2014) [6].

These factors have revamped the democratic process, and adding substantial support to continue the transition.

2.2 The Democratic Transition Process

The country in "transition-phase" experienced a policy change of authoritarian regime to a democracy. T. L. Karl and P. (1991) Schmitter made a statement of the determination of such as transition [7]:

(1) The transition can be possible when elites abandon authoritarianism after mutual consensus.

(2) When the opposition is created the elites.

(3) Reforms made the transition when masses are mobilized by peaceful means.

(4) The revolution is the harbinger of transition when masses hold weapons to revolt government.

The adoption of the new Constitution on 27 January 2014 was an essential component of Tunisian transition.

The transition of Tunisian political system has a significant impact on its economy. The Government of Tunisia has opened most of the sectors of economy to foreign capital participation and trying to improve the business climate to attract FDI. The Tunisian Parliament passed an investment law (#2016-71) in Sep 2016 to encourage the responsible regulation of investments. Under this law three institutions were launched in 2017- The High Investment Council, The Tunsian Investment Authority and The Tunisian Investment Fund. The foreign investors have the same rights and obligations as Tunisian investors under this law. But the Foreign Investment Promotion Agency (FIPA) is the principle agency to promote foreign investment in Tunisia. It provides investment related information and communicate with investors through FIPA offices throughout the country[8]

Foreign direct investment plays a crucial role in the development of a country. Therefore the contribution of FDI in an economy cannot be ignored. The study investigated the impact of democratization on foreign direct investment in Tunisia and made a comparison of pre and post revolution period. For this purpose the analysis has been divided into two parts- pre revolution period (2000-2010) and post revolution period (2011-2018). The data has been taken from the World Bank for the variables GDP per capita, FDI, Gross Fixed Capital Formation (GFCF), Current health expenditure (% of GDP).

The main objective of this study is to demonstrate the impact of the governments democratic / undemocratic system does attract the FDI. In this case, the extensive empirical study gives us contradictory arguments for both of the political and economic policies related to FDI. This has been debated after the revolution, in the Tunisian conference while directing to European investors, as, "We have no more dictators". This is argued due to the conception that democracy may be the path to more FDI inflows.

3. Review of the Literature

At the dawn of 2011, Tunisia reached to become a democratic republic after "Jasmine Revolution", which is explained by (Laurel E. Miller, 2012) as a distinct case of successful democratization in the Arab World [9]. The revolution has led to spark the process of the democratic revolution in other countries like Libya, Egypt, and other Middle Eastern countries. Hence, The Tunisian democratization has long been considered an exception in the Arab world for a democratic transition. The successful transition is witnessed due to a large middle class; educated population and ethnically homogenous population [10]. Rachdi, H., & Saidi (2015) are in support of the democratic process for investments that foster economic growth [11]. The inflow of investment from a donor country to the host country is the determinant of economic growth known as Foreign Direct Investment (FDI) (Siddique, H. M. A., Ansar, R., et al. 2017), which is considered a milestone in regulating economic constraints; establishing a well-ordered inclusive structure with high-income economies [12], Bass, H. H. (2015) views Tunisia in the limelight while giving the fact as "African Lions' " due to financial deepening and emerging industry[10].

This shows the significance of the impact of FDI (Hassen, S., & Anis, O. 2012) which evolves in the

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context of "free trade", and "free flow of goods and services"[13] .Over the past decade, FDI was considered to be integrated into socio-economic policy and adopted the strategy for gaining development [14]. This is the rationale that the impact of FDI on economic growth is considered in theoretical and economic studies (Bass, H. H. 2015) and offers a number of economic advantages, for instance, Tunisia since the 1990s has liberalized the capital market while attracting direct investment by a variety of incentives [10].

Also, (Mekki R., 2005) FDI is vital in increasing industrialization and prospects of high economic growth by benefiting the host country by technological inflow, increasing employment and stimulating competitiveness. Thus, the considerations of economic reforms in developing countries place the FDI as an integral component of their policy. Tunisia, being a developing country, is not an exception [14].

It is a widely argued notion that democracy attracts more FDI as it provides an enabling environment for investors in establishing businesses. Otherwise, it is also believed that autocratic regimes are more favorable for multinational corporations and foreign investors that deal with them easier as FDI can be used for their personal benefits. The major determinants of FDI are the policies, rules, rights and duties adopted by the government, other than this debate of democracy versus autocracy for attracting more FDI in the country [15].

Tunisian economic reforms in the autocratic regime were considered as the model since it gave impressive economic growth. However, serious problems have been hidden under this economic endeavor as the unemployment rate among educated youth skyrocketed. Also a regional disparity related-to socio-economic standards vis a vis individual debt among the middle class prevailed [9].

3.1 The Impact of Democracy and Autocracy on FDI

There is a debate whether democracy has more impact or autocracy on FDI, yet the scope of the subject is never challenged by any school of thought. Countries have introduced reforms for a successful democratic process (Prezworski and Limongi, cited in Rachdi, H., & Saidi 2015) "we have no idea to suggest whether democracy stems economic growth or not" [16].The rationale is that FDI becomes an essential component of the global economy and is one of the factors that drives development strategies of both the developed and developing countries. Jensen, N. (2003) finds different perspective in two-way approach (Cross-sectional and Time Series cross-sectional tests) of 100 countries to analyze the determinants of FDI as follows in two type of governments [17]:

(1) Democratic structures flexible to drive FDI inflows into a country.

(2) Democratic countries attract (70%) more than their counter autocratic regimes [17].

The extensive study of literature review suggests that democracy and autocracy have ambiguous courses of actions on FDI. These are the rights, obligations, and approaches which set risky ground for democracy and autocracy in case of foreign investment. Li and Resnick (2003) argue further this difference between the effects of democracy and its interaction with respect to risk for foreign investors. They argue for the influence of democracy with respect to rights, commitments and approaches contrasting to autocracy that pledges a series of explicitly deferential general rights and of work rights [18].

Harms and Ursprung (2002) implies that the democratic government attracts less FDI than autocracy. The former gives greater ability to workers and thus deter foreign investors. In line with this argument, as observed by Rodrik (1999), by giving more weight to workers, democracy may drive pay scale-up, thus diverting those foreign investors, who are searching for labor on cheap wages. Additionally, democratic governments may in like manner differentiate from autocratic governments in their approaches towards FDI [19,20].

O'Donnell (1999) contemplated that, forcing investors, like multinational firms, misuse a customary fondness for autocrats while taking personal benefits from foreign investments [21].

As Li and Resnick (2003) argue that dictators possibly counter less limitation than democrats, they prioritize their own interests and also offer liberal, enabling and inspiring incentives to foreign investors. For instance, exemptions in tax and subsidies in investments and allotments.

On the other hand, democratic systems offer a voice to a greater segment of the masses, including experts who may not be able to bring FDI if it poses threat or challenge to local economic firms. Thus, it is suggested that the demand for protection from FDI is practically more accepted in democracies since losers from FDI have more ways to deal with the policymakers. Therefore, an open system or public policy becomes less conceivable for FDI in democratic governments. The argument ought to be qualified, considering the way that the interests of the losers from FDI must be weighed against those of the victors from FDI [18].

In many countries, the median voter is contributing to more work than capital. The median voter thus gets more benefits by capital inflows. According to the Stolper-

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Samuelson speculation, and should subsequently reinforce FDI enabling policies. As Pandya (2014) argued that by allocating decision power towards the median voter and away from a conventionally elite with more capital than the median voter, the democratic government ought to achieve continuously FDI-pleasing policies. As per her argument, Pandya (2014) sees that democratic countries have less restriction with respect to FDI [22]. The third estimation along which democratic governments varied from authoritarianism is industrial policy.

On the other hand, considering the way that democratic governments offer a voice to a greater segment of the people, they are less disposed to recognize monopolies, whose interest is to provide profits to a smaller subset of people however, their cost is borne by a larger set of people. Additionally, in line with the argument of Grosjean and Senik's (2011), democratic governments ensure income redistribution, while providing an insurance against the adversative outcomes of capital inflows for some groups of people [23].

Therefore, they provide the citizens with incentives to enhance market liberalization. The arguments deduce that democratic governments should opt for more market-friendly approaches. This has been acknowledged by Rode and Gwartney (2012), Giuliano et al. (2013), and Bjornskov and Rode (2014) [24-26].

Generally, democratic governments have been found to execute approaches that indirectly pull in FDI, for instance by empowering the education sector, and openness to trade [27]. The effect of democracies with respect to risk to property rights, firms that put their assets into another country or invest there, face a threat of seizure. Though, complete seizure of assets is not common, however, firms may lose some part of their benefits or revenue because of taxation, rules on foreign ownership, capital controls, downsizing, thievery of authorized advancement rights, or even more generally taking into account policy changes that decline the revenue streams made by their favorable assets [17,18,28].

Therefore, the favorability of democracies or autocracies with respect to FDI will depend on the capacity of these two systems of government to safeguard property rights. Regarding the impact of democracies on property rights, Przeworski and Limongi (1993) recounted that classical theorist, for instance, David Ricardo and Karl Marx, considered universal suffrage would emasculate property rights, by virtue of the incentives for poorer voters to seize the rich [29] Alesina and Rodrik (1994), Persson and Tabellini (1994), and Acemoglu and Robinson (2001) give modern forms of the argument in models where democratic policies redistribute income towards the median voter. [30-32]

Rather than those arguments, North (1990) and North and Weingast (1989) argued that a larger democratic government guarantees increasingly secure property rights since it construes adjusted administration that constrains the actions of policymakers [20,31,32]. As Henisz (2004) point out, in a democratic framework, changing laws requires the agreement of a couple of veto players. As their number goes higher, the probability of policy-change that may affect property rights becomes lessened [28].

Dutt and Mobarak (2016) argued that the inconsistency in policies will be more diminutive in a democratic framework, considering the way that decision making power is shared across people who can add up to more information in a manner like that of a Condorcet jury [33]. Contrary to it, the power of decision making in an autocratic framework is concentrated in one or few hands. As per these arguments, and the empirical evidence, provided by Adserà et al. (2003) or Besley and Ghatak (2010), generally indicate that there is a positive relationship between democratic policies and safeguarding of property rights, which ultimately attract FDI [34,35]. In the case of Tunisia, the democratic transition is going to complete a decade, thus the previous two decades, one with autocracy and second with democracy, provide a rich opportunity for comparison of FDI in these two decades.

3.2 Evolution of FDI in Tunisia: Pre and Post revolution (2000-18)

The Tunisian economy has given vital significance to FDI as a way to advance financial and economic development; it has persuaded the significance of their role in advancing the country's economic performance in growing GDP. Attracting FDI and providing easy ways to foreign investors for a long time, also, it has been the subject of major national policy to gain economic development.

The Tunisian government has proclaimed a progression of monetary and administrative measures to inspire foreign investors to situate in the country by setting up a great venture and favorable circumstances for investment.

In this research, we have found, that, there is fluctuation in both of the periods, while doing in-depth content analysis into the subject matter, Grosjean and Senik's (2011) Rode and Gwartney (2012), went in favor of democracy, as, democracy ensures income redistribution, and provides capital inflows as an incentive for market liberalization [23][24]. Supporting to it, Giuliano et al. (2013), and Bjornskov and Rode (2014) argues approaches of government that brings FDI to country, for instance, while investing to the education sector, (Aidt and Gassebner, 2010) forward this while discussing factors of FDI,

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"openness to trade" attracts to a country [25-27].

Dutt and Mobarak (2016) critically observe the democratic framework, as the ill-political policies have always been disastrous for creating a viable political milieu, as the power is concentrated in few elite hands, who exploit it for personal benefits[33]. Harms and Ursprung (2002), Rodrik (1999), As Li and Resnick (2003) have found the elements of democracy that enable to bring the FDI[19][207][18]. Due to various reasons, for instance, if the foreign investors find the labour market too expensive, then they start to look for the cheapest one, in order to manufacture cheaper products for high sales and profits in return. Yet, it has been found in pre-revolution period that Tunisia's economic policy underwent abrupt changes, for the sole rationale of attracting FDI, yet, the challenges arose from the state actors and non-state actors, which operates from unprecedented reasons. However, a flexible economic policy is designed on the base of the consensus, and the cooperation of different actors.

4. Result and Discussion

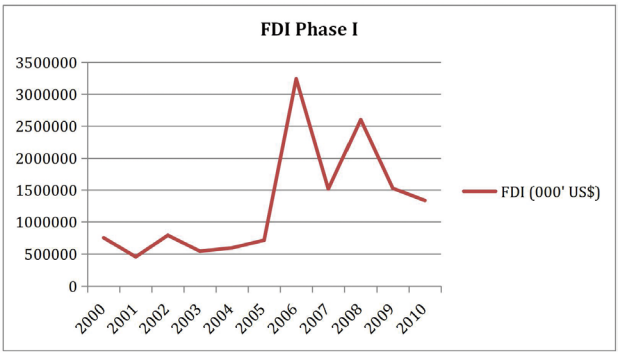
The study investigated the democratic transition with the given variables, the interpretation is explained through the table and its graph.

Table 1 shows that there was a significant increase in FDI in 2006, but there was decreasing trend in FDI after 2008. GDP per capita, Gross fixed capital formation and Current health expenditure (% of GDP) had increased persistently over the pre revolution period.

Table 1. The variables relative to the evolution of FDI (Pre Revolution)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
FDI (000' US$)	750720	451515	790303	539482	592148	712715	3239909	1515345	2600675	1525245	1334498
GDPPC (US$)	2212	2253	2344	2760	3111	3193	3370	3776	4307	4128	4142
GFCF(000' US$)	5404100	5588239	5730886	6286845	6900442	6883999	7763636	8967067	10600114	10574095	10830376
Current health expenditure (%) of GDP)	5.0	5.1	5.4	5.5	5.5	5.4	5.4	5.4	5.4	5.7	5.9

Source: WorldBank



Graph 1. Foreign Direct Investment in Tunisia (2000-2010)

The statistics of the World Bank give a valuable rise of 152% increase, that is 402.9 million in 1997 to 1015.7 million in 2005. Tunisia is facing economic as well as other successive crises before the revolution. The first crisis known as the "subprime crisis" is the external financial crisis which began after the global 2008 global financial crisis.

Table 2 shows that FDI had decreased till 2016 but it has been increasing afterwards. GDP per capita and Gross fixed capital formation had declined post revolution. But current health expenditure (%GDP) has been increasing post revolution.

Table 2. The variables relative to the evolution of FDI (Post Revolution)

Year	2011	2012	2013	2014	2015	2016	2017	2018
FDI (000' US$)	432666	1554269	1058623	1024754	970522	622569	810936	988943
GDPPC (US$)	4265	4153	4223	4305	3862	3698	3482	3448
GFCF(000' US$)	10012797	10131378	10134609	9680862	8570351	8070950	7497189	7392044
Current health expenditure (% of GDP)	6.4	6.6	6.9	6.8	7.0	7.0	7.2	

Source: WorldBank

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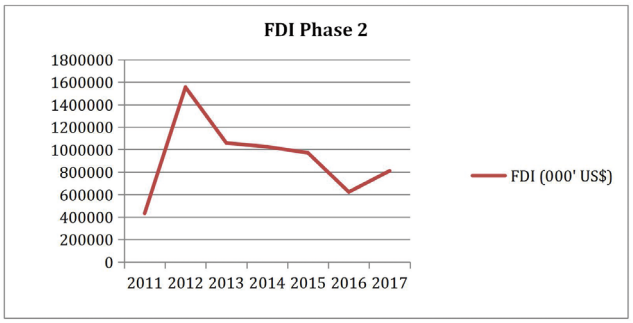

Graph 2. Foreign Direct Investment in Tunisia (2011-2017)

The feasible and viable environment of Tunisia attracts investors across the world. It's the strength of economic policy that has been adding milestones to Tunisian epoch. Tunisia needs an economic strategy to foster the milieu in which FDI could prosper. The struggling economy can be revamped by overcoming key challenges, such as, unemployment, unequal distribution of income, and regional disparities or unequal distribution of wealth (Achy, L. 2011). For this, the government should design a shaping public policy to take all the sectors on the road to progress. In a similar manner, (Achy, L. 2011) cites, the impressive performance is attained at the end of 2010 reaching $3720 per capita income, as compared to $2713 in 2005 [36].

When Tunisia retains the integrity that is promised, then foreign investors entrust their funds with real change. This trust in investing on projects can be effective, particularly, the masses.

5. Conclusion

The objective of this case study is to answer the following question: In what extent the democratic political regime adaptation impact the Pre/Post revolution FDI evolution?

Using indicators and variables relating to FDI, Pre and Post revolution. We conclude that there is a correlation between the adoption of a democratic regime and the FDI evolution.

A democratic regime, which involves the existence and exercise of fundamental civil liberties and political rights, creates the right political circumstances to improve macroeconomic performance. Democracy tends to encourage and prepare actors to exercise economic freedom and to encourage the private initiative of entrepreneurs.

This article does not provide a definitive conclusion as to the nature of the relationship between democracy and FDI. In order to find an explanation for this case, our attempt was to verify that the political weather stability could affect the nature of this relationship.

We have found that democracy can stimulate growth if it is conducted in a stable political environment.

This study is part of a long-term research project. In this sense, to improve the academic understanding of this subject, this research can be supplemented or further developed by developing it through a pre-selected countries, an introduction of other determinants of democracy, other variables of the FDI and the application of more robust econometric methods.

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ARTICLE

Study On Benefit Distribution of Improved Shapley Value in Fresh Agricultural Cold Chain

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ABSTRACT

This article studies the problem of fresh agricultural cold chain and constructs a comprehensive benefit distribution model with improved Shapley value. First of all, this article considers the influence of input factors, risk factors, effort level on benefit distribution, and uses the entropy method , the order relationship analysis method to determine the benefit distribution coefficient under each influence factor. Then, this article establishes a comprehensive benefit distribution model, and uses the Topsis method to calculate the weight of each participating enterprise. Finally, the simulation result shows the feasibility and effectiveness of the proposed methods. The profit distribution model in this article takes into account the degree of contribution to participating enterprises to the cooperation and their satisfaction with the benefits distribution, solves the problem of unfair benefits distribution of the fresh agricultural cold chain, and thus promotes the stability of the cooperation among participating enterprises.

1. Introduction

China is a big producer of fresh agricultural products, with about 4 trillion tons of fruits and vegetables entering the market every year. Fresh agricultural products, as an important part of agriculture, are one of the important driving forces for the growth of agricultural economy. However, in recent years, the prices of fruits and vegetables among fresh agricultural products have increased greatly, while the cold chain of fresh agricultural products has an "arch bridge effect". Members of both ends of the supply chain have low incomes, while the income at the middle link is too high for the unfair distribution of benefits. Due to the strict requirements on transportation conditions of fresh agricultural products, unreasonable profit distribution will lead to negative cooperation attitude to supply chain members, which will reduce the operation efficiency of the supply chain and the quality of agricultural products, and seriously hinder the development of cold chain of fresh agricultural products. Therefore, how to design a fair and reasonable benefit distribution scheme has become an urgent problem in cold chain of fresh agricultural products.

There are few researches on the distribution of benefits in the cold chain of fresh agricultural products, but many scholars have studied and paid attention to the distribution of benefits in the supply chain of agricultural products. Huang Yong [1] investigated the data of the pork industry chain in EnShi, Hubei, and analyzed the supply of pork. The income of chain breeding, processing, and sales shows that the income of the sales link is much higher

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than that of processing and breeding, which greatly affects the stability of the supply chain. Chun Feng et al. [2] analyzed the situation of "low vegetables hurting farmers" and "expensive vegetables hurting the people", and concluded that the main body of the supply chain will affect the distribution of benefits. The participation of farmers in cooperatives can increase the output and income of agricultural products, while reducing Prices increase overall revenue. Minghua Jin et al.[3] analyzed the benefit distribution of agricultural product supply chain under the background of "New Retail", and studied the influence of the three aspects of the supply chain's risk-taking, innovation ability and cooperation degree on benefit distribution. Wenjuan Tu et al. [4] studied the supply chain stability, income, and pricing of agricultural products under different cooperative situations between farmers and agricultural cooperatives from the perspective of supply chain. The above literature discusses the distribution of benefits in the supply chain in terms of pricing, models, and partnerships, but did not involve the decay of agricultural product freshness over time, which affects the income of the supply chain. The freshness of agricultural products is an important factor affecting the sales link and the income of supply chain [5].

In terms of interest distribution method, Shapley value method can give consideration to both "fairness" and "efficiency", effectively mobilize the enthusiasm of enterprises, and the calculation method is monotonous and operable, so this paper intends to adopt Shapley value method to solve the interest distribution problem of fresh agricultural products cold chain. Representative studies on the application of Shapley value method include: Maersk et al. [6] solved the benefit distribution problem of multi-person cooperation based on Shapley value method. Bahinipati[7] applied Shapley value method to the cooperation field of semiconductor alliance to ensure the fairness of benefit distribution. Jerzy Martyna [8] used the Shapley value to solve the power allocation problem of the secondary users in the Radio Network Alliance, and verified the results with a simulation model to prove the validity of the Shapley value. Although the Shapley value is a relatively common method to solve the problem of income distribution in cooperative games, this method has certain limitations. It ignores the indirect factors that lead to the increase or decrease of income. To solve this problem, many scholars have improved Shapley value. Lilin Diao et al. [9] proposed the multi-weight Shapley value method to solve the benefit distribution. . Baizhou Li et al. [10] improved Shapley by using analytic hierarchy process to determine risk factors, selected innovation factors and risk factors of cooperative enterprises, and solved the benefit distribution of cooperative enterprises. Weigan Li et al. [11] studied the compensation apportionment of various regions in the basin based on the DEA-Shapley value model, considering the importance of input and output in each region, and using trapezoidal fuzzy numbers to determine the weight coefficients of each region to improve the Shapley value method. Compensation apportionment provides decision-making reference. Xu et al. [12] used the gray correlation method to improve the Shapley value and established a theoretical model of the centralized market revenue distribution mechanism, and solved the benefit distribution of the green supply chain. Yiheng Xi et al. [13] used fuzzy analysis to improve the Shapley value, considering risk, investment and member satisfaction as influencing factors, and constructed a supply chain cooperation benefit distribution model. Through the above-mentioned literature analysis, it is found that the improvement process of the Sharpley value method has the shortcomings of strong subjectivity or objectivity, which leads to the problem of indicator weight deviation. On the basis of the above-mentioned research, this article uses a combination of subjective and objective methods to improve the shapley value model, and discusses the distribution of cold chain benefits of fresh agricultural products.

2. Influencing Factors of Cold Chain Profit Distribution of Fresh Agricultural Products

It is difficult to evaluate the contribution of the participating members in the cold chain of fresh agricultural products to the cold chain, and the inapplicability of the benefit distribution method will lead to non-cooperative behavior in the cold chain cooperation of fresh agricultural products and hinder the development of the cold chain of fresh agricultural products. Therefore, by analyzing the characteristics of the cold chain of fresh agricultural products and the principle of benefit distribution, this paper proposes three factors affecting the distribution of benefits of the cold chain of fresh agricultural products.

2.1 Equipment Investment

Investment refers to the commodities or labor used by the enterprise in operation, the long-distance truck transportation, the variety of agricultural products, the strict and harsh transportation environment, and the high requirements on the operating equipment. At the same time, the scale of the cold chain is usually determined by the circulation of agricultural products. All is the investment of cold chain equipment, so equipment investment is an important factor in evaluating the distribution of benefits

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of the cold chain of fresh agricultural products.

2.2 Fresh-keeping Effort Level

The level of fresh-keeping effort refers to the degree of active measures taken by participating members to preserve fresh agricultural products. The insurance effort of participating members of the cold chain of fresh agricultural products is also related to market demand and agricultural product pricing [14]. Different behaviors and cooperative attitudes are also different, and a positive attitude will inevitably increase the benefits of the cold chain of fresh agricultural products [15]. Therefore, the level of fresh-keeping effort as an influencing factor of benefit distribution can effectively avoid participating in the negative cooperative behavior of enterprises.

2.3 Risk Assumption

In the process of cold chain cooperation for fresh agricultural products, participating companies face the risk of chain disconnection, time risk, production risk, etc. These risks directly affect the operation of the participating companies, resulting in a decrease in market share. In order to reflect the benefit sharing, Risk sharing, the greater the risk the participating companies bear, the greater the distribution of their profits. Therefore, risk-taking is an important factor affecting the distribution of benefits in the cold chain of fresh agricultural products.

3. Problem Definition

In the fresh produce cold chain, the farmer is responsible to order agricultural cooperatives agricultural planting, harvesting and other work; agricultural cooperatives to produce the collection, packaging, storage; supermarket responsible for the procurement, orders, inspection and other tasks, the sales of agricultural products to the market . The cold chain operation mode of fresh agricultural products is shown in Figure 1.

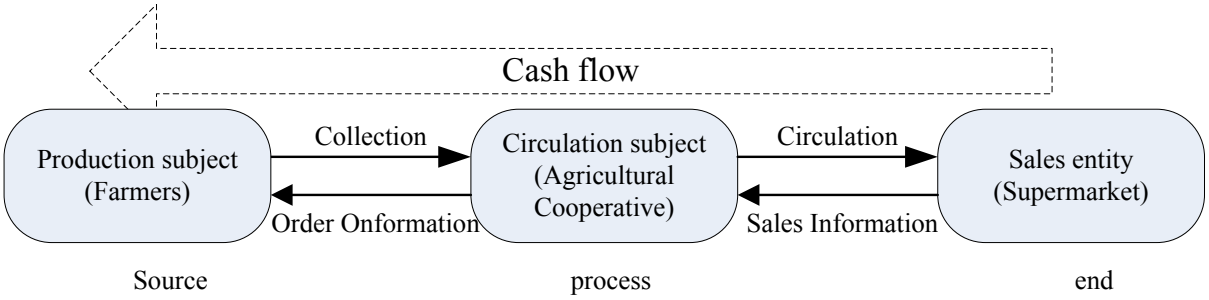

Figure 1. Cold chain operation mode of fresh agricultural products

The cold chain of fresh agricultural products has strict requirements on operating time, temperature control, links and service conditions. The fairness of the benefit distribution of the cold chain of fresh agricultural products directly affects the stability and reliability of the cold chain of fresh agricultural products. Xiaoqing Gan et al. [16] found that the profit rate of the production link was 10%, the monthly fund return rate was 4%, the circulation link profit rate was 15.06%, the monthly fund return was 99%, and the sales link profit rate was found by investigating the Poyang Lake pig supply chain. 9.8%, and the monthly capital return rate is 146.9%. It can be seen that the upstream nodes that make a large contribution to the supply chain have a lower rate of return, while the middle and downstream nodes that contribute generally to the cooperation have a higher profit. This reduces the enthusiasm of many farmers to cooperate and benefits. Unfair distribution hinders the development of the supply chain. This paper studies the three-level cold chain of fresh agricultural products, considering the impact of facility investment, preservation efforts, and risk-taking on the benefits of the cold chain of fresh agricultural products, using Shapley value, Topsis and other methods to study the distribution of benefits of the cold chain of fresh agricultural products.

To facilitate modeling, make assumptions:

(1) The participating members of the cold chain of fresh agricultural products are all rationally involved, and each member pursues the maximization of their own interests while participating in cooperation;

(2) The implementation of the cold chain of fresh agricultural products is supported and guaranteed by agreement;

(3) Before the implementation of the cold chain for fresh agricultural products, all parties will make feasibility predictions and cooperate only when it is "profitable". The distribution benefits of the cold chain for fresh agricultural products have been estimated;

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(4) Each member of the cold chain of fresh agricultural products joins the alliance organization randomly, regardless of order;

(5) The cold chain of fresh agricultural products consists of a farmer, an agricultural cooperative, and a seller.

4. Construction of a Cold Chain Benefit distribution model for fresh agricultural products with improved Shapley value

4.1 Shapley

Set $N=\{1,2,...,n\}$, for any subset s in set N, there is a corresponding function $V(S)$, and it satisfies:

$$V(\varnothing)=0 \qquad V(S_1 \cup S_2) \geq V(S_1)+V(S_2) \tag{1}$$

and

$$S_1 \cap S_2 = \varnothing \tag{2}$$

Then the benefit distribution determined by the *Shapley* value method means:

$$\phi_i(V)=\sum_{S \in S_i} W(|S|)\left[V(S)-V(S/i)\right] \; i=1,2,\cdots,n \tag{3}$$

$$W(|S|)=\frac{(n-|S|)!(|S|-1)!}{n!} \tag{4}$$

$W(|S|)$ represents the weighting factor. S_i means that the set N contains all the subsets of the member i. $|S|$ represents the number of elements in the subset S. $V(S/i)$ is the income after removing member i from subset S. $\phi(V)=(\phi 1(V), \phi 2(V),..., \phi n(V))$ is the benefit distribution of the cold chain of fresh agricultural products. The premise of the Shapley value method is that all participating members have an equal relationship, but it ignores the behavior of each member that indirectly leads to the increase or decrease of income, and cannot guarantee the fairness of income. Participating members have different investment in facilities and equipment, fresh-keeping efforts, and risk-taking. These factors constitute the bargaining power of participating members in the distribution of cold chain benefits of fresh agricultural products. Therefore, in the cold chain benefit distribution of fresh agricultural products, the above-mentioned influencing factors should be considered to revise the Shapley value of benefit distribution.

4.2 Determination of Influencing Factor Coefficients

4.2.1 Determination of Facility Investment Coefficient

The input factors of facilities and equipment B include the input of transport vehicles x_{1i}, the construction of refrigerated warehouses x_{2i}, the maintenance of refrigerated equipment x_{3i} etc.Through the quantitative analysis of each participating memb er's input of facilities and equipment, the weight of each participating member's input of facilities and equipment w_i^B is determined:

$$w_i^B=\frac{x_{1i}+x_{2i}+x_{3i}}{\sum_{i=1}^{3}(x_{1i}+x_{2i}+x_{3i})}, i=1,2,3 \tag{5}$$

The correction factor for facility investment is $\Delta w^B{}_i = w^B{}_i - \frac{1}{n}$, $\sum_{i=0}^{n}\Delta w^B{}_i = 0$. When $\Delta w^B{}_i > 0$, it means that member i's investment in the construction of the cold chain of agricultural products is higher than the average value of the overall input. At this time, member i should be given more compensation in the benefit distribution. When $\Delta w^B{}_i < 0$, the benefits should be reduced.

4.2.2 Determination of the Coefficient of Preservation Effort

When consumers buy agricultural products, they prefer fresh agricultural products. According to the description of the freshness of agricultural products in the literature [17], the freshness of agricultural products is expressed as $\theta_i=\theta_0 e^{-\eta x_{4i}}$. θ_0 indicates the freshness of the agricultural products at the moment they are picked from the orchard, $0 \leq \theta_0 \leq 1$, x_{4i} represents the operating time of each member's agricultural products, and the above function has the following properties:

(1) $\frac{d\theta_t}{dt}<0$, it means that the freshness of agricultural products decreases with the loss of time;

(2) $\frac{d^2\theta_t}{dt^2}>0$, it means that the freshness of agricultural products gradually slows down with the change of time.

In order to increase the overall profit and their own profits, each member has made efforts to preserve the freshness of agricultural products according to their own conditions in cooperation. η_0 Indicates the natural attenuation index of agricultural products. After each member adopts the preservation of agricultural products, the attenuation index is $\eta=a\eta_0$. a Indicates the sensitivity coefficient of preservation to the attenuation index, $a \in (0,1)$. According to literature [18],on the assumption that product input and cost are quadratic function, the fresh-keeping input cost function of each member of the cold chain of fresh agricultural products is defined as $C=ka^2$, i=1, 2, 3. k represents the influence coefficient of preservation

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efforts on cost, then:

$$\theta_i = \theta_0 e^{\{-[(1-\sqrt{\frac{C_i}{k}})\eta_0]x_{4i}\}} \quad (6)$$

The weight of the fresh-keeping effort level of each participating member is expressed as:

$$w_i^C = \frac{\theta_i - \theta_{i+1}}{\theta_0 - \theta_e} \quad (7)$$

θ_e indicates the freshness of the supermarket selling agricultural products. The correction coefficient for the preservation effort level is $\Delta w^C{}_i = w^C{}_i - \frac{1}{n}$, $\sum_{i=0}^{n} \Delta w^C{}_i = 0$. When $\Delta w^C{}_i > 0$, it means that member is actual fresh-keeping effort level is higher than the average value of the overall effort in the operation of the cold chain of fresh produce of agricultural products. At this time, member i should be given more compensation in the distribution of benefits; When $\Delta w^C{}_i < 0$, the revenue should be reduced to compensate other cooperative members.

4.2.3 Determination of Risk-taking Coefficient

Risk factor D includes time risk x_{5i}, chain break risk x_{6i} and quality risk x_{7i}. Through the quantitative analysis of the risk-taking of each participating member, the measured value of each indicator is standardized to obtain the judgment matrix $R=(r_{ji})_{n\times m}$. This paper uses the entropy method to determine the risk-taking weight of each participating member w_i^D:

$$w_i^D = \frac{1 - E_i^D}{m - \sum E_i^D}, \ i = (1,2,...,n) \quad (8)$$

$$E_i^D = -\ln(n)^{-1} \sum_{j=1}^{m} p_{ji} \ln p_{ji}, \ i = (1,2,...,n), j = (1,2,...,m) \quad (9)$$

$$p_{ji} = \frac{r_{ji}}{\sum_{j=1}^{m} r_{ji}}, \ i = (1,2,...,n), j = (1,2,...,m) \quad (10)$$

r_{ji} indicates the normalized data of the measured value of each indicator. p_{ji} indicates the normalized measurement value r_{ji} the probability of being in the i-type index. E_i^D represents the information entropy of each indicator. Then the correction coefficient of risk taking is $\Delta w^D{}_i = w^D{}_i - \frac{1}{n}$, $\sum_{i=0}^{n} \Delta w^D{}_i = 0$. When $\Delta w^D{}_i > 0$, it means that the actual risk taken by member i in the practice of the cold chain of agricultural products is higher than the average value of the overall risk. At this time, member i should be given more risk compensation during the benefit distribution; when $\Delta w^D{}_i < 0$, it should be Reduce benefits.

4.2.4 Determination of Relative Coefficients Among Influencing Factors

This paper establishes a set of influencing factors of benefit distribution $X=\{X_1, X_2, \ldots, X_m\}$. According to the importance of each indicator, determine the order of the indicators. If X_i is more important than X_k, it is expressed as $X_i>X_k$. The ratio of the relative importance of the evaluation indicators X_{k-1} and X_k by experts is r_k, and the value of r_k is shown in Table 2 [19]. The order relation analysis method is used to determine the relative weight of each influencing factor w_β^z.

Table 2. Attribute comparison judgment table

r_k	Description
1.0	Attribute X_i has the same importance as attribute X_j
1.1	Attribute X_i is slightly more important than the attribute X_j
1.2	Attribute X_i is obviously more important than attribute X_j
1.3	Attribute X_i is more important than attribute X_j
1.4	Attribute X_i is extremely important than attribute X_j

$$w_\beta^z = (1 + \sum_{\beta=2}^{m} \prod_{i=\beta}^{m} r_i)^{-1}, \ (\beta = m, m-1, ..., 2) \quad (11)$$

$$r_\beta = \frac{w_{\beta-1}}{w_\beta}, \ (\beta = m, m-1, ..., 2) \quad (12)$$

4.3 Improved Shapley Value of Fresh Produce Cold Chain Benefit Distribution Model

This article constructs the coefficient matrix A through w_β^z and w_i^B、w_i^C、w_i^D. Standardize matrix A to get matrix $B=(b_{ij})_{n\times m}$, b_{ij} is the corresponding element after standardization:

$$b_{ij} = \frac{a_{ij}}{\sqrt{\sum_{i=1}^{n} (a_{ij})^2}}, \ j = (1,2,...,m) \quad (13)$$

$$B = (b_{ij})_{n\times m} = \begin{bmatrix} b_{11} & b_{12} & \ldots & b_{1m} \\ b_{21} & b_{22} & \ldots & b_{2m} \\ \ldots & \ldots & \ldots & \ldots \\ b_{n1} & b_{n2} & \ldots & b_{nm} \end{bmatrix} \quad (14)$$

Determine absolute ideal solution and negative ideal solution:

$$B^+ = \left\{ (\max b_{ij} \,|\, j \in J^+), (\min b_{ij} \,|\, j \in J^-) \right\} = \left\{ b_1^+, b_2^+, ..., b_m^+ \right\} \quad (15)$$

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$$B^- = \left\{ (\min b_{ij} \,|\, j \in J^+), (\max b_{ij} \,|\, j \in J^-) \right\} = \left\{ b_1^-, b_2^-, ..., b_m^- \right\} \tag{16}$$

$J^+ \bigcup J^- = J$, J^+ indicates that the larger the value, the better the set of indicators. J^- represents a set of indicators that the larger the value, the worse. This paper selects 1 and 0 as the absolute positive ideal value and the absolute negative ideal value of the positive index [20].

Determine the Euclidean distance of each participating member to the positive and negative ideal point:

$$d_i^+ = \left\| b_{ij} - B^+ \right\| = \sqrt{\sum_{j=1}^{m} w_\beta^{z2} (b_j^+ - b_{ij})^2} \tag{17}$$

$$d_i^- = \left\| b_{ij} - B^- \right\| = \sqrt{\sum_{j=1}^{m} w_\beta^{z2} (b_{ij} - b_j^-)^2} \tag{18}$$

Determine how close each participating member is to the ideal plan, and determine the coefficient w_i:

$$w_i = \frac{d_i^- / (d_i^+ + d_i^-)}{\sum_{i=1}^{n} [d_i^- / (d_i^+ + d_i^-)]}, \; i = (1, 2, ..., n) \tag{19}$$

Then the improved Shapley value of fresh agricultural products cold chain benefit distribution $\phi_i(V)'$:

$$\phi_i(V)' = \sum_{S \in S_i} W(|S|)[V(S) - V(S/i)] + V(N) \times (w_i - \frac{1}{n}) \tag{20}$$

$W(|S|)$ represents the weighting factor. S_i means that the set N contains all the subsets of the member i. $|S|$ represents the number of elements in the subset S. $V(S/i)$ is the income after removing member i from subset S. w_i indicates the improved benefit distribution coefficient. d_i indicates the Euclidean distance of each participating member to the positive and negative ideal point. $\phi(V)=(\phi_1(V), \phi_2(V), ..., \phi_n(V))$is the profit distribution of the cold chain of fresh agricultural products.Whether the improved comprehensive benefit distribution model meets the necessary conditions for cooperation needs to be further verified:

$$\sum \phi_i(V)' = \sum [\sum_{S \in S_i} W(|S|)[V(S) - V(S/i)] + V(N) \times (w_i - \frac{1}{n})]$$

$$= \sum \phi_i(V) + \sum [V(N) \times (w_i - \frac{1}{n})]$$

$$= \sum \phi_i(V) + V(N) \sum (w_i - \frac{1}{n})$$

$$= \sum \phi_i(V) + V(N)(\sum w_i - \sum \frac{1}{n})$$

$$= \sum \phi_i(V)$$

$$= V(N)$$

5. The Example Simulation

Currently, there are three farmers A, agricultural cooperative B and supermarket C participating in the cold chain of fresh agricultural products. It is known that the profit of farmer A operating alone is 70,000 yuan, the profit of agricultural cooperative B operating alone is 80,000 yuan, the profit of supermarket C operating alone is 50,000 yuan; the profits of the two-two cooperation are V_{AB}=208,000 yuan, V_{BC} = 179 thousand yuan, V_{AC} = 151,000 yuan, and the profit of the three cooperative operations V_{ABC} = 298,000 yuan. According to the reference [17] for the value of the relevant parameters and the value basis, this paper sets the initial freshness θ_0 = 1, attenuation index η_0=0.07, k=0.5.

Table 3. Operating situation of each participating member

Main Body	Cold storage capacity	Refrigerated truck	Refrigerator	Work time	Preservation cost	On-time rate of agricultural products	Equipment failure rate	Agricultural product integrity rate
Farmer	2400	6	30	2	0.12	94	95	95
Agricultural cooperatives	2600	5	40	1.5	0.11	96	97	93
Supermarket	1800	3	20	2.5	0.13	92	94	96

According to formulas (5) ~ (10), the weight of each participating member under different influence factors is as follows:

Table 4. Weights of participating members under different influencing factors

Influencing factors	Farmer	Agricultural cooperatives	Supermarket
Equipment investment	0.3547	0.3198	0.3255
Freshness effort level	0.3498	0.2908	0.3594
Exposures	0.3601	0.3239	0.3160

According to formulas (11) ~ (12), $r^2=\frac{y^1}{y^2}$=1.1, $r^3=\frac{y^2}{y^3}$=1, $w_3^z = \frac{1}{1+r^2r^3+r^3}$=0.3216; The results are shown in the following table:

Table 5. Relative weights among influencing factors

Influencing factors	Freshness effort level	Equipment investment	Exposures
Relative weight	0.386	0.2924	0.3216

Construct the coefficient matrix with the weight coefficients in Table 4 and Table 5, and substitute them into equations (15)~(20) to obtain the final benefit distribution result $\phi_i(V)^{'}$.

$$\phi_1(V)^{'}=\frac{1}{3}\times 25.3+\frac{1}{6}\times 10.1+29.8\times[0\frac{0.1978/(0.3803+0.1978)}{1.9977}-\frac{1}{3}]=10.41$$

$$\phi_2(V)^{'}=\frac{1}{3}\times 29.6+\frac{1}{6}\times 12.9+29.8\times[\frac{0.1814/(0.1814+0.3971)}{0.9977}-\frac{1}{3}]=11.45$$

$$\phi_3(V)^{'}=\frac{1}{3}\times 14+\frac{1}{6}\times 18+29.8\times[\frac{0.1968/(0.1968+0.3788)}{0.9977}-\frac{1}{3}]=7.94$$

The benefit distribution results before and after the Shapley value improvement are shown in the following table:

Table 6. Benefit distribution before and after Shapley value improvement

	Farmer A	Agricultural cooperatives B	Supermarket C
Initial Shapley	10.12	12.02	7.66
Initial allocation ratio	0.34	0.40	0.26
Facility input correction factor	0.0214	-0.0135	-0.0078
Fresh-keeping effort level correction coefficient	0.0165	-0.0425	0.0261
Risk-taking correction factor	0.0268	-0.0094	-0.0173
Improved Shapley	10.41	11.45	7.94
Improve the allocation ratio	0.35	0.38	0.27

From the data in the table, it can be seen that there is a significant difference in the income value of each member before and after the Shapley value is improved. From the perspective of facility investment, the correction coefficient of farmers is greater than zero and should be compensated. Compensation should be shared by agricultural cooperatives and supermarkets with less input. From the perspective of fresh-keeping effort level, farmers' fresh-keeping effort level is 2.14% higher than the average, and supermarket fresh-keeping effort level is higher than the average 0.78%. However, the correction coefficient of agricultural cooperatives is less than zero and should be punished to reduce the return value. From the perspective of risk-taking, farmers performed better. The risk of farmers exceeds 2.68% of the average. According to the principle of proportionality between risks and benefits [13], farmers should get more rewards. In the initial distribution plan, the benefit distribution coefficients of participating members are 0.34, 0.40, 0.26, while the current benefit distribution coefficients are 0.35, 0.38, 0.27. Compared with the original plan, the benefit distribution coefficients of farmers and supermarkets have increased to varying degrees, while the benefit distribution coefficients of agricultural cooperatives have decreased more. Members with high contribution will receive more profits, in line with the principle of high investment and high return. The improved distribution results not only improve the fairness of the cold chain benefit distribution of fresh agricultural products, but also promote the enthusiasm and stability of cold chain cooperation for fresh agricultural products.

6. Conclusion

This paper studies the profit distribution of fresh agricultural products in the cold chain, constructs a profit distribution model with improved Shapley value, and verifies it through calculation examples. The results show that the use of Shapley value to solve the problem of benefit distribution should fully consider other factors besides marginal contribution. If supply chain companies want to obtain more benefits, they must play a greater role in equipment investment, risk-taking, and fresh-keeping efforts. Although this paper proposes a more reasonable cold chain benefit distribution plan for fresh agricultural products, this paper only studies the profit distribution of the participating companies under different cooperation situations with precise values.The issue of benefit distribution with clear cooperation and ambiguous returns needs further study.

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ARTICLE

Retailers, You Can Get Omni-Shopper's Satisfaction!

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ABSTRACT

This paper evaluates the influence that information processing routes have on omni-shopping behavior, as well as analyzing the consequences of this behavior for retailers through a cognitive-affective approach. A sample of 705 mobile phone users was used for this purpose. The results obtained using the binomial logit model in a first phase and later with an application of structural equations, reflect that omni-shoppers have a more planned purchasing behavior than those who develop a one-stop shopping behavior. They search for information in a rational and deep way, spending time and effort. As for the consequences that the omni-channel behavior has for retailers, it has been found that those omni-shoppers who experience negative emotions with the retailer, have a low perceived value of the company and their satisfaction will also be negative.

1. Introduction

Retailing is immersed in the most significant revolution of recent decades. To talk of a revolution in the retail sector is to talk of Omni-Channel Retailing (OCR). OCR is defined as the strategy that integrates all available channels to create a seamless shopping experience that increases engagement during the customer journey. OCR has not changed the essence of the business–customer relationship. Retailers continue to have the leitmotiv of providing customers with a faster and more positive response and differentiating themselves from their competitors, but now, in addition, that response must be seamless.

For their part, customers combine offline and online channels during their shopping journeys, choosing one channel or another, depending on the needs they want to see satisfied at any given time. Thus, sometimes customers will consider the Internet to be more convenient for searching for information, while at other times they will consider the physical store to be the place where the best information can be gathered, asking sales staff the advantages and disadvantages of the product or of a particular brand. The same will happen at the purchase stage. Some customers will consider the physical store to be the best choice, since they can look at, touch and try the product. While at other times, they will consider the trip to the physical store unnecessary and will buy online.

The literature review reflects the incipient character of academic researches focused on the analysis of omni-channel customer behavior. Consequently, there is a

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gap in the analysis of the customer's internal drivers that affect this actual shopping behavior. Some studies have tried to offer an approach by studying the influence of some types of drivers on the development of omni-channel customer behavior [1,13], basically considering the demographic and socio-economic characteristics of customers or their predisposition to use information and communication technologies (ICTs). Thus, authors such as Balasubramanian et al. [1] and Pookulangara, Hawley, & Xiao [30] highlight the need to complement research with psychographic variables (for example, the consumer's self-concept, personality, lifestyle, or motivations, interests, tastes, opinions and values).

On the other hand, our literature review show that OCR studies focused on determining how omni-shoppers are more profitable than one-stop shoppers. According to Viejo-Fernández, Sanzo-Pérez, & Vázquez-Casielles [35], nowadays customers demand a seamless experience through the different touchpoints, physical or virtual, to interact with retailers. In this sense, it is necessary to consider, instead of economic variables, those cognitive-affective variables and analyze their influence on the companies' commercial strategies.

Taking into account the above considerations, the aim of our research is to develop and deepen the OCR literature, given its incipient nature. Specifically, our contribution will focus on the joint study of the antecedents that influence on the development of an omni-channel customer behavior, those linked to the psychographic characteristics of customers, in particular, in the study of forms of information processing, and the consequences of this shopping behavior for retailers, from a perspective that contemplates not the economic aspect but a cognitive-affective approach.

This study is structured into five sections. First, the theoretical framework used is described, and our basic hypotheses are put forward. Second, we describe the empirical research conducted to test our hypothesis. Third, we explain our main results. Fourth, we examine our findings and derive our conclusions and implications. Fifth and finally, we address the limitations of our research and offer avenues for future inquiry.

2. Conceptual Framework

2.1 Omni-Channel Customer Behavior

Customer journey has been studied in marketing literature through different models. Both classical models that analyze the offline decision-making [10,18], and those that focus on online shopping journey [7,20] are insufficient to explain the omni-channel customer behavior, since they treat the two channels separately. In general, these studies consider five basic stages in the decision-making: (1) problem recognition, (2) information search, (3) evaluation of alternatives, (4) purchase decision and (5) post-purchase evaluation, although certain differences are established between the physical and virtual purchasing process. The online channel provides a series of benefits for the shopper, such as access to a wide selection of alternatives and possibilities to search for information and compare in depth the most relevant characteristics of the different options selected. In this sense, one of the key concepts for today's businesses and marketing is to understand the so-called "customer decision journey" or "customer journey" [6], understood as the journey made by individuals through the various channels, physical and virtual, from the time a brand attracts their attention until they make the purchase (and subsequently use the product).

Court et al. [6] argue that the interrelationship of physical and virtual environments causes customers to demand and generate information offline and online. Thus, decision-making becomes a circular model with four stages: (1) initial consideration, (2) active evaluation, (3) moment of purchase, and (4) post-purchase experience.

The first stage, called initial consideration, is where the desire to purchase a certain product is activated. The information received from the traditional media and, to an increasing extent, from the digital media, which are characterized by providing virality to the messages of the companies and mainly to those of the customers, influence in such a way that the shoppers form a first opinion and only consider a certain number of brands among the great available offer.

Next, active evaluation involves the search and considered assessment of information about both the products and the brands that offer them. According to Court et al. [6], firms listed in the first stage are more likely to be chosen at the purchase stage. However, when customers actively evaluate all the information collected through the multiple touchpoints, they may consider new brands. If companies focus their efforts on maintaining, for example, two-way business-to-customer communication at the various physical (physical store, catalogue, telephone or mailing) and virtual (whether through the web, social networks, blogs, mobile phones or Apps) touchpoints, they are more likely to be chosen at the time of purchase.

The third stage refers to the acquisition of the product by the customer, which can be done offline or online. Given the ease with which information is currently available on the Internet, new brands or alternatives can

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be accessed (and considered) at all stages of the decision-making, including the time of purchase itself. Thus, unlike the traditional concept of "purchase funnel" (where the alternatives are reduced as the stages pass), in the approach represented by the "customer decision journey" the opposite may occur. Even if customers come to the physical store with the intention of buying, they can easily use their smartphone for searching for information on the spot that allows them to expand the alternatives available, make comparisons, or finally buy the product online.

Finally, the post-purchase experience stage ranges from the use of the product by customers to the assessment of whether or not their purchase decision was correct. According to Court et al. [6], this stage is "a moment of truth" and therefore companies should generate positive experiences and maintain two-way communication with the aim of achieving active loyalty. In other words, shoppers should develop a commitment to the brand that leads them to act as influencers for other customers.

The conclusion to be drawn from the customer journey analysis is that the current shopper can make use of ICTs at any stage of his or her decision-making. Consequently, the technology and the intensive use of it by individuals, lead retailers who want to compete in the markets of the 21st century, to include the Internet in their business models, and increasingly mobile internet, since smartphones are devices frequently used for any activity, especially for shopping, without forgetting to coordinate these online touchpoints with the traditional offline channel.

However, retailers cannot "be everything to everyone everywhere". It is mean, companies cannot have all offline and online touchpoints that exist. In this sense, it is necessary to identify the drivers that influence the omni-channel customer behavior, in order to implement a successful OCR strategy and firms can choose the most appropriate touchpoints to reach their target effectively.

OCR literature review indicates a focus on studying the influence of demographic and socio-economic factors and the predisposition of individuals to use ICTs on the development of omni-channel customer behavior. However, the consideration of these variables does not contribute to fully explain why the customer may or may not develop this kind of shopping journey. Authors such as Balasubramanian et al. [1] and Pookulangara et al. [30] insist on the need to advance in OCR literature to consider other explanatory factors, such as psychographic variables (the consumer's self-concept, personality, lifestyle, motivations, interests, tastes, opinions and values). A particular factor related to psychographic variables that acquires great relevance within the OCR context is the different forms of information processing followed by the customer linked to variables such as motivations, involvement or personality. The reason for this is that omni-channel customer behavior implies changes in the way the shopper searches for, evaluates and compares information, giving rise to a more complex, non-linear process, reflected in the consumer decision journey.

2.2 Information Processing: Central Route Versus Peripheral Route

One of the models that has had most influence in explaining information processing has been the Elaboration Likelihood Model (ELM) proposed by Petty and Cacioppo [27]. These authors conceive information processing as a continuum whose ends are formed by two levels of information processing, high and low, giving rise to the two possible routes by which the individual can process information, the central route and the peripheral route. These routes reflect different cognitive efforts [2]. In this way, in the central route the product, information and messages receive greater interest from the shopper, being examined in a critical, rational and in-depth way. In contrast, customers use the peripheral route when they do not feel motivated or capable of actively processing information to make a certain decision, and therefore pay less attention to the information or messages received.

The ELM suggests the existence of two conditioning factors when it comes to explaining the choice of one or the other route: (1) the motivation to seek information, and (2) the capacity to make evaluations. Motivation is related to the degree of involvement. Involvement reflects the importance that individuals attach to the specific attributes of the product they wish to acquire, taking into account the perceived risk of the purchase and their interests and needs [3,9]. If customers are more involved with the purchase, their motivation to seek and obtain information will be higher and will be accompanied by a greater investment of time and effort. Therefore, information and messages will be examined through the central route, i.e., in a more critical, rational and in-depth way, developing a proactive behavior, seeking and paying more attention to information related to product characteristics [38]. In addition, the time and effort invested make the attitudes of these consumers more durable and resistant to change.

The central route is also enhanced by the customer's ability to perform information analysis at more complex and deeper levels, requiring prior knowledge of the subject or the ability to connect that information to previous experiences. On the other hand, a person who follows a peripheral route makes a superficial search or inspects few alternatives in order to find an acceptable

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solution. Also, these individuals are more impressionable, and their limited knowledge and/or lack of previous experiences make any element distract their attention and lose their ability to make in-depth evaluations of the information received. Therefore, it can be concluded that the peripheral route is characterized by less cognitive reasoning than the central route.

Taking into account the characteristics that define an omni-channel shopping behavior as opposed to a one-stop shopping behavior, it is possible to argue that, in general terms, the development of the first type of behavior appears more likely in those cases in which the central information processing route is used. The greater involvement in purchasing that leads to the use of the central route will favor the development of omni-channel journey. The combination of different channels or touchpoints, online and offline, makes it easier for the customer to search, obtain, compare and evaluate specific information about the product and/or the distributor before the final purchase, acting as a "smart shopper" and evidencing a more rational and reflexive behavior, spending more time on the purchase process and handling more information. Thus, we propose:

H_1: Omni-shoppers are more likely to use the central route to information processing than one-stop shoppers.

2.3 OCR within the Relationship Marketing Approach: the Moderating Effect of Omni-channel Customer Behavior on Emotions, Perceived Value and Satisfaction

Today's customer markets are characterized as environments where there is great global competition. It is increasingly difficult for retailers to maintain a competitive advantage focused on their products and it is necessary to create long-term relationships based on trust and mutual benefit, which is the logic behind relationship marketing [25].

OCR, which is closely related to relationship marketing, seeks a balance between offline and online channels to serve the shopper [37] and enhance their value and expertise, developing lasting relationships while increasing the long-term profitability of companies [22]

Omni-channel customer journey can be considered one of the results of the company's relationship marketing strategy and its ability management of databases and other dimensions of the CRM (Customer Relationship Management) approach. Therefore, all the specific effects of relationship marketing can be included in the identification of possible consequences of the multi-channel strategy. We focus on three key variables: the emotions experienced during the shopping journey, the perceived value of the organization, and the satisfaction that the customer develops with that company.

As previously discussed, today's customers have access to a wealth of information during their shopping journey about the companies that can provide them with the product they are looking for. When buying, they demand a quality product, at a good price, and in addition, that the firm offers them guarantees of its know-how. However, this amount of information has turned the customer into a more critical shopper of standardized products who is looking for differentiating elements. Therefore, new customer needs are more related to obtaining experiences and emotions at all stages that make up their decision-making, which in turn has led to the development of emotion marketing or experiential marketing [26,32].

The literature review shows different theoretical models for measuring emotions. Given that this research aims to measure the emotions experienced by customers who combine offline and online channels, and their satisfaction with the company, the model developed by Watson and Tellegen [36] will be taken as a reference, which proposes a two-dimensional approach to emotions (positive and negative) based on valence.

In this sense, the success of retailers lies in being able to generate positive emotions for their target since customers will perceive the brand as their own, developing greater loyalty with the company [5] and acting as their greatest influencers. Otherwise, the customer's propensity to complain to the manager and share the experience through negative word-of-mouth will increase [17].

The emotions experienced by the customer will also have a direct positive (positive emotions) and negative (negative emotions) impact on the perceived value. Thus, the literature review shows the existence of a causal relationship between attitudes towards a brand and the consumer's perception of the product sold under that brand (a favorable attitude towards the brand leads to an increase in the perception of the product's quality and vice versa). Similarly, works such as those developed by Griskevicius, Shiota, & Nowlis [16], Han, Lerner, & Keltner [17] and Nyer and Gopinath [24] show the resistance to change of attitudes (and emotions) initially formed. Thus, experiencing positive or negative emotions "conditions" continuing to think or act in the same way, with resistance to change being more intense in the case of experiencing negative emotions than in the case of experiencing positive emotions.

Another of the most studied concepts within marketing and consumer behavior, especially in the retail sector, is satisfaction. The literature review shows multiple definitions using the cognitive and affective approach.

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Although traditionally greater emphasis has been placed on the cognitive dimension than the affective one [4], for the purposes of this research both approaches are taken into account as there is evidence of a direct relationship between emotions and satisfaction, especially in the area of physical establishments [15,34]. In this sense, if companies are able to develop emotional marketing, the creation of experiences will be reinforced, either positively or negatively depending on the result of the interaction, consequently influencing customer satisfaction.

However, it should be noted that the omni-shopping behavior and one-stop shopping behavior may generate differences in the intensity of some of the relationships and links described above. The reason would be found in the different way of processing information that seems to characterize each of these customer journeys. Omni-channel behavior, most likely linked to the central information processing route, will generate more intense emotions (whether positive or negative), inasmuch as it usually corresponds to a customer who is more involved in the decision-making, who invests more cognitive effort in it, and who by interacting with several points of contact receives a more complete experience of the company and/or purchase process. Thus, it is foreseeable that for those variables that are directly affected by emotions (perceived value and satisfaction), the intensity of this effect will be greater in the case of omni-shopping behavior than one-stop shopping behavior. All these reflections lead us to make the following hypotheses:

H_{2a}: The positive relationship between positive emotions and perceived value is more intense in the case of customer engaged in omni-shopping behavior than in one-stop shopping behavior.

H_{2b}: The negative relationship between negative emotions and perceived value is more intense in the case of customer engaged in omni-shopping behavior than in one-stop shopping behavior.

H_{3a}: The positive relationship between positive emotions and satisfaction is more intense in the case of customer engaged in omni-shopping behavior than in one-stop shopping behavior.

H_{3b}: The negative relationship between negative emotions and satisfaction is more intense in the case of customer engaged in omni-shopping behavior than in one-stop shopping behavior.

3. Research method

3.1 Research Scope and Sample Design

To achieve the objectives of this work, a database compiled by a prestigious market research company was used for its report analyzing offline and online consumer behavior. For the purposes of our research this database contains detailed information on the purchasing process carried out by those individuals out of a total sample of 4,067 consumers who have purchased products included in the sector selected for this research. The database consisted of an online survey carried out with the most rigorous criteria by the above-mentioned company. This ensures that respondents keep their shopping experience recent and therefore remember if they reported more or less deeply, how long it took from the time they felt the need to purchase to the time they made the decision to do so, as well as the positive or negative emotions they developed with the retailer and their satisfaction, as a result, with the retailer. In this way, asking for a real-life shopping experience will generate responses that are not based on assumptions and that will make it possible to measure whether consumers have processed the information more or less deeply (central route versus peripheral route) and what emotions they have experienced in relation to the retailers, influencing their perception of the company's image and their satisfaction with it.

To test the proposed hypotheses, the empirical research analyses technical customer goods sector (TCG) sector in Spain. The empirical research choosing a sample of Spanish population over 15 years of age that have purchased any product from the such as mobile phones, tablet, phone accessories, television, Bluetooth, GPS navigator, desktop, laptop, pen drive, software or videogames…, during the past year in a physical store or through the Internet. The sample has 705 observations.

Two basic criteria have been taken into account in order to select the TCG sector: (1) the weight that e-commerce has within this sector (or its future projection) in the Spanish market, and (2) the fact that products from TCG industry are items whose purchase implies different degrees of consumer involvement [14], which will allow the influence of this variable to be analyzed.

3.2 Measurement of the Model Variables

Omni-channel customer journey was measured through three types of questions (Appendix). First, we used a dichotomous question, in which the respondents specified whether they had made the purchase through a single channel (regardless of whether it was offline or online) or, on the contrary, had used both the physical and the virtual channels. Subsequently, to determine whether their behaviors had indeed been omni-shopping or one-stop shopping, we included a question that referred to offline and/or online information sources used during

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the shopping journey and the place (physical or virtual stores) chosen to acquire the products from TCG sector. Finally, omni-channel behavior was measured through a ten-point scale, in which 1 referred to the use of a single channel (whether physical or virtual) and 10 referred to the combined use of offline and online channels to choose and purchase products.

To test the independent variables corresponding to the processing of information, questions were designed to evaluate the degree of planning of the purchase, the depth of the search for information or the time invested in the purchase. These variables were measured through a semantic differential scale from 1 to 6 to measure numerically the effort and planning of the respondents in their shopping trip. For the measurement of the data and its statistical treatment, we subsequently converted these items into dichotomous variables (Appendix).

The measurement of emotions, perceived value and satisfaction was performed through a series of items obtained in the literature review on the subject. All the items were evaluated using a 11-point Likert scale. Appendix 1 shows the scales and items used. As far as emotions are concerned, they have not been analyzed just at the moment they occurred, but a posteriori. The quick and ephemeral nature of emotions seems to suggest that the first option is more advisable. However, the high cost of this method and its intrusive consideration by individuals means that a posteriori measurement remains the most widespread technique. Studies as those conducted by Jaeger, Cardello, & Schutz [19], King, Meiselman, & Carr [21] and Piqueras-Fiszman and Jaeger [28,29] have demonstrated this fact, evidencing that emotions experienced during the use or consumption of products function as a selection system. Customers store in their memories and in a prolonged manner the facts that have special emotional meanings, which can be positive [8] or negative [12]. This way, these facts are more easily remembered. Regarding perceived value, we focused on the studies conducted by Fandos, Sánchez, Moliner, & Llorens [11], Moliner, Sánchez, Rodríguez, & Callarisa [23], Sánchez, Callarisa, Rodríguez, & Moliner [31] and Sweeney and Soutar [33]. Considering these studies, we measured the perceived value from two of its basic dimensions, i.e. the functional value and the social value. The functional value dimension is composed of three items, namely: (1) functional value of the company; (2) functional value of sales personnel; and (3) functional value of the price. After confirming the reliability and validity of the functional value and social value, we combined the two scales into a second-order factor, which was called perceived value (Appendix).

4. Results

To test whether or not customers' shopping journey is omni-channel, a binomial logit model was estimated using STATA 12 statistical software. Table 1 shows the results, indicating the values of the coefficients of the different independent variables, their robust standard error and an indication of their level of significance. The estimated models show good overall significance of the parameters.

Table 1. Binomial logit model estimated for omni-shoppers vs. one-stop shoppers

Variable	Coefficient	Standard robust error
I researched thoroughly and knew exactly what I wanted to buy	0.196**	0.213
I spent time visiting stores (physical and/or virtual) and on shopping	0.355*	0.198
I visited to the store (physical or virtual) only to buy the product	0.054	0.192
I had been thinking about buying the product for some time	0.214*	0.212
Observations = 705; Wald chi2 (39) = 78.21***; Pseudo R^2 = 0.0934		

Notes:
*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.*

The results in Table 1 show that the variables that are usually a reflection of the central route to information processing have a positive influence on the development of omni-channel behavior. Specifically, individuals who are well-informed about product characteristics, prices, and alternative products, those who invest time and interest in walking around stores and comparing alternatives, and customers who plan in-deep their purchases ahead of time are more likely to follow an omni-channel behavior. In this sense, the aggregate consideration of all these evidences allows us to accept the first of the hypotheses of our research, $\mathbf{H_1}$.

On the other hand, to test the hypotheses raised about the cognitive-affective consequences of the omni-channel behavior, a multi-sample analysis (EQS 6.2 software for Windows) has been carried out distinguishing two groups: omni-shoppers (275 respondents) and one-stop shoppers (430 respondents).

The statistical results show that positive emotions do not have a more intense effect on the perceived value in the case of omni-shoppers than in the case of one-stop shoppers, rejecting hypothesis $\mathbf{H_{2a}}$, nor on satisfaction, rejecting consequently hypothesis $\mathbf{H_{3a}}$. However, the data show that the negative effect of negative emotions on the perceived value is significantly more intense in the case of omni-channel behavior than one-stop shopping behavior,

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supporting hypothesis $\mathbf{H_{2b}}$. The statistical analysis also shows that negative emotions have a more intense effect on satisfaction in the case of omni-shoppers than in the vase of one-stop shoppers, as established in the hypothesis $\mathbf{H_{3b}}$, although the significance level is 90% (Table 2 and Table 3).

Table 2. Measurement model for omni-shoppers vs. one-stop shoppers. Step one

	Omni-shoppers Standardized path coefficients (t-values)			One-stop shoppers Standardized path coefficients (t-values)	
Positive emotions→	0.523***			0.479***	
Perceived value	(9.654)			(7.310)	
Negative emotions→	-0,305**			-0,307**	
Perceived value	(-2,538)			(-2,579)	
Positive emotions→	0,357***			0,328***	
Satisfaction	(3,319)			(5,301)	
Negative emotions→	-0,116**			-0,151**	
Satisfaction	(-2,556)			(-2,253)	
$\chi^2(1050) = 2058.1930$	BNNFI	CFI	IFI	RMSEA	SRMR
	0.940	0.945	0.946	0.055	0.155

Notes:
*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.*

Table 3. Measurement model for omni-shoppers vs. one-stop shoppers. Step two

Constraints	Chi-square	Probability
Positive emotions→ Perceived value	1.699	0.145
Negative emotions→ Perceived value	0.350	0.045
Positive emotions→ Satisfaction	1.154	0.150
Negative emotions→ Satisfaction	0.255	0.025

5. Conclusions and Managerial Implications

The aim of our research was to analyze the influence of information processing on the development of omni-channel customer behavior, as well as to understand the consequences of this behavior for retailers through a cognitive-affective approach.

The results show that omni-shoppers (as opposed to one-stop shoppers) are more rational and reflective, informing themselves in depth about the main elements concerning the product (characteristics, prices, other alternatives...), spending more time on their decision-making and planning their purchase with considerable time. On the other hand, our research has shown that omni-channel customer behavior moderates the effect that negative emotions have on perceived value and satisfaction.

In this sense, the results show that omni-channel behavior seems to be associated with the central route to information processing more likely than the single-channel behavior. Omni-shoppers present a more planning behavior, evaluating to a greater extent the purchase decision criteria that help them to make the best decision. Likewise, their interactions with physical and virtual channels make them have a deeper knowledge of the pros and cons of retailers. Although, as shown in the results, any negative experience has a greater impact on the perception of the company's image and, consequently, will generate dissatisfaction. Therefore, the most immediate consequence is the non-repetition of the purchase in the future.

Consequently, retailers who want to successfully implement an OCR strategy and gain the loyalty of existing shoppers will have to ensure that the shopping experience is truly seamless, generating positive emotions at all touchpoints and providing full and complete information on all aspects that are highlighted for the consumer to make their purchase decision (and that is with the company and not with a competitor). In this sense, retailers should be aware that each channel has strengths and weaknesses in comfort, advice and provide information, possibility of product inspection, contacts with vendors, security, privacy, control of the purchase process, economic cost, personal effort, time, payment methods.

Effective OCR management requires a strategic vision aimed at managing the different channels jointly and not independently. In this sense, retailers must leave behind what is known as the "silo approach", as today's customer does not differentiate between physical and virtual media, but only wants global solutions. It should also be stressed that the action of the retailer's sales team will be key to contributing to the success of OCR. Retailers should look for the so-called "4.0 seller". Thus, in the selection and training processes, skills related to the handling of digital devices and the virtual world must be included as an essential component. In addition, it will be necessary to develop a protocol of action so that sellers know how to act with showroom buyers, as well as to make the appropriate electronic devices available to them. On the other hand, motivation and incentive policies will be essential so that the sales force does not see the company's virtual store or other platforms where they are present as competitors. Salespeople should be able to achieve the incentives for sales achieved regardless of whether

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they are made in the physical store or whether the buyer acquires the product online guided by the salesperson in the store itself. The development of internal marketing policies aimed at salespeople will therefore be decisive.

6. Limitations and Future Lines of Research

Among the most important limitations of this research is the fact that it is a cross-sectional study focused on a particular moment in time. The research focuses on a specific sector and products within it, which recommends caution when extending or generalizing the results to other sectors and products in retailing environment.

On the other hand, the drivers analyzed focused on information processing, and there are other factors that may also be interesting related to psychographic variables, such as, for example, the predisposition to use ICTs. Likewise, the consequences of omni-channel behavior have only been analyzed on the basis of three variables, emotions, perceived value and satisfaction, with other dimensions not being considered, such trust and loyalty.

Future research could be aimed to deep this joint study of the antecedents that influence the development of an omni-shopping journey and, as a consequence, the effects that this behavior produce for companies, taking into account other relevant factors. Future research could also be carried out in other sectors and with more products in order to assess whether the variables studied present the same results. In this respect, it would be particularly interesting to consider the case of services. Similarly, while the today's individual is, in general terms, omni-shopper by combining the physical and virtual channels in the different stages that make up the customer journey, there are currently two behaviors that stand out from the rest, webrooming and showrooming. These omni-channel behaviors must be analyzed so that retailers develop segmentation strategies according to each of these profiles with the aim of achieving the loyalty of these types of customers.

Appendix

Omni-shopping behavior	
Referring to your shopping journey, of this pair of sentences, say which one reflects your last shopping behavior of TCG	
Items	**%**
"I searched for information and purchased the TGC product using just a single channel (physical store or the Internet)"	61.0%
"I searched for information and purchased the TGC product by combining the physical store and the Internet"	39.0%

Omni-shopping behavior				
Referring to your shopping journey, say which of these sources you used for searching for information				
(%)	**Offline**		**Online**	
Items	Yes	No	Yes	No
Physical stores (manufacture's, multi-brand…)	15.7	84.3	28.2	71.8
Category-killers	27.9	72.1	20.8	79.2
Department stores	25.1	74.9	16.2	83.8
Friend or family recommendations	52.6	47.4	10.3	89.7
Other customers or experts' recommendations	-	-	45.3	54.7
Search engines prices or shopbots	-	-	75.2	24.8
Others (social media, blogs, catalogues…)	10.1	89.9	14.3	85.7
In which of these places did you buy your TCG product?				
(%)	Offline		Online	
Items	Yes	No	Yes	No
Physical stores (manufacture's, multi-brand…)	2.1	97.9	0.2	99.8
Category-killers	65.2	34.8	32.7	67.3
Department stores	57.2	42.8	45.6	54.4
Social media or C2C platforms (eBay…)	-	-	13.6	86.4
Thrift shop	1.8	98.2	1.3	98.7
Others (friends, family, catalogues, telecom stores…)	0.3	99.7	0.1	99.9

Omni-shopping behavior		
Of this pair of sentences, say which one more closely reflects your shopping behavior		
Items	**Mean**	**SD**
"I'm a one-stop shopper who searched for information and purchased the TCG product in the physical store/the Internet)" and "I'm an omni-shopper who searched for information and purchased the TCG product by combining offline and online channels (physical store and the Internet)"	2.5	2.25

Processing routes of information		
Referring to the purchase process, of each pair of sentences, say which one reflects more your usual purchase of products (Semantic difference from 1 to 6)		
1	6	Item
I chose based on what I was recommended or on impulse	*I was deeply informed and knew exactly what I wanted*	I researched thoroughly and knew exactly what I wanted to buy
I made the least effort on this purchase	*I spent time and effort going around stores, shopping...*	I spent time visiting stores (physical and/or virtual) and on shopping
I took the chance that I was doing other shopping to go to the store	*I went exclusively to purchase the product*	I visited to the store (physical or virtual) only to buy the product
I decided to make the purchase suddenly, on impulse	*I've been thinking about purchasing the product*	I had been thinking about buying the product for some time

Notes:
As can be seen from the table, not all statements are worded in the same way. Some of the items propose that the smaller the scale value, the more planning the purchases. While, for other items, the opposite situation occurs. We therefore recoded the variables so that they were all written in the same way. They were then converted into dichotomous variables, as the use of dichotomous variables is easier to interpret and the results do not differ much from continuous variables.

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Processing routes of information		
Total sample: 705 shoppers		
Item	Omni-shoppers (275 shoppers)	One-stop shoppers (430 shoppers)
I researched thoroughly and knew exactly what I wanted to buy	200 (72.7%)	278 (64.7%)
I spent time visiting stores (physical and/or virtual) and on shopping	174 (63.3%)	228 (53.0%)
I visited to the store (physical or virtual) only to buy the product	172 (62.5%)	272 (63.3%)
I had been thinking about buying the product for some time	214 (77.8%)	311 (72.3%)

Emotions (Laros & Steenkamp, 2005; Smith & Bolton, 2002; White & Yu, 2005)			
Referring to the experience during the shopping journey, say which one of these emotions reflects how you felt			
Positive emotions ***α = 0.959; CR = 0.959; AVE = 0.824***			
Items	Loadings (t-value)	Mean	SD
Delighted	0.929 (38.159)	5.13	2.52
Glad	0.931 (36.275)	5.45	2.49
Happy	0.947 (40.834)	5.01	2.53
Excited	0.895 (35.838)	5.41	2.70
Pleased	0.831 (30.814)	5.43	2.64
Negative emotions **α = 0.935; CR = 0.941; AVE = 0.765**			
Angry	0.858 (25.527)	2.97	2.48
Frustrated	0.958 (27.650)	2.77	2.42
Annoyed	0.968 (29.757)	2.78	2.43
Distressed	0.898 (23.080)	2.58	2.35
Bored	0.654 (18.053)	3.29	2.73

Perceived value [11,23,31,33] **α = 0.890; CR = 0.936; AVE = 0.879**			
Functional value			
Items	Loadings (t-value)	Mean	SD
The Retailer X provides services correct as a whole	0.965 (15.132)	6.59	1.95
The Retailer X has a qualified salesforce, they know their job well		6.75	2.20
The Retailer X provides correct quality-price ratio		6.14	2.14
Social value			
The Retailer X has a positive social image	0.926 (23.491)	6.92	1.88
The Retailer X has a good image for my friends and relatives		6.54	2.06
The Retailer X has a positive image for me, considering all the items specified above		6.71	2.10

Satisfaction (Bloemer & Odekerken-Schröder, 2002; Oliver, 1999) α = 0.938; CR = 0.941; AVE = 0.800			
Items	Loadings (t-value)	Mean	SD
The Retailer X confirms my expectations	0.898 (30.335)	6.45	2.13
After shopping at the Retailer X, I am happy in my choice	0.945 (34.040)	6.38	2.22
After shopping at the Retailer X, I think I have made the right choice	0.803 (24.709)	5.54	2.33
In general, I am satisfied with the Retailer X	0.925 (33.728)	6.40	2.23

Notes:
Participants responded using a 11-point Likert scale: 0 = completely disagree and 10 = completely agree; α: Cronbach's alpha; CR: composite reliability; AVE: average variance extracted.

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ARTICLE

Comparative Financial Analysis of Conventional and Islamic Banks of Developing Countries

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ABSTRACT

This study investigated the financial performance of Bangladesh's State-Owned Commercial Banks, Islami Shariah Based Private commercial Banks and Conventional Private Commercial Banks over 12 years from 2006 to 2017. The objective of this study is to find out the financial performance of a bank based on CAMEL indicators. The finding of this study is that Islami Shariah Based Private commercial Banks and Conventional Private Commercial Banks has a good position than State-Owned Commercial Banks. Specific, Pubali Bank Limited, Standard Bank Limited, Prime Bank Limited, City Bank Limited and Al-Arafah Islami Bank Limited are in the best position in Bangladesh under this study. We also found that the performance of State-Owned Commercial Banks is not good. This study gives a policy implementation according to results. 1. State-Owned Commercial Banks should restructure the infrastructure. 2. It needs more emphasis on efficiency and effectiveness to control the cost and loan investment. 3. It will be required to pay more in insurance premiums. 4. It should be born in mine, for higher rating banks. We suggest to a higher number of rating banks that it's hinders a bank's ability to expand by investing, consolidating, or adding more branches. We also suggest to all lower rating banks. The institutions with a poor rating will be required to pay more in insurance premiums.

1. Introduction

Financial institutions took a superfluous risk during the period of the world financial crisis 2008-2009.The banking sector plays a significant role in sustaining financial markets and has an impact on the success of the economy. The banking division is performing a significant role in economic development. Banking activities are necessary for strong economies that eventually become the motive to be involved in the grade of developed nations. Job and commercial activities enlarged in the 18th century throughout the industrial revolution by the beginning of large scale production. To increase commercial operations got importance and became an essential facility. In today's global market, customer satisfaction and product quality may enhance the performance of banks for the wealthy remnant. Globalization has attracted the attention of all parties, with increasing integration, economic growth, rules, and

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competition among banks, and uninterrupted innovation to provide financial benefits that are appropriate under Islamic guidelines and traditions. It should be of concern about the widely critical assumptions of Islamic banks. Conventional banks get their earnings from the difference between the interest rate from debtors and the interest rate given to depositors. Islamic banking does the same task in this scheme, and interest is severely prohibited. In that way, they cannot accept a fixed rate from debtors and do not pay a fixed interest rate to the investors. It earns based on the profit-sharing contracts with the depositors and with the debtors. However, some fee-based banking services are the same as conventional banks do. Hence, Islamic banking is a banking system as it provides profit-sharing and disallows interest. This profit-sharing depends on the degree of the risk involvement of the parties. Its conduct on Quranic instructions and as It explained using Shariah philosophies [4]. Reliability is an issue in any financial division. One of the dealings of economic development and financial progress of a nation has been the reliability of its banks. The soundness of the banking division is identical based on producing, efficiency, stability, profitability, and a shock-free atmosphere. Attaining constancy in banking is only the foundation of a sound banking scheme. The main objective of banks today is to sustain stability and make sure they are resistant to outside shocks while at the same time it being internally sound and practical [15].

Performance appraisal of the banking division is an effective and efficient measure and a pointer to check the soundness of economic events of an economy [13]. The sound financial health of a bank is the security for not only its depositors but also is similarly significant for the shareholders, stakeholders, and the whole economy as well. For this day by day, it made to measure the financial position of Islamic banks and Conventional banks and manage it effectively and efficiently. In developing countries like Bangladesh, banking industries play a vital role in economic development. It is true, as stock and bond markets are typically underdeveloped. Besides, the development of the banking system and enhancing its financial performance connected to the higher economic growth of any country. Specific, commercial banks contribute to economic growth and other development through their financial role in Bangladesh. The healthy performance of banking industries is the first condition for product innovation, product development, diversification, and effectiveness of the commercial banks. In any country, the development of economic growth and other system deepens on the stability of the banking industry and the better financial performance of banking industries. The organized banking industry can absorb the risk level of an economy. In a small country like Bangladesh, the number of government and private banks is increasing year after. The local bank faced with competition. As a result of regulatory requirements as well as financial and technological innovation, and new entry of foreign banks in the local banking environment and make contests of the current global financial crisis in Bangladesh. These particular changes affected the present financial performance of the commercial banks in Bangladesh. The study does analyze the financial performance of conventional banks and Islamic banks in Bangladesh based on CAMEL. It (CAMEL) uses as a performance measuring tool as well as to provide some recommendations for betterment in performance in banking industries in Bangladesh. The evaluation of the financial performance of the banking industry is essential for some reasons. CAMEL rating is a controlling rating system initially advanced in the (U. S.) in 1979-80 to classify a Bank's inclusive position. It is practical to every bank and credit union in the U. S. and also applied outside the U. S. by several banking managerial regulators. The term "CAMEL" rating, it recognized by the federal financial organization examination council on November 13, 1979. And then later by the national credit union administration in October 1987. The scores are given based on the ratio investigation of the financial report.

It used to be an active internal controlling tool for assessing the soundness of a financial firm, based on recognizing those institutions demanding special consideration or concern. Uniform Financial Institutions Rating System 1997. Bangladesh Bank announced CAMEL Rating System in 1993 as a vital part of the Off-site Regulation System. It uses for evaluating bank performance. It is a model for the level of the banks. CAMEL is an abbreviation for the five components of banks' safety and soundness.

(1) Capital adequacy
(2) Asset quality
(3) Management quality
(4) Earning abilities
(5) Liquidity

In the current study, an effort to assess the financial performance of the particular banks in Bangladesh. The remaining sections of this paper are 2. Literature review, 3. Research methodology, 4. Analysis and result discussion, 5. Conclusion and policymaking.

2. Literature Review

The performance of the bank & all other financial

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industries signifies the real picture of any nation of the world. So focusing on this industry must be the strategy of any well developed and other developing countries. Many studies do see banking performance through various performance measuring tools. CAMEL variables are considered a tool for measuring weapons. They conducted a study that the CAMEL components had a positive effect on the performance of commercial banks as well as Islamic banks in financially. The research determines that strengthening CAMEL mechanisms can raise the safety of commercial banks and Islamic banks in Bangladesh [9]. They found that the productivity of both categories of banks displays inverse outcomes. But Islamic banks are marginally superior in terms of loss as compared to conventional banks. The main motive is that both types of banks designated are new entrants to the market So that they are incapable of control their operating expenses. Islamic banks are showing improved results in a loan to deposit ratio and loan to asset ratio. Whereas, Conventional banks are presenting slightly decent results in terms of cash & portfolio to deposit & borrowing [16].

They tried to find out the result of company governance on the money stability of deposit cash banks in the African countries. The population of the study comprised the twenty-one listed deposit banks on the Nigerian exchange as of September 2016 [3]. It completes that company governance encompasses a vital result in money stability. Financial performance influence by the administration behavior of the banking industry [10].

They showed the constructive behavior of the financial position for Erbil Banks, and some of their economic factors variable impact the performance for the banks. They found that the whole financial performance of Erbil Banks is enlightening in case of assets quality ratios, liquidity ratios, or credit performance, profitability ratios (NPM, ROA, and ROE)[1]. This paper scrutinize whether the Islamic banks accomplish better in terms of risk and return as associated with conventional banks. The financial performance measures assessed using ROA and ROE ratios [20].

They made an evocative analysis established that, during the war, post-war private banks had high financial performance than state banks. State banks need to focus on their financial performance to compete and persist effectively in the existing world and also private commercial banks' effort to attain their goal financial performance for their extended survival [23].

They observed the link between the rate of interest, financial process, and banks loaning in the African country. The study utilized a standard statistical method (OLS) technique to research knowledge. The study found that the rate of interest had a negative relationship with banks loaning in the African country. The economic process had a direct correlation with banks loan in African countries [22]. On the other hand, they found the results of the study indicated that credit risk and liquidity risk had a positive impact on come back on quality. Whereas, capital adequacy risk had a negative and insignificant effect on coming back on quality. The study complete that risk management/concentration affected the performance of banks in the Federal Republic of Nigeria [12].

They found that IBs yield additional liquidity per unit of assets than Commercial banks. On the other hand, Islamic bank liquidity creation doesn't [6]. The Islamic banks square measure less risky and a lot of solvents as well as economical than standard banks. However, there's not a lot of distinction seen in terms of profit. In respect of the analysis record of Islamic banks discovered sensible positive trends as compared to standard banks. The results of the study would be useful to the current management of Islamic banks to enhance their performance additionally as potential stakeholders [6].

They found that (1) minor Islamic banks tend to be financially sturdier than commercial banks. (2) Large commercial banks tend to be financially sturdier than large Islamic banks. (3) Islamic banks tend to be financially stouter than large Islamic banks. That may imitate trials of credit risk supervision in large Islamic banks. They also found that the marketplace share of Islamic banks does not have a substantial impact on the financial forte of other banks [9].

Z-score analysis is the pointer of bank stability. Using the Z-score as a pointer of banks constancy, a regression study (covering a matched sample of 34 Islamic Banks (IBs) and 34 Conventional banks (CBs) from 16 countries) demonstrations that there is no difference in terms of the effect of the financial disaster on the reliability of IBs and Commercial banks. This conclusion discloses that IBs are deviating from their hypothetical business model that would have permitted them to keep a similar level of accuracy even throughout the crisis [7].

Islamic banking is interest-free banking that marks it essential for monotheism banks to necessitate active half within the procedures of the business, i. e. share profits likewise as losses. Banks composed of Islamic banks favor taking minimum risk. On the other hand, Islamic banks should face a lot of problems. It can have a lot of unstable or maybe adverse yields on their assets [11].

Islamic banking is rising at a fast pace in frugality.

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And, it is the winners of entrepreneurship and counters the interest-based financial system. Presently, Islamic banks have touched $1 trillion and is rising around at 20% yearly. Yet, this rapid growth did not restrict the Muslim countries, but the merchandises of Islamic institutions are finding standing in non-Muslim nations. The drive of this study is to comprehend the main alterations in Islamic and Conventional Banking in Pakistan based on cost. And it benefits inquiry, assessment of the lending structure, and comparison of risk administration in the context of the current period [5].

They found that by associating the failure risk for both bank's categories, Islamic banks have an expressively lesser risky of failure than that of their conventional banks. Our findings specify that the plan and application of early warning systems for banks failure should identify the distinct risk shapes of the two bank types [18].

3. Research Methodology

The study period of this paper is from 2006 to 2017. All data collected from bank-scope data based. It covers the 32 banks of Bangladesh including, 4 State-Owned Commercial Banks, 6 Islamic shariah based private commercial banks, and 22 conventional private commercial banks. Type-1, Type-2, and Type-3 are representing Government commercial banks, Islamic sharia-based commercial banks, and Conventional Private Commercial Banks. We consider zero when we found missing value. This study conducts only CAMEL parameters.

Table 1. List of banks of this study

Type-1 State-Owned Commercial Banks (SOCBs)	
1	Rupali Bank Ltd.
2	Agrani Bank Limited
3	Janata Bank Limited
4	Sonali Bank Limited
Type-2 Islami Shariah Based Private commercial Banks (PCBs)	
1	Social Islami Bank Limited (SOIBL)
2	Al-Arafah Islami Bank Limited (AIBL)
3	EXIM Bank Limited
4	Shahjalal Islami Bank Limited (SIBL)
5	Islami Bank Bangladesh Limited (IBBL)
6	First Security Islami Bank Limited (FSEIBL)
Type-3 Conventional Private Commercial Banks (PCBs)	
1	Standard Bank Ltd.
2	Southeast Bank Limited
3	IFIC
4	Uttara bank
5	AB Bank Limited
6	BRAC
7	The City bank
8	Dutch Bangla Bank Limited (DBBL)
9	Eastern Bank Limited
10	Mercantile Bank Limited
11	Dhaka Bank Limited
12	National Bank Ltd.
13	National Credit and Commerce Bank Limited (NCC)
14	Prime Bank Limited
15	Pubali Bank Limited
16	Trust Bank Limited
17	Jamuna Bank Limited
18	United Commercial Bank Limited
18	Mutual Trust Bank Ltd.
20	One Bank Limited
21	Premier Bank Limited
22	Bank Asia Limited

Camel Parameters

Capital Adequacy Ratio: Capital adequacy ratio is an essential factor to help the bank understand the attractive potential of shock during risk. Capital adequacy enables a bank to meet any financially unforeseen conditions due to FX risk, market risk, credit risk, interest rate risk. It protects the interest of depositors in a bank.

Capital adequacy ratios (CAR) are an assessment of the amount of a bank's core capital stated as a % of its risk-weighted asset. Capital adequacy ratio defined as

CAR = (Tier 1 Capital + Tier 2 Capital) / Risk weighted Assets*100

TIER 1 CAPITAL - Tier 1 capital comprises a bank's stockholders' equity and retained earnings. Risk-weighted

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assets are a bank's assets weighted in response to their risk exposure. For instance, cash carries zero risks, but actually, numerous risk weightings keep on to specific loans like mortgages or commercial loans. The risk premium is a percentage that's practical to the consistent loans to attain the total risk-weighted assets. To estimate a bank's tier 1 capital ratio, divide its tier 1 capital by its total risk-weighted assets.

TIER 2 CAPITAL - (1). Unrevealed Reserves, (2). General Loss reserves, (3). Hybrid debt capital instruments and subordinated debts where risk can also be weighted assets or the particular national regulator's least total capital obligation. When using risk-weighted assets,

$CAR = [(T1 + T2) / a] \geq 10\%$

Percent threshold differs from banks to banks (10% in this case, an obligation for regulators compatible with the Basel treaties) is set by the national banking controller of various countries. [17, 2, 19].

Asset Quality: To interpretation for the degree of Non-Performing loan in the portfolios of the banks and the degree of damage this specific asset class may have on the financial performance. Asset quality measure by impaired loan to the gross loan [19]. This measurement of CAMEL analysis takes the portfolio risk the banks are exposed to and the effects it could have on the general presentation of the banks.

Management Quality: The management aspect in CAMEL investigation has supposed much significant position like not ever before. To capture the potential dynamics of management effectiveness affecting the financial performance of the bank's subsequent ratios that reflected the Operating expense as a percentage of total assets [2,17,19].

Earnings Quality: It helps to focus on the gripping power of the loss, determines the level of its earnings and earnings, and the funds available to reward its shareholders. This paper employs two functional measures to measure the profitability of banks like ROA and ROE [17, 2, 19].

Liquidity: Liquidity management in banks has a supposed significance due to competitive pressure and the relaxed flow of external capital in the local markets. The influence of liquidity emergency in the banks can badly influence the financial performance of the banks. The incapability of the banks to accomplish its short term liquidity liabilities and loan obligations can badly impact the performance of the banks by significantly increasing its cost of fund and over disclosure to the unrated asset class. Also, the cash flow from principal and interest expenses could vary for the sorts of loans on the balance sheet effect the liquidity situation. The higher average value of the ratios becomes ranked greater. The liquidity ratio calculates at a net loan to the total asset [17, 2].

Table 2. CAMEL parameters and their calculation method

Variables	Formula
Capital Adequacy	Self-Owned Capital / Risk-Weighted Assets*100%, Self-Owned Capital =Tier1 Capital+ Tier2 Capital
Asset Quality	Impaired loan / Gross loan
Management Quality	Operating expenses / Total asset
Earnings Ability	i. ROA = Net profit / total asset ii. ROE = Net profit / total equity
Liquidity	Net loans / Deposits and short term funding

Sources: [17,2,19]

Table 3. Shows rating and composite range

Rating	Composite Range	Comment
1	1.00-1.49	Strong
2	1.50-2.49	Satisfactory
3	2.50-3.49	Fair
4	3.50-4.49	Marginal
5	4.50-5.00	Unsatisfactory

Sources: [14,2]

Table 4. Describe the rating value

Rating	Interpretation
1	Define performance.
2	Indicates average performance that means sound and slightly safe operation.
3	Represents that performance flawed to some degree
4	Sign for unsatisfactory performance. It could be a threaten to solvency for banking operations.
5	Sign for very unsatisfactory performance. That means Banking companies need immediate remediation to survive.

Sources: [21,2]

Below the "1", it defines the poor performance of bank.

4. Analysis and Result Discussion

In table 5, shows the capital adequacy ratio that measures by Self-Owned Capital / Risk-Weighted Assets*100%. The Islamic bank performs better performance (11.83%) than the other two type's bank. Commercial bank does better (11.66%) than the government state-owned bank (8.77%). So, Bangladesh's State-owned commercial bank shows poor performance (8.77%) among the four banks. The result suggested that Bangladesh's State-owned commercial bank is unable to meet unexpected financial

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risks like credit risk, market risk, and interest rate risk.

Table 5. Capital Adequacy Ratio (%) Mean (consolidated)

Type	Type-1	Type-2	Type-3
Capital Adequacy	8.77	11.83	11.66

In table 6, shows the quality of the asset determined by impaired loan to gross loan. State-owned commercial bank displays poor performance (17.06%) from the other two type's bank. Islami bank performs (3.22) better among the other types bank. The higher the rate that it indicates higher the amount of the banks impeded loan, the higher the risk of the bank. It further refers that Bangladesh's State-owned commercial bank is at the highest risk.

Table 6. Asset Quality Ratio (%) Mean (consolidated)

Type	Type-1	Type-2	Type-3
Asset Quality	17.06	3.22	4.11

In table 7, this step of performance will shed light on the excellence of management. It is to ensure that banks manage easily and decently. The superiority of banks is decided by efficiency and effectiveness in controlling costs and increasing productivity, ultimately achieving higher profits. The result suggests that the cost increase of conventional commercial bank (type-3) rather than type-1 and type- 2.

Table 7. Management Quality Ratio (%) Mean (consolidated)

Type	Type-1	Type-2	Type-3
Management Quality	1.76	1.65	2.44

In table 8, it helps to focus on the gripping power of the loss, determines the level of its earnings and the funds available to reward its shareholders. This paper employs two functional measures the profitability of banks like ROA and ROE. Type-3 bank achieved the highest profit during the study period. The overall performance of type-2 bank is slightly lower than type-3 bank. Whereas type-1 bank earned low-income form the other two types of bank.

Table 8. Earnings Ability (ROA) Ratio (%) Mean (consolidated)

Type	Type-1	Type-2	Type-3
Earnings Ability (ROA)	1.04	1.38	1.44

In table 9, ROE contributes to the understanding of the management's work about the earnings or income received from the owner's equity. Return on Equity (ROE) reveals how much a bank can earn compared to the total amount of equity held by the shareholders on the balance sheet. Any bank that expresses higher returns on equity is able to generate more cash internally, while having higher returns on equity. The result suggests that the type-1 bank shows the better earning ability from the type-2 and type-3 bank.

Table 9. Earnings Ability (ROE) Ratio (%) Mean (consolidated)

Type	Type-1	Type-2	Type-3
Earnings Ability (ROE)	18.24	14.75	15.74

Table 10. Liquidity Ratio (%) Mean (consolidated)

Type	Type-1	Type-2	Type-3
Liquidity	56.90	86.60	79.85

In table 10, the liquidity ratio of a bank measures its performance to repay its current liabilities. If a bank faces a liquidity crisis, the bank cannot meet its short-term obligations. It needs a sufficient liquidity ratio to run a bank operation soundness. The result suggests that the type-2 bank shows (86.60%) the better earning ability from the type-3 (79.85%) and type-1 (56.90%) bank.

From table 11, based on composite rating value, the researcher found that the performance of type-1 (state-owned) banks like Rupali (5), Agrani (5), Janata (8), Sonali (7) time show poor performance over the study period.

We also found that the performance of type-2 banks like First Security Islami Bank Limited (6), Social Islami Bank Limited (1), Shahjalal Islami Bank Limited(1), Islami Bank Bangladesh Limited(1) time show poor performance during the study period. Whereas, Al-Arafah Islami Bank Limited and EXIM Bank Limited display zero time poor performance under the study period.

We further found that the performance of type-3 banks like Uttara bank (4), One Bank Limited (4), Mutual Trust Bank ltd (2), Trust Bank Limited (1) time show poor performance during the study period. Other banks in type-3 show one (1)-time poor performance during the study period. On the other hand, Pubali Bank Limited, Prime Bank Limited, The City Bank, AB Bank Limited, and Standard Bank Ltd show zero time poor performance during the study period.

Our result suggests that a higher number of ratings hinders a bank's power to expand by investing,

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Table 11. Consolidated Rating value and Composite value

Bank	Rating (mean)	Composite value(mean)	Description			
Type-1			**Strong**	**Satisfactory**	**Fair**	**Poor**
Rupali Bank Ltd.	0.67	1.20	6	1	0	5
Agrani Bank Limited	0.83	1.27	5	1	1	5
Janata Bank Limited	0.33	0.74	4	0	0	8
Sonali Bank Limited	0.42	0.92	5	0	0	7
Type-2						
Social Islami Bank Limited	1	1.13	10	1	0	1
Al-Arafah Islami Bank Limited	1	1.31	12	0	0	0
EXIM Bank Limited	1.25	1.33	9	3	0	0
Shahjalal Islami Bank Limited	0.92	1.23	11	0	0	1
Islami Bank Bangladesh Limited	0.92	1.11	11	0	0	1
First Security Islami Bank Limited	0.50	1.05	6	0	0	6
Type-3						
Standard Bank Ltd.	1	1.23	12	0	0	0
Southeast Bank Limited	0.92	1.08	11	0	0	1
IFIC	0.92	1.09	11	0	0	1
Uttara bank	0.67	0.98	8	0	0	4
AB Bank Limited	1.08	1.26	11	1	0	0
BRAC	0.92	1.24	11	0	0	1
The City bank	1	1.23	12	0	0	0
Dutch Bangla Bank Limited	0.92	1.11	11	0	0	1
Eastern Bank Limited	0.92	1.29	11	0	0	1
Mercantile Bank Limited	0.92	1.36	11	0	0	1
Dhaka Bank Limited	0.92	1.14	11	0	0	1
National Bank Ltd.	1	1.20	10	1	0	1
NCC Bank Limited	0.92	1.20	11	0	0	1
Prime Bank Limited	1	1.22	12	0	0	0
Pubali Bank Limited	1	1.19	12	0	0	0
Trust Bank Limited	0.83	1.13	10	0	0	2
Jamuna Bank Limited	0.92	1.07	11	0	0	1
United Commercial Bank Limited	0.92	1.12	11	0	0	1
Mutual Trust Bank ltd	0.83	1.09	10	0	0	2
One Bank Limited	0.67	0.96	8	0	0	4
Premier Bank Limited	0.92	1.16	11	0	0	1
Bank Asia Limited	0.92	1.18	11	0	0	1

Source: Authors Calculation

consolidating, or adding more branches. So, it should be concerned about this matter. Our result also suggests that those banks show poor performance during the study period. Especially, type-1 banks are not good performance under the study period. That's mean it can't reach the minimum composite rate. So, it should need an immediate step to overcome this situation. We suggest to all lower rating banks. The institutions with a poor rating will be required to pay more in insurance premiums.

5. Conclusion and Implementation

This study investigated the financial performance of Bangladesh's State-Owned Commercial Banks, Islami Shariah Based Private commercial Banks and Conventional Private Commercial Banks over 12 years from 2006 to 2017. The objective of this study is to

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find out the financial performance of the bank based on CAMEL indicators. The finding of this study is that Islami Shariah Based Private commercial Banks and Conventional Private Commercial Banks has a good position than State-Owned Commercial Banks. Specific, Al-Arafah Islami Bank Limited, Standard Bank Limited, Prime Bank Limited, Pubali Bank Limited, and City Bank Limited are in the best position in Bangladesh under this study. We also found that the performance of State-Owned Commercial Banks is not good. We recommended to future researches to use cost efficiency and Z-Scores variables that are the pointer of performance measurement. This study gives a policy implementation according to results. (1) State-Owned Commercial Banks should restructure the infrastructure. (2) It needs more emphasis on efficiency and effectiveness to control the cost and loan investment. (3) It will be required to pay more in insurance premiums. (4) It should be born in mine, for higher rating banks. A higher number of ratings hinders a bank's ability to expand by investing, consolidating, or adding more branches. Finally, the study recommends that the mutual participation of the Central Banks of Bangladesh could involve the International Monetary Fund and World Banks professionals in designing improved legislative rules. And, it looks for extending reserves injection that will help in increasing the growth and operation of both conventional and Islamic banking institutions. We also suggest to all lower rating banks. The institutions with a poor rating will be required to pay more in insurance premiums.

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ARTICLE

Research on Public Participation in Public Procurement: In the Context of Digital Economy

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ABSTRACT

Public participation in public procurement is an important guarantee for its sustainable and healthy operation. In the era of digital economy and big data, public participation in information disclosure, service quality, and service pricing in public procurement plays an important role. Public private partnerships are an innovative form of public procurement. This study sorts out the issues of public participation in PPP projects, and puts forward several suggestions based on data thinking. In terms of public procurement project information disclosure, big data technology is used to improve the timeliness and breadth of information disclosure, and enhance the professionalism of information disclosure. Performance-oriented public procurement focuses on service quality, and guarantees service security through information platforms and professional third parties. The stakeholders use big data to supervise social organizations, so that they actively represent the public to file lawsuits in public procurement and relieve the public's damaged rights and interests. The protection of the public's right to know, suggest and supervise is inseparable from the training of professional talents by universities. Colleges and universities attach great importance to the cultivation of big data-oriented public procurement professionals, which includes improving teachers' teaching ability, building a new knowledge system that combines big data and public procurement, and setting professional courses for students at different learning stages through connotative development.

1. Introduction

An important aspect of fiscal expenditure, public procurement should meet the new requirements of national governance and digital economy [1-3]. Public procurement pursues value-for-money goals, fairness and transparency [4]. The governance principles of public procurement include: (1) Participation: to ensure that stakeholders have the opportunity and in-depth participation; (2) Sustainable and green procurement; (3) Transparency: the procurement process and decision-making are open; (4) Attributable Responsibility: Public procurement officials bear adverse consequences

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for their actions; (5) Fairness: Public procurement rules apply fairly to all participating suppliers; (6) Efficiency: Procurement of projects, goods and services for the public in a timely manner within the budget constraints and prescribed time limit [5-6]. It can be seen that public participation is the primary principle of good governance in public procurement. Academically, there is little research on the connotation, methods, content, characteristics and goals of public participation in public procurement. In the context of digital economy and big data, public participation in public procurement is a manifestation of its sustainable development and legitimacy. In terms of the theoretical and practical innovation of public procurement, public participation has become an important topic. The convenience of public participation in public procurement to obtain key procurement information, and the typical practice of the government using big data technology to protect the public' s right to know and supervisory rights. This research focuses on remedies for damage to public interests in public procurement, and the role of public participation in the sustainable operation of public procurement throughout its life cycle.

2. Literature Review

In terms of the connotation of public participation, in order to obtain scientific decision-making, the government enables the public to participate in major matters involving public interest or self-interest by making suggestions, providing information, and making comments [7-8]. Effective communication between the government and the public to enhance the fairness, legitimacy and rationality of major decisions. Public participation in public procurement emphasizes interaction and feedback. Public participation in public procurement, governments and enterprises use big data technology to ensure that the public understands procurement project information; diversified participation enhances procurement effectiveness [9].

Public participation enables public procurement to achieve its social policy goals. The core goal of public procurement is to meet public needs and enhance public value. Procurers who lack supervision cannot effectively represent public interests, and public participation is the key. The basic connotation of public interest in public procurement includes: providing equalized public services, reasonably pricing services, ensuring project quality and safety, ensuring efficiency and fair competition, effectively achieving overall social economic welfare, and promoting sustainable development [10].

Public participation in public procurement is conducive to improving fiscal efficiency and better safeguarding their own interests. Public participation makes public procurement projects not only focus on economic benefits, but also social benefits. Public procurement must meet the requirements of value for money evaluation, and public participation in project evaluation can enhance the scientific nature of procurement decisions [11-12].

Public participation enhances good governance of public procurement [13]. Good governance includes three major contents: people-oriented, legal governance, and public governance. Good governance of public procurement means good cooperation between the government and the public. Good governance relies on citizens' voluntary cooperation and conscious recognition of authority. Without the active participation and cooperation of citizens, it is difficult to achieve good governance in public procurement. Public participation is an important content of national governance. In public procurement, citizens' right to know, express, participate, make decisions, and supervise are protected by law [14]. Public participation in public procurement can play a good demonstration effect. It is conducive to solving the political risks of public procurement projects and consolidating social consensus.

Public participation helps alleviate government regulatory risks in public procurement and prevent regulatory capture [15]. Regulatory capture is based on the theory of interest groups. The government has self-interested motives and is easily controlled by interest groups. Regulatory failure is based on the theory of public choice. As a rational "economic man", the government pursues the maximization of personal benefits, and does not take the maximization of public interest as the primary goal.

Public participation can help alleviate government regulatory risks in public procurement. Public participation plays the role of external supervision to prevent the deviation of supervision objectives or lack of supervision in public procurement. The public promotes the effectiveness of public procurement supervision through complaints, reports, and information. Professional monitoring agencies and environmental protection organizations participate in the supervision of public procurement to achieve effective supervision of public procurement regulators [16-17].

3. Analysis on the Theoretical and Practical Issues of Public Participation in Public Procurement

3.1 The Theory and Connotation of Public Participation in Public Procurement

According to the ladder theory of public participation, based on whether the public participates substantially, it

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can be divided into participation and non-participation, and can be further subdivided into eight ladders [18]. Public participation in public procurement includes six aspects: (1) Notification: information notification, one-way process; (2) Consultation: discovering public needs and paying attention to listening; (3) Appeasement: accepting suggestions from the public; (4) Partnership: the public Participate in negotiation and assume responsibility; (5) Delegation of power: empower citizens with decision-making and accountability powers; (6) Citizen control: empower citizens with financial responsibility for decision-making and execution. Non-participation includes two levels of manipulation and treatment. These two types of citizen participation are essentially manipulated and are considered non-participation. Citizen participation ladder theory is helpful to understand the basic connotation of public procurement and public participation.

Public participation in public procurement reflects the protection of the public' s right to know, suggest, and supervise. It requires timely disclosure of information in public procurement to meet public needs, ensure public supervision throughout the process, and provide timely feedback on public participation(table 1).

Table 1. Basic requirements for public participation in public procurement

Contents	Requirements
Right to know	The information in public procurement is required to have accessibility, timeliness, completeness and reliability.
Right to suggest	In public procurement, the government listens to the voice of the people, incorporates public needs into decision-making, and provides effective information for decision-makers.
Supervisory rights	The entire life cycle of public procurement guarantees public participation.
Effective feedback	Set up public participation feedback procedures to ensure that participants have the opportunity to comment on the results of the feedback.

The full life cycle of public procurement includes multiple stages of bidding, contract management, and contract acceptance, involving multiple requirements and different standards. The public participates in appropriate ways at different stages of public procurement. According to the characteristics of public participation, different ways of participation can maximize the effect of public procurement.

3.2 Practical Issues of Public Participation in Public Procurement

3.2.1 Information Disclosure and Supervision Feedback in Public Procurement

Big data technology promotes the government's digital transformation, but information disclosure in public procurement still needs to be further improved. Public procurement contract information is not disclosed in a timely manner and insufficiently damages the public's right to know. Public procurement contracts clarify the rights and obligations of the government and suppliers. If the contract is not disclosed in a timely manner or key information is concealed, it will be difficult for the public to supervise public procurement. In the case of public procurement, the government or suppliers used "state secrets and trade secrets" as an excuse to not disclose or delay the disclosure of contracts. In this case, data technology is more difficult to play the role of information disclosure. The public participates in project service quality supervision through complaints. The lack of timely feedback procedures in the supervision of public participation in project procurement makes it difficult to guarantee the effect of public participation in supervision. In public procurement, the efficiency and method of government feedback to public complaints can be further improved and optimized with the help of electronic platforms and big data technology.

3.2.2 Insufficient Public Participation in Public Procurement Cost Accounting and Fiscal Payment

Suppliers in public procurement have profitability requirements, and effective price regulation is the key to ensuring that companies are "profitable without huge profits". The price adjustment of public procurement directly affects the vital interests of the public, so service costs and prices must be monitored through hearing procedures. In user-paid PPP projects, the public hopes that PPP project companies can guarantee or improve the quality and safety of public services and products without increasing payment pressure. According to the "Price Law", the subjects applying for price adjustments include the government, price departments, operators, and consumers. According to practical cases, almost all applicants for price adjustments in PPP projects are PPP project companies. The ability to disperse consumers is limited, and it is difficult to propose a countermeasure against it. Therefore, once the price increase application submitted by the operator is approved by the government, the final result is often a price increase. The price hearing procedure lacks operat-

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ing rules, and neither the participants of the hearing nor the public who did not participate in the hearing are not satisfied.

There are two standards for price regulation adjustment: cost-plus mode and price ceiling mode. China's PPP model adopts a cost-plus price regulation mode. In practice, there is information asymmetry, and the cost of enterprises under the cost-plus model is not easy to determine. The pricing of public procurement projects is a process of bargaining between price authorities and suppliers, and public participation is more difficult. The law imposes lighter regulations on operators' responsibility for price adjustments. The impact assessment mechanism of public project price adjustment decisions needs to be improved. The lack of evaluation of public project price adjustment will affect the scientific nature of pricing. The pricing of public utilities and public projects rarely introduces big data technology, which is not conducive to ensuring the public's supervision of pricing.

3.2.3 Analysis of Public Participation in the Quality and Safety of Public Procurement Projects

Service quality supervision is an important aspect of public participation. Suppliers or supervisory departments of public procurement failed to disclose quality and safety information in a timely manner. The implementation unit of the public procurement project shall file the public service quality with the competent unit. When the project has quality and safety issues, the regulatory agencies usually disclose the information, which will delay the efficiency of emergency information disclosure. In cases where the pollutants of tap water exceed the standard, the public is not aware of the water quality and the condition of water supply facilities. When tap water is polluted, the public is aware of the major hidden dangers in water quality safety. The project company and the government conceal important information about water quality testing, damaging the personal and property safety of the public [20]. Professional third-party institutions for quality and safety testing of public procurement projects need to be cultivated. The lack of professional and neutral test results is insufficient to guarantee the safety and quality of the project. The safety of public projects is related to the public's right to life and health, which is the most important aspect of public participation.

It is difficult for the public to use legal procedures to supervise the quality and safety of public procurement projects. The public supervises the quality and safety of public projects through public interest litigation and urges the government to provide better public services through procurement. In the judicial process, the subject who is eligible to initiate public interest litigation must be a social organization. If the social organization fails to perform its duty of initiating public interest litigation, it will be more difficult to protect the damaged public interest through judicial procedures.

4. Suggestions for Improving Public Participation in Public Procurement

4.1 Big Data Technology Improves the Efficiency and Scope of Information Disclosure in Public Procurement

Disclosure of public procurement project agreements helps the public fully understand the use of financial funds and the value of the project. During the entire life cycle of public procurement, both parties must strictly perform the contract in accordance with the contract. To better participate in public procurement projects, the public must have a more comprehensive understanding of the rights and obligations of the government and social capital. The government uses electronic procurement platforms and big data technology to enable the public to better participate in project procurement and ensure the enthusiasm of public participation. Big data and blockchain technologies are conducive to the authenticity and timeliness of public procurement information disclosure. The government of digital transformation will use professional technology to effectively manage public procurement contracts. The government uses big data technology to monitor abnormal situations in the execution of contracts. The public can promptly question the abnormal situations and urge the government and suppliers to correct them in time. Disclosure of public procurement contracts will improve transaction efficiency and supplier competitiveness, and the public's right to know, participate and monitor will be effectively implemented. In addition, the Chinese government should emphasize the importance and value of public procurement contracts in the law, and encourage governments at all levels to use big data technology to promote information disclosure.

Regarding the scope of disclosure of public procurement contracts, China should make strict textual and systematic interpretations of the "State Secrets and Commercial Secrets" provisions to prevent the government and suppliers from evading information disclosure. Public procurement uses big data technology to provide feedback on public participation. The government uses big data and artificial intelligence information network platforms to im-

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prove feedback efficiency. If the supervisory department fails to give feedback to the public's questions in time, the public can provide relief through legal channels.

4.2 Combination of Digital Economy and Price Monitoring of Public Procurement

The digital economy emphasizes the mining of digital assets. The digital economy places innovative demands on traditional pricing methods. The scientific pricing of services in public procurement under the digital economy requires continuous improvement of consumers' ability to participate in government pricing adjustments. Through the digital platform, individual and decentralized citizens are organized, and the combination of professional institutions and the public can make reasonable prices for services. In public procurement, big digital technology is used to improve the cost investigation and review system before government pricing. The scientific cost supervision and review report has become the fundamental basis for the government to set prices, which will ensure the value for money of procurement and enhance the effect of public participation in supervision. The government must implement the cost supervision and review investigation system and clarify the project company's cost supervision and review obligations.

In the case of public procurement pricing and guide price adjustments, professional investigators are conducive to obtaining public opinions and will effectively improve the dilemma of bargaining between the competent department and the operator in cost supervision and review. In order to better protect the public interest and enhance the effect of public participation in price supervision, the government should focus on clarifying the obligations of suppliers. On the one hand, the obligation of operators to disclose pricing information is enhanced. On the other hand, it is necessary to strengthen the responsibility of operators to apply for price adjustments.

For user-paid projects, the government should make prior assessments when making price decisions. The evaluation of public procurement price adjustment decisions supported by digital technology includes: whether the price adjustment takes into account the interests of all parties; the mass acceptability; the rescue plan for the group that cannot afford the price; the publicity of the price adjustment decision and the degree of expression of the public's true willingness. The improvement of the price hearing procedure in public procurement mainly includes two aspects. First, clarify the procedures and conditions for the selection of price hearing participants. Second, improve public participation in price supervision methods.

4.3 Consistency of Performance Procurement and Service-oriented Procurement

Public participation in public procurement is conducive to the realization of the efficiency, safety, health, environment, and development goals of public services. To achieve this goal, the government should promote quality and safety information disclosure, cultivate professional third-party institutions, and improve judicial supervision channels. Government departments and public utilities have a tendency to "secret" for short-term interests. Procurement performance is based on information disclosure, effective quality and safety. In the entire life cycle of public procurement, it is important to ensure the quality and safety of its services, which is the basic requirement for meeting public needs. Public procurement laws and guidelines should stipulate the timeliness of emergency response when public service quality safety occurs, and strengthen the responsibility of the competent authority.

The quality and safety of public procurement projects are of great importance. This study suggests that each procurement unit should have full-time personnel responsible for information disclosure, and take the initiative to disclose important issues of quality and service performance to the public through information channels. China's large-scale public procurement projects are related to the national economy and people's livelihood, and information disclosure should be promoted with performance procurement as the goal.

The government should promote public performance evaluation with quality and safety as the core. Public procurement establishes a comprehensive quality and safety evaluation system that includes the participation of diversified entities such as government, enterprises, and the public. The evaluation system includes indicators for project operation, use of financial funds, public service quality and safety, and public satisfaction. The publicity of procurement performance evaluation results is conducive to public participation in supervision. In PPP projects, the financial department can encourage partners to improve public services and product quality and safety as their core goals by adjusting prices or increasing or reducing subsidies. Regulatory agencies can establish dynamic monitoring of service indicators of PPP projects and scientific quality and safety technical evaluation standards; public opinions and satisfaction should be introduced into the social evaluation and supervision system, so that the public, regulatory agencies and other entities can jointly monitor service quality and safety.

Professional social organizations are conducive to the sustainability of the quality and safety of the PPP

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model. The public has a more convenient, true and comprehensive understanding of the quality and safety of public services through independent third-party agencies. The combination of third-party testing agencies and government regulatory agencies will minimize quality and safety hazards and safeguard public interests.

The obstacles for the public to participate in the supervision of the service quality of public procurement through judicial channels are the qualifications of plaintiffs in public interest litigation and the supervision of the public's prosecution of social organizations. In the context of big data, digital channels can be used to protect the public through judicial means to relieve public interests, and to strengthen supervision of social organizations through network platforms.

4.4 The Cultivation of Big Data-oriented Public Procurement Professionals

Big data and digital economy provide new opportunities for public procurement innovation and sustainable development.As an important tool of fiscal policy and national governance, public procurement plays an important role in the realization of common prosperity goals, the promotion of rural revitalization strategies, and the effective response to major emergencies. Public procurement is the core goal of satisfying public interests. To ensure the value for money of fiscal funds, the government needs to use information technology and data thinking. The effect of public participation depends on the improvement of the public's professionalism. This requires Chinese universities to effectively integrate big data and public procurement when cultivating public procurement professionals. Colleges and universities focus on several aspects in the cultivation of big data-oriented public procurement talents: First, strengthen the training of teachers, enable public procurement teachers to establish big data thinking, and combine professional application scenarios such as procurement supply chain and green procurement with big data technology; Second, the public procurement knowledge of undergraduates is systematic, which relies on the setting of public procurement and big data courses. In terms of discipline setting, economics and law disciplines can effectively combine big data and public procurement; Third, combine public procurement employment with curriculum and training goals. Professionals with practical knowledge of public procurement teach courses to college students. Systematic arrangements are made for the different levels of knowledge of undergraduates, graduates, and doctoral students. Through the training of professional talents, the effectiveness and sustainability of public participation in public procurement will be improved. In the context of the digital economy, colleges and universities should strengthen the training of professional talents that combine big data with public procurement, specifically focusing on teacher data thinking, subject construction, and undergraduate students' public procurement knowledge system.

5. Conclusion

Public procurement requires transparent procedures to ensure public participation and respect public interests. In the context of the digital economy, public procurement uses big data to promote information disclosure, promote contract disclosure, improve the efficiency and quality of public feedback, and ensure the effectiveness of public participation. In public procurement, big data technology is used to improve the scientific nature of pricing adjustment, effectively implement the cost supervision, review and investigation system, and meet public needs; use information platforms to improve the pre-assessment of public procurement pricing decisions. In terms of public participation in the quality of public procurement services, a commissioner shall be set up to be responsible for the information disclosure of the enterprise to reduce the delay in information disclosure. The government should strengthen performance evaluation centered on quality and safety, and make public satisfaction with public services or products an important criterion for performance evaluation. The public supervises social organizations to perform public interest litigation duties through digital platforms.

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Author Guidelines

This document provides some guidelines to authors for submission in order to work towards a seamless submission process. While complete adherence to the following guidelines is not enforced, authors should note that following through with the guidelines will be helpful in expediting the copyediting and proofreading processes, and allow for improved readability during the review process.

Ⅰ. Format

- Program: Microsoft Word (preferred)
- Font: Times New Roman
- Size: 12
- Style: Normal
- Paragraph: Justified
- Required Documents

Ⅱ. Cover Letter

All articles should include a cover letter as a separate document.

The cover letter should include:

- Names and affiliation of author(s)

The corresponding author should be identified.

Eg. Department, University, Province/City/State, Postal Code, Country

- A brief description of the novelty and importance of the findings detailed in the paper

Declaration

v Conflict of Interest

Examples of conflicts of interest include (but are not limited to):

- Research grants
- Honoria
- Employment or consultation
- Project sponsors
- Author’s position on advisory boards or board of directors/management relationships
- Multiple affiliation
- Other financial relationships/support
- Informed Consent

This section confirms that written consent was obtained from all participants prior to the study.

- Ethical Approval

Eg. The paper received the ethical approval of XXX Ethics Committee.

- Trial Registration

Eg. Name of Trial Registry: Trial Registration Number

- Contributorship

The role(s) that each author undertook should be reflected in this section. This section affirms that each credited author has had a significant contribution to the article.

1. Main Manuscript
2. Reference List
3. Supplementary Data/Information

Supplementary figures, small tables, text etc.

As supplementary data/information is not copyedited/proofread, kindly ensure that the section is free from errors, and is presented clearly.

Ⅲ. Abstract

A general introduction to the research topic of the paper should be provided, along with a brief summary of its main results and implications. Kindly ensure the abstract is self-contained and remains readable to a wider audience. The abstract should also be kept to a maximum of 200 words.

Authors should also include 5-8 keywords after the abstract, separated by a semi-colon, avoiding the words already used in the title of the article.

Abstract and keywords should be reflected as font size 14.

Ⅳ. Title

The title should not exceed 50 words. Authors are encouraged to keep their titles succinct and relevant.

Titles should be reflected as font size 26, and in bold type.

Ⅳ. Section Headings

Section headings, sub-headings, and sub-subheadings should be differentiated by font size.

Section Headings: Font size 22, bold type

Sub-Headings: Font size 16, bold type

Sub-Subheadings: Font size 14, bold type

Main Manuscript Outline

Ⅴ. Introduction

The introduction should highlight the significance of the research conducted, in particular, in relation to current state of research in the field. A clear research objective should be conveyed within a single sentence.

Ⅵ. Methodology/Methods

In this section, the methods used to obtain the results in the paper should be clearly elucidated. This allows readers to be able to replicate the study in the future. Authors should ensure that any references made to other research or experiments should be clearly cited.

Ⅶ. Results

In this section, the results of experiments conducted should be detailed. The results should not be discussed at length in

this section. Alternatively, Results and Discussion can also be combined to a single section.

Ⅷ. Discussion

In this section, the results of the experiments conducted can be discussed in detail. Authors should discuss the direct and indirect implications of their findings, and also discuss if the results obtain reflect the current state of research in the field. Applications for the research should be discussed in this section. Suggestions for future research can also be discussed in this section.

Ⅸ. Conclusion

This section offers closure for the paper. An effective conclusion will need to sum up the principal findings of the papers, and its implications for further research.

Ⅹ. References

References should be included as a separate page from the main manuscript. For parts of the manuscript that have referenced a particular source, a superscript (ie. [x]) should be included next to the referenced text.

[x] refers to the allocated number of the source under the Reference List (eg. [1], [2], [3])

In the References section, the corresponding source should be referenced as:

[x] Author(s). Article Title [Publication Type]. Journal Name, Vol. No., Issue No.: Page numbers. (DOI number)

Ⅺ. Glossary of Publication Type

J = Journal/Magazine

M = Monograph/Book

C = (Article) Collection

D = Dissertation/Thesis

P = Patent

S = Standards

N = Newspapers

R = Reports

Kindly note that the order of appearance of the referenced source should follow its order of appearance in the main manuscript.

Graphs, Figures, Tables, and Equations

Graphs, figures and tables should be labelled closely below it and aligned to the center. Each data presentation type should be labelled as Graph, Figure, or Table, and its sequence should be in running order, separate from each other.

Equations should be aligned to the left, and numbered with in running order with its number in parenthesis (aligned right).

Ⅻ. Others

Conflicts of interest, acknowledgements, and publication ethics should also be declared in the final version of the manuscript. Instructions have been provided as its counterpart under Cover Letter.

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