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Health Insurance amid COVID-19

Service on Customer Satisfaction

Highlights

A Study on People's Perception

Assessment of Long Run Relationship

Discovering Thoughts, Inventing Future

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A Study on People's Perception towards Health Insurance amid COVID-19 Outbreak: A Perspective from Bangladesh

By Morioum Hasna
University of Barishal

Abstract- The Health Sector of Bangladesh is been in a very fragile condition since its independence. The situation is deteriorating day by day, although a great effort has been provided by Government, national and international organizations. Every year the allocation for health and family welfare ministry in the national budget is bouncing, yet it is the lowest in terms of GDP in South Asia. Moreover, the Government-sponsored hospitals couldn't provide quality treatment due to their resource, workforce, and capacity constraints. Hence the people should be empowered to take quality health care from state-of-the-art private hospitals and nursing homes. With a public-private initiative, the wretched face which came into our sight during Covid-19 could be recovered. In this case, health insurance may be a great stimulus. Many developing countries are now planning to introduce mandatory health insurance policies for their citizens.

Keywords: insurance, health insurance, covid-19, health consciousness, inclusiveness.

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A Study on People's Perception towards Health Insurance amid COVID-19 Outbreak: A Perspective from Bangladesh

Morioum Hasna

Abstract- The Health Sector of Bangladesh is been in a very fragile condition since its independence. The situation is deteriorating day by day, although a great effort has been provided by Government, national and international organizations. Every year the allocation for health and family welfare ministry in the national budget is bouncing, yet it is the lowest in terms of GDP in South Asia. Moreover, the Government-sponsored hospitals couldn't provide quality treatment due to their resource, workforce, and capacity constraints. Hence the people should be empowered to take quality health care from state-of-the-art private hospitals and nursing homes. With a public-private initiative, the wretched face which came into our sight during Covid-19 could be recovered. In this case, health insurance may be a great stimulus. Many developing countries are now planning to introduce mandatory health insurance policies for their citizens. This move is motivated basically by two factors, firstly to accumulate more money in the health sector and secondly to provide inclusive and equal quality treatment to all. In this way, the huge burden upon the Government could be lessened, and the limited resources of the state can be utilized on giving medical services for fewer people and thus the quality, rate of coverage, and standard of the medical services can be extended in Government-run health sector. In this study, the present situation of insurance and health insurance, basic health care management, health consciousness of the people, and the changing pattern of people's perception towards health insurance will be assessed based on primary data collected through an e-survey and another aim of the study is to find out the factors which influence people to purchase a health insurance policy. Along with the descriptive analysis of the collected data, a logistic regression model has been applied to validate the hypotheses. And it has been found that income, insurance provided by the organization, sources of information regarding health insurance, and knowledge regarding health insurance proving company have an impact on the purchasing behavior of health insurance.

Keywords: insurance, health insurance, covid-19, health consciousness, inclusiveness.

I. Introduction

Health, one of the key necessities for the well-being and survival of humankind. With the tremendous scientific advancements, research, and innovations in medical sciences, it is now possible to diagnose all the diseases and to provide treatment either through surgeries/operations or medicine accordingly. Hospitals and nursing care homes brought a revolutionary change in their services. The success rates were bumping gradually, specifically with the invention of antibiotics and the introduction of sanitary endeavors. The newly introduced medical instruments, drugs, and diagnosis were expensive. Despite these advancements in medical sciences, the matter of sorrow is that the medical sector of almost every country became roughly commercialized, and getting proper treatment is dependent exclusively on money. Hospitals and nursing homes still couldn't enthrall patients due to the costs. As the largest element of the society, the middle class and lower-middle-class people, who live on a fixed amount of income and due to the lack of savings and uncertainty of their professions, they failed to confront the medical expenses for the treatment of themselves and their family members. Hence the idea of Health insurance was evolved, and in 1850 the earliest inklings of what would change into health insurance appeared in Franklin Health Assurance Company of Massachusetts. Due to the labor movement, the health insurance industry was boomed after that and within 1866, around Sixty organizations were offering accident insurance in the United States only. Overtime, in first-world countries, the schemes of health insurance became a necessity, and in some cases, it made mandatory to have a health insurance policy for the citizens of some countries. But in Bangladesh, the rate of taking health insurance is poor since its independence to date. Several people are dying everyday due to the lack of proper medical treatments. Still, the poor literacy rate, health consciousnesses, faulty thinking, and misunderstanding about health insurances deviated themselves for not taking health insurance policies. But when the COVID-19 pandemic broke out, the to psyturvydom in the medical sector has become a concern to all walks of people. Moreover, the callousness of the medical professionals and the closure of national/international boundaries created immense uncertainty. In this paper, the scenario of health insurances in Bangladesh and the people's perception towards health insurance during COVID-19 will be assessed in this study with the primary data.

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a) The Objectives of the Study

The crucial purpose of this study is to apprehend the state of insurance/health insurance literacy among the general people of Bangladesh and especially to find out the changing pattern in people's perception in taking health insurance policies with the experience of the COVID-19 pandemic. This study has the following specific objectives:

i. To explore the history of insurance in independent Bangladesh and the contemporary insurance market of Bangladesh and in this regard to figuring out a comparative analysis of general insurance and health insurance.
ii. To find out peoples knowing about health insurance companies and their policies for confronting health threats of the consumers.
iii. To explore the people who take health insurance and how they can benefited/ outwitted by taking these policies.
iv. To find out the factors that influence the purchasing behavior of health insurance during this COVID- 19 pandemic.
v. Finally, to make an objective assessment about the people's new outlook towards health insurance companies and their schemes during the Covid-19 pandemic based on the respondents' inputs.

II. Literature Review

Some articles have reviewed health insurance and people's perception towards it, Anjali (2018) surveyed 50 respondents In Ranny Thaluk in Kerala, India. And she tried to know the perception of customers towards health insurance. The study finds out the awareness level of people regarding health insurance, sources of awareness, and the factors which influence people to select the health insurance company.

Bawa and Ruchita (2011) studied 563 people and found that a low level of awareness and willingness to purchase a health insurance policy among people. And also found seven key factors which create a barrier to have a health insurance policy. Besides these, they have found significant existed relationships between the age, gender, education, employment, income of respondents with their preparedness to pay for health insurance.

Panchal N (2013) found three factors that's why people have not any health insurance policy. These are low consciousness level among people, lack of efficient financial tools, and the high premium charged by the company.

Nekmahmud, Shahedul and Ferdush (2017) they researched to know the perception of people regarding life insurance. They found a large number of people are aware of life insurance. It emphasized mass communication to raise awareness among people.

Joshi and Shah (2015) try to know the perception of the customers to Health Insurance of different service providers and to find out customers purpose and numerous factors for buying Health Insurance policy.

Luebke, Windschitl, and Visker (2016) found that participants have positive attitudes towards health insurance. And other findings by using the HILM (Health Insurance Literacy Management) tool is that when participants have to choose a health insurance plan, they are indifferent. However, findings also specified that practiced behaviors would enable them to choose the best health insurance plan.

Anandhi (2016) identified some factors which influence participants to purchase the health insurance policy. The main findings are that the choice of a company by customers depends on some factors these are product features, lower premium, accessibility, good advertising, and proper settlements of claims and complaints.

Hamid (2014) outlined a structure of health insurance scheme for government employees that is cashless and participative. A list is suggested by the author, which includes medical and no-surgical inpatient care existing in the public hospitals and specified private hospitals.

Mathur and et al. (2015) found that people's subscription to health insurance rests on age, dependent family members, medical cost, health condition, and perception regarding the products. And another important factor is personal characteristics of respondents have a positive association with insurance status.

Islam and Palash (2018) talked about the impact of micro health insurance provided by Grameen Kalyan for the well-being of its members.

Lavuri and Naik (2019) carried out research to find out the awareness level of policy holder and the effect of health insurance policy factors, holders' satisfaction level, and problems faced by them. Another important finding of this study that there is a significant impact of Health insurance policies on demographical factors of policy holder.

This paper is a fresh initiative based on primary data for an objective understanding of health insurance and people's perception towards health insurance during COVID-19.

III. Methods

a) Sources of Data and sample size

This study is mainly based on primary data collected from an online survey using google doc. The respondents are from various backgrounds, their feedback on a set-questionnaire is collected to get a

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general understanding of the answers seeking in this study. This questionnaire was administered to the respondents that collected primary data on several aspects that are directly related to health insurance, such as average monthly medical expenses of his/her family, respective employer's health insurance facilities, source of fund to confront medical expenses of their families, knowledge about health insurances, the factor encourage themselves to take health insurance policies, the capability of schemes to meet up the major medical expenditures and health consciousness of people of Bangladesh during Covid-19. This survey was conducted from 12th December to 30th December 2020. A total of 378 responses are collected for this study.

$$\text{Sample Size} = \frac{\frac{z^2 * P(1-P)}{e^2}}{1+(\frac{z^2*(1-P)}{e^2*N})}$$

$$= \frac{\frac{1.96^2 * .5(1-.5)}{.05^2}}{1+\left(\frac{1.96^2*(1-.05)}{.05^2*N}\right)}$$

$$= 378$$

b) Techniques of Data Analysis

By surveying through google forms the primary data are collected. Thus, the output of the correspondents has shown in both frequencies and percentages. In each segment, an overall assessment is made through the consultation of national and international literature, journals, books, and articles for understanding the comprehensive picture of health insurance in Bangladesh, and an analytical assessment would be prepared based on primary data in the concerned segment.

This study grabbed the efforts to discover the persuading factors that work as a component to purchasing health insurance policy. To identify the truly inducing factors descriptive analysis, such as frequency and percentage was used in this study. Likert scale was used in this study to evaluate the respondents' views on the schemes offered by the major health insurance companies, health consciousness of people of Bangladesh during this COVID-19. Respondents were asked to provide their opinion in five statements, which strongly disagree (SDA), disagree (DA), neutral (N), Agree (A), and strongly agree (SA).

One of the prime objectives of this study was to measure whether respondents have a health insurance policy or not. In this study, binary logistic regression is used because the nature of dependent variable is dichotomous (Mahmud et al 2014). The selected dependent variable "current status on health insurance policy" has two categories. "People who have a health insurance policy" was coded as "one" and "People who have not a health insurance policy" was coded as "zero." The researchers also used logistic regression to assess respondents' opinions on various socio-economic issues such as financial and social empowerment and food security status (Weber, 2014; Mahmud et al., 2014).

The model can be specified as,

$$\left[\frac{P_i}{1-P_i}\right] = A_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + b_{10}X_{10} + b_{11}X_{11} + b_{12}X_{12} + b_{13}X_{13} + b_{14}X_{14} + b_{15}X_{15} + b_{16}X_{16} + b_{17}X_{17} + b_{18}X_{18}$$

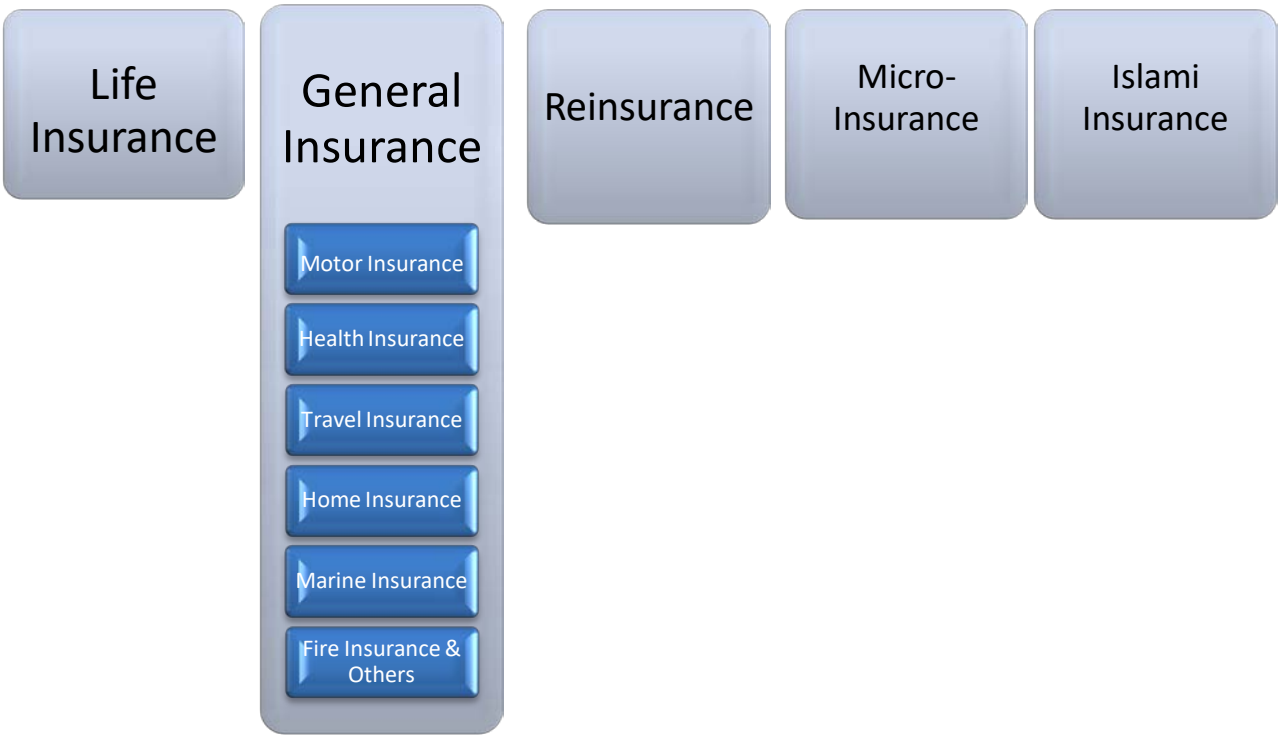
Where,

P_i = People who have a health insurance policy
$1 - P_i$ =People who have not a health insurance policy
X_1 = Gender of the respondents
X_2 = Age
X_3 = Education Level
X_4 = Employment
X_5 = Income Level
X_6 = Number of dependent family members
X_7 = Monthly medical expenditure
X_8 = Providing health insurance facility from the organization
X_9 = Sources of medical expenditure
X_{10} = Sources of information regarding health insurance
X_{11} = Key reason to buy a health insurance policy
X_{12} = Key reason not to buy a health insurance policy
X_{13} = Knowledge regarding health insurance providing company
X_{14} = Information regarding schemes offered by insurance companies
X_{15} = Opinion about the health insurance service provided by the company
X_{16} = Health consciousness of the people of Bangladesh during Covid-19
X_{17} =Social awareness will raise the purchase decision of health insurance

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IV. Bangladesh's Insurance Industry and Health Insurance

It won't be an exaggeration that Insurance became the lifeline of the modern multi-phenomenal business operations both for national and international trade. The role of the insurance sector is worthy of mentioning in reducing the risks in an economy. Insurance policies build up confidence among the stakeholders of an economy. From households, SME enterprises to large companies, it safeguards business enterprises, industries, and transportation of products and commodities, thus reduces the financial burden caused by unpremeditated accidents and promotes a stable economy in which trade and economy can flourish and succeed. Soon after the independence, Bangabandhu Sheikh Mujibur Rahman in 1972 nationalized the insurance sector by a presidential order which numbered 95. With the proclamation of this order, all types of insurance businesses transacting in then Pakistan came under this proclamation. Later on, all the nationalized companies/agencies were brought under five state-controlled insurance. After a year later, some changes were instituted, and with the enactment of Insurance Corporation Act VI 1973, two new state-owned corporations were founded, namely Sadharan Bima Corporation for general insurance and Jiban Bima Corporation for life insurance. For nearly one decade, Sadharan Bima Corporation was acted as the only general insurance company. The then Military Government headed by Lt. Gn. H. M. Ershad moved towards rapid privatization of state-owned services and took a crucial decision in 1984 to allow operation of insurance companies in the private sector side by side with state-owned Sadharan Bima Corporation and Jiban Bima Corporation.[1] The private sector acted promptly to grab the opportunity to run privately owned insurance companies and came forward to initiate private insurance companies through the enactment of the Insurance Corporations (Amendment) Ordinance (LI of 1984) 1984.[2] After that with the entrance of privatized insurance companies in the industry, this sector got expanded in the next two decades rapidly. The Insurance Market in Bangladesh now consists of 18 life insurance companies including one foreign company and one state-owned corporation, 44 General Insurance Companies including one state-owned company.[3] Nowadays, 62 companies are operating under the Insurance Act of 2010, and these are under the regulatory authority of the Insurance Regulatory and Development Authority (IRDA). Insurance companies in Bangladesh provide the following services:



Bangladesh has excelled its rival countries in all socio-economic development indexes, and now it became a lower-middle-income country, stands on the verge of LDC graduation. Tremendous development and advancement have been taken place not only in the structural and communication sector but also in other sectors too. Bangladesh's foreign currency reserves have hit a record $41.03 billion amid the Covid-19 pandemic. In the long-term, the Bangladesh Foreign Exchange Reserves is projected to trend around 43886.00 USD Million in 2021 and 49194.00 USD Million in 2022, according to econometric models of tradingeconomics.com.[4] While Bangladesh has taken some tremendous steps on the path to economic

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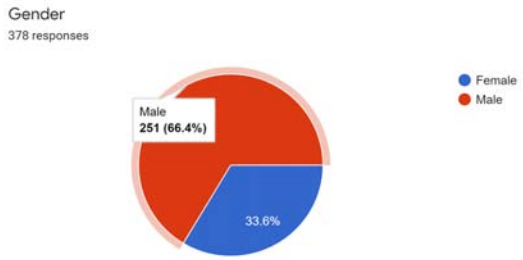
prosperity under the umbrella of vision 2021 and vision 2041, its insurance industry, exclusively health industry, is an exigent area that needs fruitful attention and can be benefitted significantly from regulatory reforms. The health sector of Bangladesh is going through a double burden of diseases, poor service coverage, and a lack of effective financial risk protection mechanisms. This sector is highly unregulated and some actors are providing health services, namely the Bangladesh government, for-profit private sector, not-for-profit private sector (mainly the nongovernmental organizations [NGOs]), and the international development organizations.[5]

Government-run hospitals are giving medical facilities with a highly subsidized rate; only a portion of the treatment cost has to be paid by the patients. Health insurance, both national and private, is practically nonexistent. Health financing is underfunded; in 2019/20 financial year, the Ministry of Health and Family Welfare was allocated only 4.9% taka of the national budget on health, one of the lowest in South Asia.[6] A study in 2017 shows that 'financial health coverage is so sparse that nine percent households face catastrophic health payment, 5.6 percent face impoverishment, and seven percent face distress financing (borrowing or selling household assets to finance healthcare costs)'.[7] To build a well-structured and efficient health care system, the government has to allocate a reasonable amount of money in the annual budget. Again, as the constitution commits to addressing inequalities in access to health for all types of people, Government needs to plan for compulsory health insurance for all citizens where citizens have to pay a minimum amount of money as a premium, and the rest of the premium will be given from national treasury. Thus, an inclusive healthcare system might have been developed in the country. Without Government intervention, the health insurance industry won't be flourished in Bangladesh. Till now, most of the people of Bangladesh are living below the poverty line; they are struggling to manage necessities. Even most people aren't accustomed to regular banking and insurance services.

V. Analysis and Results

a) *Descriptive statistics*

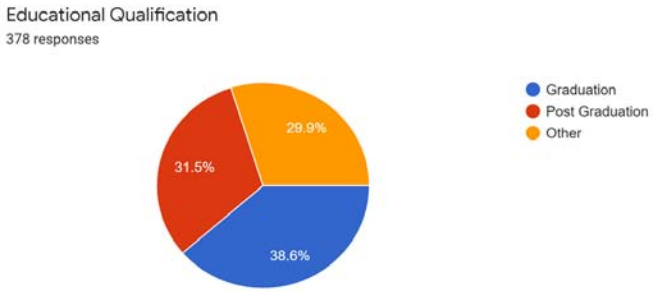
This section focused on the frequency distribution about the opinion of the respondents regarding health insurance amid the COVID-19 pandemic. Here, opinions on different aspects were collected to assess the respondent's motive to purchase a health insurance policy. Analysis has been made based on the frequency distribution of the opinion of the respondents. Hence to get factual information about health insurance, this survey is conducted among the professionals who are now in the government and non-government services or at least undergraduate and graduate-level students.



Source: Survey, 2020

Chart 01: Gender

It has been seen that there were 251 (66.4%) male respondents and 127 (33.6%) female respondents.



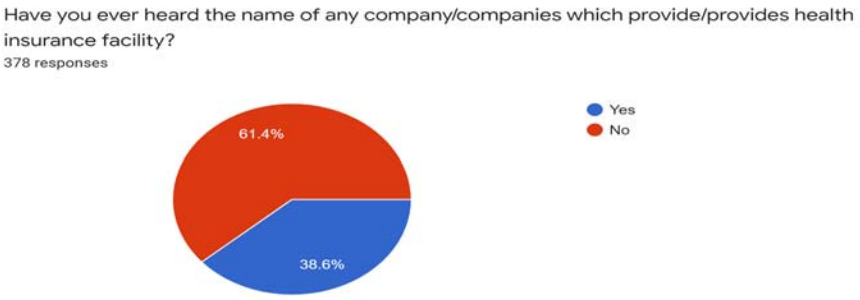
Source: Survey, 2020

Chart 02: Educational Qualification

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Of them, 146 (38.6%) have completed their graduation, 119 (31.5%) have a post-graduate degree, whereas the rest of the correspondents are now in their undergraduate level studies (Chart-2).

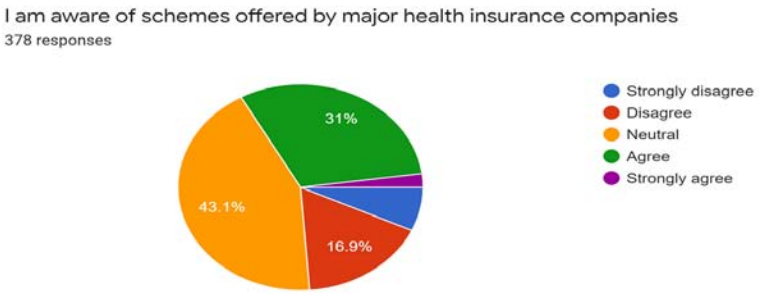
b) Health Insurance Literacy



Source: Survey, 2020

Chart 03: Peoples Knowledge about Company/Companies Providing Health Insurance

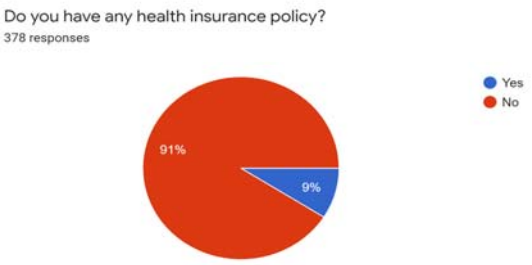
The study reveals that only 146 (38.6%) correspondents are familiar with the name of the companies providing health insurance facilities, and a large portion of the correspondents (61.4) didn't know about the companies who provide health insurance facilities (Chart-3). Those who are acquainted with the health insurance facilities, when they are asked about their knowledge on health insurance schemes/policies. 16.9% didn't know about any policies, 43.15 correspondents remained unanswered, and only 31% are known to the health insurance schemes (Chart-4).



Source: Survey, 2020

Chart 04: Correspondent's Consciousness about Schemes of Major Health Insurance Companies

If we have taken these remarks into close observation, it reveals that the health insurance literacy among the progressive, learned and professional class is very poor. 91% of respondents didn't haveany health insurance policies, and only 9% of respondents are in the coverage of health insurance (Chart-5). But a fact needs to be mentioned here that when the employed respondents were asked about their coverage from employer, 20.6% respondents said that their employer provide health insurance facility for them (Chart-6)

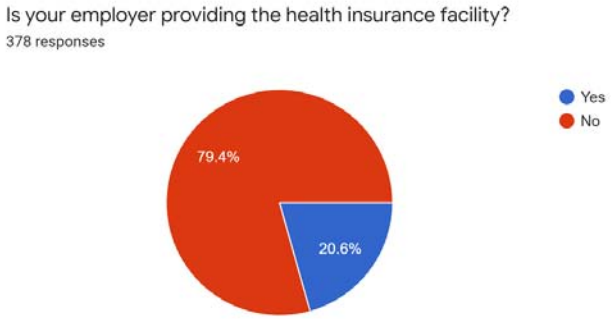


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Source: Survey, 2020

Chart 05: Ownership of Health Insurance Policy of the Correspondents

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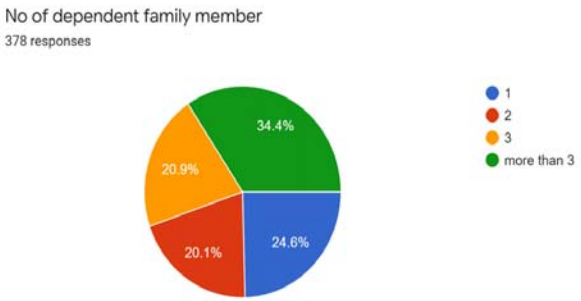


Source: Survey, 2020

Chart 06: Employer's Role in Providing Health Insurance Policies

c) *Respondent's Healthcare Management and Tendency towards Health Insurance*

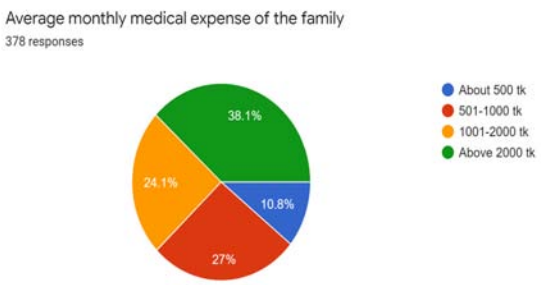
Multiple questions were asked to the respondents for getting a comprehensive scenario about the existing healthcare scenario of the respondents and their family members. It is revealed from the survey that more than three persons are dependent upon the 34.4% respondents, three persons are dependent on 20.9% respondents, two persons are dependent on 20.1% respondents and one person is dependent on 24.6% respondents (Chart-7).



Source: Survey, 2020

Chart 07: Number of Dependent Family Member upon the Correspondents

38% of respondents are expending more than BDT. 2000 in every month for medical purposes for themselves and their dependent persons whereas 62% are spending below BDT. 2000 in each month (Chart-8). Only 12.7% of respondents usually used to take free/subsidized medical services from public health care services, most of the respondents (77.2%) are

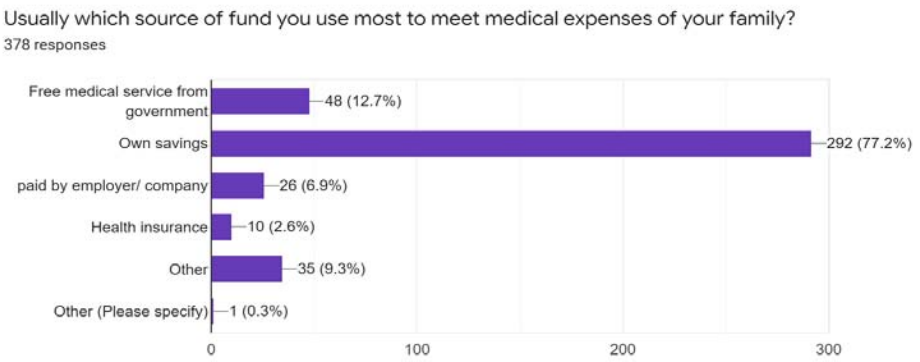


Source: Survey, 2020

Chart 08: Average Monthly Medical Expenses of the Family

Dependent on their savings to meet medical expenses. 6.9% of respondents are privileged to get medical expenses from their employer/company and only 2.6% of respondents are getting their expenses from health insurance policies (Chart-9).

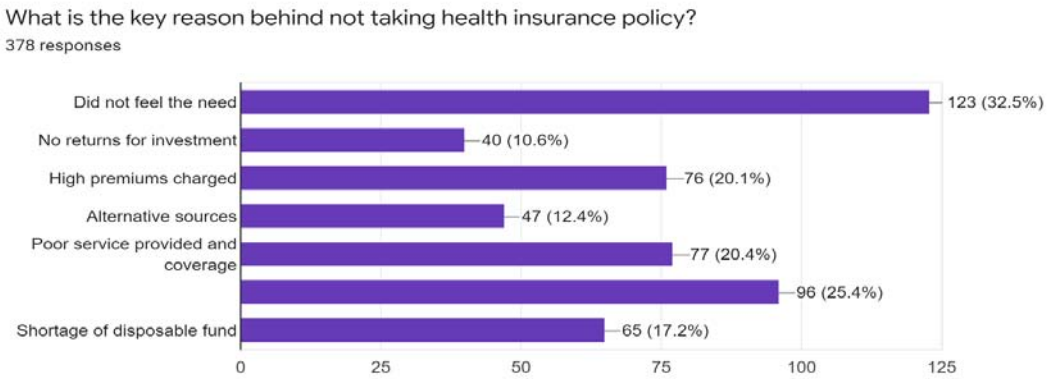
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Source: Survey, 2020

Chart 09: Sources of Fund Use Most by the Correspondents to Meet Medical Expenses of Their Family

The miserable situation of taking health insurance is very threatening for obtaining the SDG goals and for building an inclusive healthcare system for all citizens. Again, when the Covid-19 pandemic broke out, the sense of insecurity in getting proper medical services has panicked the lower/middle-class families. It was asked to the respondents who didn't have any health insurance policy that why they didn't have any health insurance policy? 123 (32.5%) respondents replied that they didn't feel necessary to have a health insurance policy. Forty respondents said that it doesn't return the investment. Moreover, 76 correspondents didn't want to take a policy because of the high rate of premiums and 47 correspondents could avail the needed money from alternative sources. The poor service and coverage rate also didn't encourage many correspondents to take the health insurance policy. Finally, shortage of disposable fund also compelled 17.2% of correspondents not to take health insurance policies (Chart-10)



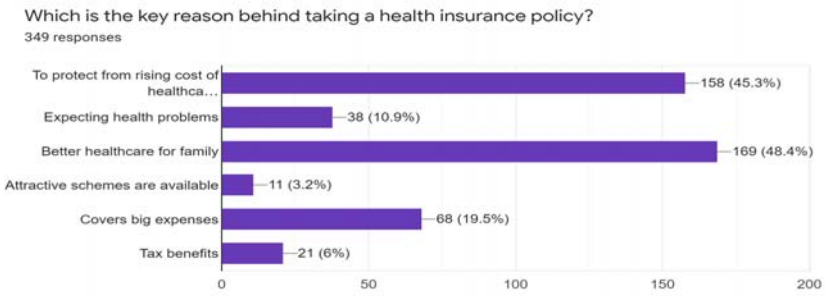
Source: Survey, 2020

Chart-10: Key Reason for Not Taking Health Insurance Policy

d) The Covid-19 Situation and People's Perception to Health Insurance

It is mentioned that currently, 9% of correspondents have health insurance policies, but 349 correspondents responded about the key reason to take health insurance policies. Of them, 158 correspondents replied that to protect themselves from the rising cost of health care, 38 correspondents want to take fearing the expected health problems in the near future and 169 correspondents want to avail it for providing better medical facilities to their families. Offers and promotional schemes from the companies allured 11 correspondents to have a policy, and 68 correspondents replied that it would cover big medical expenses (Chart-11). For attaining the goals of SDG, a sustainable healthcare system must be developed in Bangladesh. Health insurance policies would be a great use.

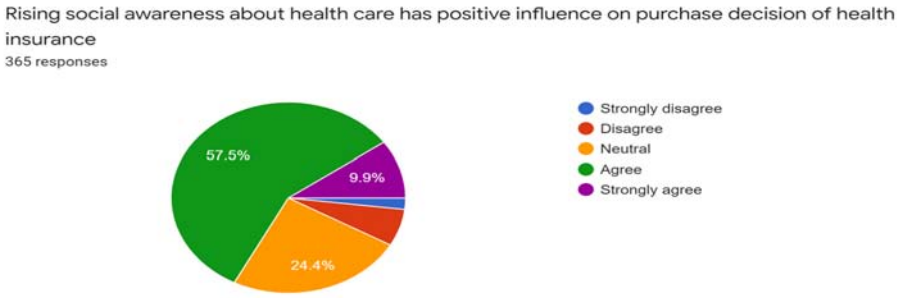
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Source: Survey, 2020

Chart-11: Key Reason behind Taking Health Insurance Policy

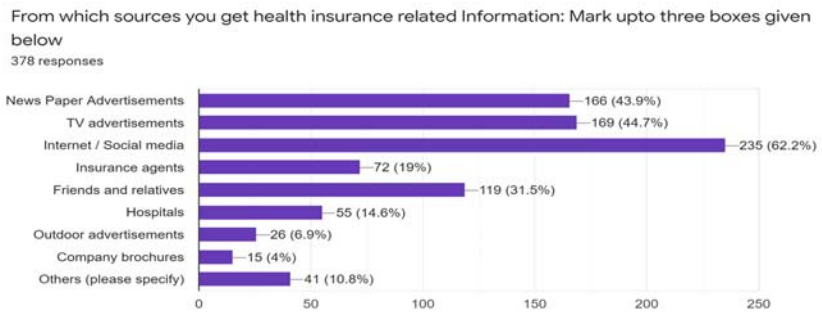
In this regard. Hence some steps must be adopted to reach the people, of them most importantly, we have to raise mass awareness and take necessary steps to disseminate the health insurance-related information publicly. 57.5% of correspondents have agreed that raising social awareness about health care might have a positive influence on the purchase decision of health insurance, whereas 24.4% of correspondents remained neutral (Chart-12).



Source: Survey, 2020

Chart-12: The Role of Social Awareness in Purchasing Health Insurance Policies

One of the questions asked the correspondents to mark up to three pre-prescribed boxes about their source of information about the health insurance. One hundred sixty-six respondents ticked newspaper advertisements, 169 ticked TV advertisements, 235 ticked internet/social media, 72 marked insurance agents, 119 marked friends and relatives, 55 from hospitals, 26 from outdoor advertisements, 15 from company brochures, and 41 ticked others (Chart-13).

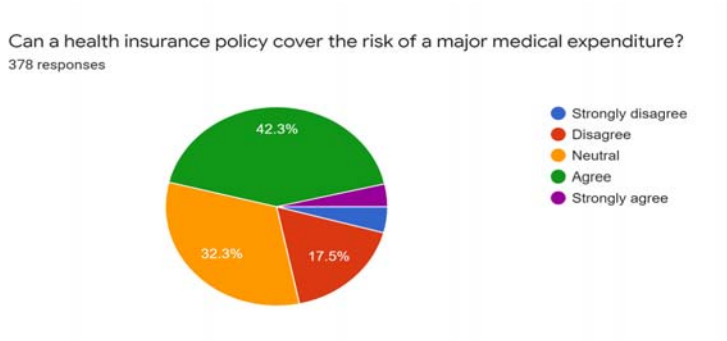


Source: Survey, 2020

Chart-13: Sources to Getting Insurance Related Information

Many correspondents had a very positive tendency about the coverage of a policy to meet major medical expenses. 42.3% of correspondents have agreed that a health insurance policy would cover the risk of a major medical expenditure, whereas 17.5% of correspondents didn't agree in this regard (Chart-14).

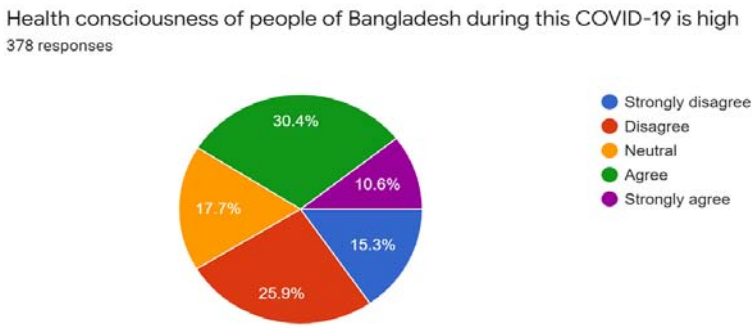
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Source: Survey, 2020

Chart-14: The Rate of Coverage of a Health Insurance Policy

The year 2020 has seen the outbreak of the COVID-19 pandemic, a major worldwide health crisis. As of January 19, 2021, the COVID-19 pandemic has spread to 216 countries, with total cases of 95.5 million, of them 52.6 million have recovered, and 2.04 million have stabbed to death deaths.[8] The Covid-19 pandemic has created a strong impact on the national & global economy and endangered people's lives seriously. In this situation, health service is now getting the topmost priority. Almost all of the countries are trying to face it by following strict quarantine measures or through the imposition of lockdown.[9] However, the compulsory prohibition of going out has severely disturbed people's daily life. Firstly, the idleness caused the emergence of a new health crisis and secondly, the fear of getting affected by covid-19 is played a key role in raising health consciousness among the people. Health consciousness is the degree to which individuals care about their health.[1011] The more health-conscious people are, the more likely they are to have healthy habits,[12] which is the basis for individuals to take health measures.[13] When the correspondents of this study were asked about the high health consciousness of the people of Bangladesh during this COVID-19, 30.4% agreed that the health consciousness of the people of Bangladesh is very high during this pandemic, 10.6% agreed strongly, 17.7% remained neutral, and only 25.9% disagreed in this matter and 15.3% strongly disagreed (Chart-15).

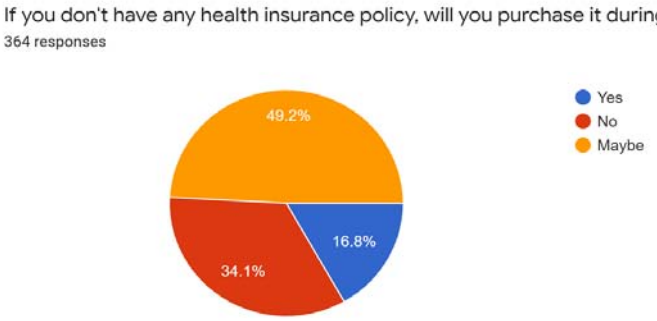


Source: Survey 2020,

Chart-15: Health Consciousness of People During Covid-19

Finally, the correspondents were asked, 'if you don't have any health insurance policy, will you purchase it during this pandemic?'. 49.2% replied that they might have purchased it during this pandemic, 16.8% of correspondents said that they would purchase it as soon as possible, and only 34.1% replied negatively that they didn't purchase any health insurance policy to meet up the Covid-19 pandemic (Chart-16). A lot of factors also were there which compelled them not to avail of a health insurance policy.

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Source: Survey, 2020

Chart-16: The Rate of Purchase of Health Insurance During Covid-19

e) *Factors that influence the purchasing behavior of health insurance during this COVID-19 pandemic*

In this section, focuses are given on the possible factors which influence people to purchase health insurance during this COVID-19, and it also focuses on the reason for not taking the health insurance policy. Based on the findings of this study respective authorities can take necessary measures to boost this potential sector of the insurance industry.

This study shows that people who have more income are very keen to purchase a health insurance policy. Because those who have more income, they also have a large number of disposable funds to outlay for health insurance. People firstly think about the basic needs of life, although treatment is a part of it, and they are indifferent in taking a health insurance policy. The demand for health insurance entirely depends on what the consumer wants and it can be considered a luxury good for its nature. The study found a 50% probability that people are taking health insurance policy because of income level.

Despite that, another most significant variable is the health insurance facility providing by the employer. In Bangladesh, many private organizations are providing health insurance facility for the wellbeing of their employees. It is an important technique to attract and recompensate talented employees for the organization. Providing health benefits also can help to increase employee productivity, increasing morale, and helping form an optimistic company culture. There's a varied range of choices existing for businesses looking to offer employee health insurance. The main concentration of a health insurance idea for employees is to protect them from uncertain health problems to remain energetic and productive. Other perquisites, like financial assistance or education aids, are useful, but employee health insurance is the most important accumulation to salary providing around the world. According to a study run by Glassdoor, it has been found that health insurance benefit is the most important benefit they get from the employer. This study shows that there is a probability of 87% who have a health insurance policy provided by their employer.

Another finding of this study is that people having access to insurance-related information are more tended to take health insurance policies and the probability rate of taking is 57% of these people.

An additional significant discovery of this study is the knowledge of people about the company which provides health insurance facility. Those who are acquainted with the health insurance company and policy have a 81% probability of taking health insurance policies.

Table 01: Factors that influence the purchasing behavior of health insurance during this COVID-19 pandemic.

Variables	Coefficient	Level of Significance	Odd Ratio	Probability
Constant	-1.891	0.317	0.151	
Gender (dummy)	-0.639	0.181	0.528	
Age (dummy)	-0.011	0.666	0.989	
Education Level (dummy)	-0.235	0.470	0.790	
Employment (dummy)	-0.189	0.289	0.827	
Income Level (dummy)	0.000	0.000	1.000	0.50
No of dependent family members (dummy)	-0.113	0.425	0.892	

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Monthly medical Expenditure (dummy)	-0.000	0.086	0.999	
Providing health insurance facility from the organization (dummy)	1.903	0.000	6.711	0.87
Sources of medical expense (dummy)	-0.164	0.488	0.848	
Sources of information regarding health insurance (dummy)	0.298	0.036	1.348	0.574
Key reason to buy a health insurance policy (dummy)	-0.283	0.084	0.753	
Key reason not to buy a health insurance policy (dummy)	-0.035	0.917	0.965	
Knowledge regarding health insurance providing company (dummy)	1.472	0.003	4.359	0.81
Information regarding schemes offered by insurance companies (Likert scale)	-0.528	0.060	0.589	
Opinion about the health insurance service provided by the company (Likert scale)	0.074	0.786	1.077	
Social consciousness of people of Bangladesh during COVID-19 (Likert scale)	0.298	0.780	1.053	
Social awareness will increase the purchase decision of health insurance (Likert scale)	0.063	0.819	1.065	
Purchase decision of health insurance policy (Dummy)	0.008	0.987	1.008	
Pseudo R2 = 0.3115				

Source: Authors own calculation

VI. Limitations of the Study

This study has some weaknesses, firstly it was conducted among various professionals having a diverse field of backgrounds, and a large number of the correspondents were undergraduates as well. So, getting a thoroughly objective scenario of the existing health insurance isn't possible from this study. Secondly, due to time, communication, and resource constraints, some of the responses won't be accommodated in this study.

VII. Conclusion

The Covid-19 pandemic has always been a great lesson for the people of Bangladesh. The fragile health care system of Bangladesh initially failed to meet up the challenges raised due to the Coronavirus issue. Moreover, most of the people were struggling to manage their daily basic needs. Many reports and news of mass media were reported that the lower artisan and laborer class would have died due to the food scarcity, not from coronavirus threat. A sustainable healthcare system must be developed to bring this class under an inclusive health care service through a universal health insurance system. Again, the health consciousness of the people of Bangladesh has been raised due to this pandemic, and the ages long perception towards health insurance has changed. Government and NGO's should have taken this advantage and must adopt some steps to ensure the health insurance of the people of Bangladesh.

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Modelling of Index System of Economic Vitality During the COVID-19 Epidemic

By Shenglan Chu, Jinming Cao & Bin Zhao
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Abstract- Economic vitality is an important indicator to measure the level and potential of economic development. The paper puts forward three social problems about economic vitality and establishes a model to solve them. We build panel data model to analyze the influencing factors of economic vitality. Based on the section data of Beijing, the VAR-VEC model is established to analyze the long-term and short-term effects of economic policies on economic vitality. The development strategy of ORT is put forward, and the scheme to promote the growth of economic vitality is given during the COVID-19 epidemic.

For the first problem, the paper preprocess panel data, and test its independence, and find that each factor is not independent of each other. Through the correlation analysis, we found that there is a strong correlation between the various elements. After Random Effect Test and Fixed Effect Test combined with Hausman Test, the data panel conforms to fixed effect model.

Keywords: panel data model; VAR-VEC model; factor analysis; index system.

GJMBR-B Classification: JEL Code: F43



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Modelling of Index System of Economic Vitality During the COVID-19 Epidemic

Shenglan Chu [α], Jinming Cao [σ] & Bin Zhao [ρ]

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For the second problem, the paper select the section data of Beijing city and construct the VAR-VEC model. Based on ADF unit root test and Johansen cointegration test, we find that there are at least three cointegration relationships between time series. We use Ais-Sc Criterion to determine the order of delay as the third order. We use OLS estimation method to get the coefficients of VEC Model. Through the IRF response, we find that the long-term impact of economic policy on economic vitality is positive correlation effect. Due to the effect of experience accumulation, the economic vitality presents a W-shaped trend.

For the third problem, the paper use the minimum average deviation method to preprocess the index data, and get 9 representative indexes. We extract two main factors by factor analysis and build an index system of economic vitality. The economic vitality of each city from 2009 to 2017 is calculated according to the index system. Beijing, Shanghai, Guangzhou and Shenzhen often rank first, while Kunming and Dongguan often rank last. Based on the same data, the panel data model test results are similar to index system.

For the fourth problem, we review the previous conclusions and put forward the ORT development strategy to improve economic vitality based on the established model.

Keywords: panel data model; VAR-VEC model; factor analysis; index system.

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I. Introduction

Under the background of new age, China's economic, social, cultural, ecological, political and other fields are coruscate gives new vigor and vitality, at the same time the good life is people's increasing need to inadequate and imbalance of the contradiction between the development of become the main social contradiction, and the unbalanced economic development between different regions is the concentrated reflection of imbalance is not fully developed; To accelerate the narrowing of the gap in regional economic development, promote the vitality of regional economic development, and promote the coordinated development of regional economy is the basis and key to solve the main social contradictions in the new age, and is also the driving force of economic and social development axis.

Regional economic vitality is an important part of regional comprehensive competitiveness. In recent years, in order to improve economic vitality, some regions have introduced a lot of preferential policies to stimulate economic vitality, such as reducing the approval steps for investment, providing financial support for entrepreneurship, and lowering the threshold for settling down in order to attract talents. However, due to different resource endowments, these policies have different effects in different regions. How to grasp the key factors and effectively improve the regional economic vitality is a worthy research topic.

In order to study how to improve regional economic vitality, given some data. Based on these data and my own survey data, this paper established an appropriate model to solve the following problems:

Problem 1, it is necessary to take a certain region (or city or province) as an example, and combine the data collected in the attachment to establish the appropriate relationship model of the influencing factors of economic vitality, and give the action plan to improve the regional economic vitality. The influence of population change trend and enterprise vitality change on regional economic vitality change is analyzed.

Problem 2, selecting a region (or city or province) and investigating the appropriate data analyze the short-term and long-term impact of economic policy transformation on the economic vitality of the region (or city or province).

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Problem 3, this paper collects relevant data, selects appropriate indicator system, establishes mathematical model to analyze and measure regional (or city or provincial) economic vitality, and ranks urban economic vitality.

II. Models

a) The model of problem

Based on the panel data model, collects data from various provinces and cities, performs correlation test and principal component analysis on the data. The fixed effect test and random effect test were carried out for the obtained factors, and the influence of policy and enterprise vitality on economic vitality was analyzed based on the established relationship model between each factor and economic vitality during the COVID-19 epidemic.

i. *Data analysis and processing*

Based on the collected data has certain error and deficiencies, in order to reduce the invalid, the influence of the error data of the following model, improve the reliability of data, need to collect the data pretreatment, firstly the filtered data, remove abnormal data, secondly, proper supplement of incomplete data, finally, has strong correlation data linear regression analysis forecasting and slight fluctuation data using the moving average method to fill the missing value, to further improve the accuracy and the integrity of the data.

1) Data selection Principle

This paper needs to collect various indicator data describing economic vitality and influencing economic vitality, and the following classical indicators can be obtained according to the expert method and the literature [10][11][13][14].

Dependent variable. In the existing economic vitality research and analysis, more choose gross domestic product (GDP) as a measure of regional economic vitality. In this paper, in order to measure regional economic vitality, main factors from the effects of the economic vitality, that reflects the GDP growth rate as the level of economic development during the period of change degree of dynamic indexes, namely whether a national economic basic index of the dynamic, and USES the linear regression analysis and panel data model analysis, the main measures for regional economic vitality.

Independent variables. Based on the existing literature research results and the aforementioned analysis, this paper selects 9 aspects including population growth rate, fiscal expenditure and employment rate (mainly used to reflect the main influencing factors of regional economic vitality and its growth trend).

The employment rate is expressed by the number of unemployed; At the same time, in the establishment of the model, for the negative value of population growth rate, in order to reduce the error in the large number region, dummy variables can be used instead of the original statistical samples, which are reset to zero in this paper.

Control variables. Based on the analysis of the comprehensive evaluation index system of urban economy, and considering the availability of data, this paper introduces independent innovation ability, per capita length of education, professional and technical talent inflow and other irrelevant variables as control variables. Through certain analysis, the variables other than independent variables that can affect the change of dependent variables should be well controlled and regarded as constants, so as to obtain appropriate causal relationship and obtain the most true and accurate value.

Table 1: Variable definition

Variable Name	Definition
Dependent variable	The local GDP、Added value of tertiary industry、Education funds、LGE、Government expenditure、Gross income from international tourism、Consumer price index、Population、Unemployment、Number of patents filed
Independent variables	Population growth rate、Fiscal spending
Control variables	Independent innovation abilitTotal corporate profitsy、Per capita years of education、The inflow of professional and technical personnel

2) Independence Test

In the analysis of the relationship between the factors affecting economic vitality, in order to fully understand whether there is an internal relationship between the factors, according to the processed data, this paper carries out an independence test for each factor.

The data source is the national bureau of statistics, and the independence test is conducted on the pre-processed data. See the appendix for the specific data. Make the following assumptions about the research hypothesis:

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Null Hypothesis:

- The factors that influence positive energy are independent of each other

Alternative Hypothesis:

- The factors influencing economic vitality are not independent

Firstly, chi-square independence test was conducted and SPSS was used to conduct independent test for each influencing factor to observe whether there was any correlation between each factor. The test results are as follows:

Table 2: Independence test results

	Observations					
	Effective		Missing			
	N	Percentage	N	Percentage	N	Percentage
Local	309309	100.0%	0	0.0%	309309	100.0%
Travel	309309	100.0%	0	0.0%	309309	100.0%
Index	309309	100.0%	0	0.0%	309309	100.0%
Profit	309309	100.0%	0	0.0%	309309	100.0%
Population	309309	100.0%	0	0.0%	309309	100.0%
Workloser	309309	100.0%	0	0.0%	309309	100.0%
Third	309309	100.0%	0	0.0%	309309	100.0%
Patent	309309	100.0%	0	0.0%	309309	100.0%
GDP	309309	100.0%	0	0.0%	309309	100.0%

It can be seen from Table 2 that the cross relation between each factor and the year, and the cross table shows the availability of different influencing factors, all of which occupy a complete percentage, indicating that the selected data are valid values with high accuracy, which can be further compared in pairs to test the independence of judgment factors. The significance analysis is used to determine whether there is independence between factors. The chi-square significance test results are shown in Table 3.

Table 3: Chi-square significance test results

	Numerical	Df	Asymptotic significance (2 ends)
Person square test	2753847.871[a]	2745	.000
Likelihood ratio	1416065.090	2745	.000
Linear to linear	13402.742	1	.000
The number of Valid observations	309309		.000

It can be seen from Table 3 that the degree of freedom is the probability of Person chi-square, which is less than 0.05, so the null hypothesis is rejected, that is, the influencing factors are not independent of each other.

3) Correlation Analysis

Each factor in the collection is the indicator data of each city in the country, which belongs to the panel data. There may be a certain correlation between the data. Considering the correlation among various factors, the linear strength relationship diagram of each factor is obtained based on the data as follows:

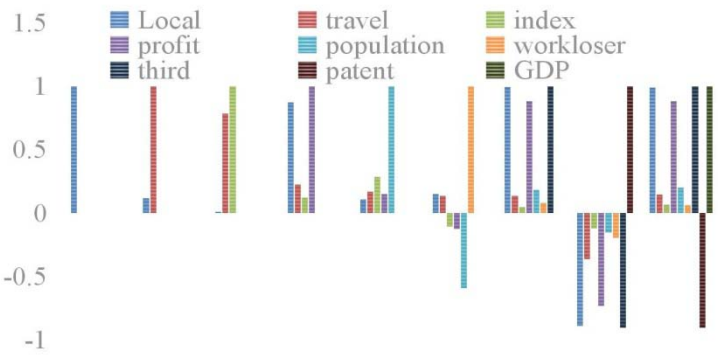


Figure 1: The linear strength relationship between the factors

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As can be seen from the observation in figure 1, there is a correlation among all factors, as well as the expression form and strength of the relationship among all factors. The closer the data is to 1, the stronger the correlation is.

Local GDP is positively correlated with Government expenditure、 Gross income from international tourism、Consumer price index、Education funds、Total corporate profits、Population、 Unemployment and added value of the tertiary industry, and negatively correlated with the number of patent applications. SPSS was used to conduct correlation analysis on the data, and the results were shown in Table 4.

Table 4: Correlation analysis

	Average	Standard deviation	95% confidence interval (lower bound upper bound)	Significant
Local	4047.2789	2473.46062	(3788.2312, 4321.1274)	0.047
travel	2071.1539	3068.79243	(1732.0034, 2455.2115)	0.00
index	102.306	1.5306	(102.134, 102.473)	0.006
profit	2024.9450	2138.79648	(1793.7463, 2264.6996)	0.011
population	5.42268	2.847803	(5.12150, 5.74611)	0.017
Work loser	24.8066	14.06292	(23.3868, 26.4238)	0.00
third	9627.7616	8985.16139	(8672.1902, 10640.3587)	0.007

Correlation coefficients can quantitatively describe the closeness of linear relationships among factors, and SPSS is used for correlation analysis to obtain the correlation coefficients among the influencing factors, as shown in Table 5.

Table 5: Correlation coefficient result

	Local	travel	index	profit	Pop	Work	third	patent
Local	1	0.602	-0.113	0.777	-0.155	0.570	0.921	0.911
travel	0.602	1	-0.022	0.592	-0.034	0.217	0.709	0.656
index	-0.113	-0.02	1	0.011	0.034	-0.057	-0.092	-0.073
profit	0.777	0.592	0.011	1	-0.145	0.589	0.875	0.935
pop	-0.155	-0.034	0.034	-0.145	1	-0.478	-0.153	-0.160
Work	0.570	0.217	-0.057	0.589	-0.478	1	0.515	0.625
third	0.921	0.709	-0.092	0.875	-0.153	0.515	1	0.972
GDP	0.911	0.656	-0.073	0.935	-0.160	0.625	0.972	1
patent	0.399	0.656	-0.034	0.662	-0.108	0.390	0.566	0.608

According to the above correlation analysis Table 5, there is a correlation among all factors, and the positive correlation coefficient is distributed between 0.5 and 1, reflecting a strong correlation; And than according to the significance test of the correlation coefficient, the significance values are all less than 0.05, indicating that the correlation coefficient has reached a high level of significance. Therefore, there is a strong correlation between various factors influencing economic vitality.

b) Establishment of model

This section is based on the panel data of various factors collected from 31 provinces and cities in China from 2009 to 2018. Considering the influence of multiple factors on economic vitality, a variety of methods can be used, such as multiple linear regression and panel data model. Here, a rough comparison is made before further model establishment. Compare the panel data model with the multiple linear regression model, as shown in Table 6.

Table 6: Model comparison

	Multiple linear regression	Panel data model
Independent variable Selection	Independent variables must be mutually exclusive	No special requirements
Observations	Less description	More description
Analysis of the dimension	One-dimensional	Two-dimensional
Predictive accuracy	Accurately	Relatively accurate
Information contained	Less	More
Controllability	No	Yes

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Based on the data and problem in this question, it is obvious that the panel data model is a better choice. The panel data model includes both the cross-section and the time dimension. Here, the factors affecting economic vitality are taken as the cross-section, and the year is taken as the time dimension. Among them, $i(i=1\ldots8)$represents the following linear model set for the year:

$$y_{it} = \alpha + \lambda_t + \beta x_{it} + \varepsilon_{it}.$$

The panel data model can be further divided into fixed effect model and random effect model.

1) Fixed effect model

The individual effect is regarded as a fixed factor that does not change with time, then equation 1 can be expressed as a vector

$$y_{it} = \alpha A_T + \lambda_t + \beta x_{it} + \varepsilon_{it}.$$

In the formula; AT is a column direction where all elements are 1, and the others have the same meaning as the original model.

2) Random effect model

The individual effect α is regarded as a random factor that changes with time. By using the random effect model, the long-term factors and short-term factors in the variance can be separated. The basic setting of the model is as follows:

$$y_{it} = \alpha_t + \lambda_t + \beta x_{it} + \varepsilon_{it}.$$

3) Model determination based on Hausman test

Because the missing related variables are not excluded, there will be dependent variable-local GDP will change with the same period correlation of random interference items, and the constraint conditions of exogenous variables are not satisfied, so that the OLS estimator is biased and different. OLS is used to test the fixed effect model and GLS is used to test the random effect model. According to the reference [13], the difference between the random effect model and the fixed effect model is that it is difficult to try to make a high degree of distinction on the description of individuals. The fixed effect will cost more degrees of freedom, while the random effect is more universal. The proposed Hausman test can be used to distinguish them to some extent.

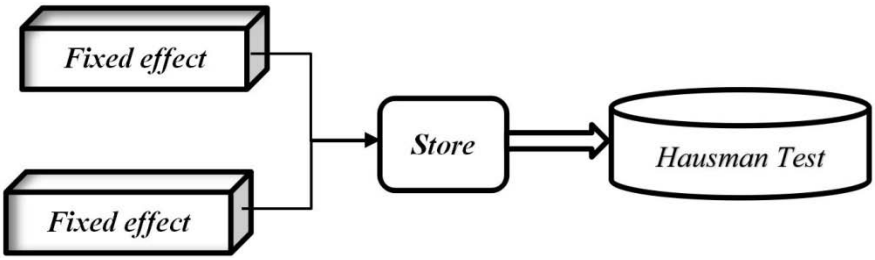


Figure 2: Inspection process

Advanced random effect model test, test results are stored; Then the fixed effect test is carried out on the model and the results are saved at the same time. Finally, Hausman test is performed on the results to obtain the final model, and the method to verify that both models are satisfied is established in turn.

It can be seen from the output result that the parameter estimation variance of random and fixed effect models under this test is a positive definite matrix, which satisfies the test conditions. Under the 95% confidence interval, the P value is much less than 0.05. Therefore, the fixed effect model should be selected as the explanation model for the influence of economic vitality, while the random effect model should be selected instead.

i. *Model solving process*

In this section, stability analysis is conducted on the existing panel data, fixed effect test and random effect test are conducted on the whole data based on the panel mathematical model, and Hausman test is used to determine the applicable model for the panel data. Finally, the analysis results are obtained based on the panel regression model.

1) Data stability and reliability analysis

The data of this paper comes from China National Statistical Yearbook, which includes the local government's financial expenditure, the total income of local international tourism, consumer price index, total profits of enterprises, population, unemployment, tertiary industry, total patents and local GDP. The inconsistency of the order of magnitude of each part will cause trouble to the model fitting. According to the statistical yearbook, the city is divided into 1-31, and the distribution of various data is shown in Figure 3.

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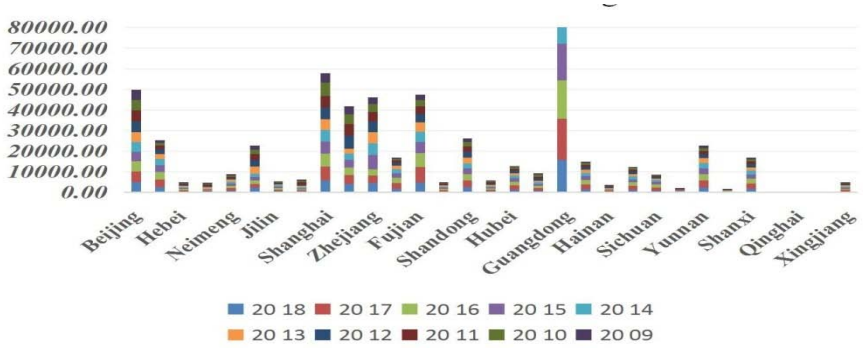


Figure 3: Data distribution of influencing factors in each city

Take Figure 3 for example, standardize it first. Assume that the original data is x_m, after standardization is X_m.

$$X_{ni} = \frac{x_{ni}}{MAX(Y) - MIN(Y)}.$$

After obtaining standardized data, it is shown as follows

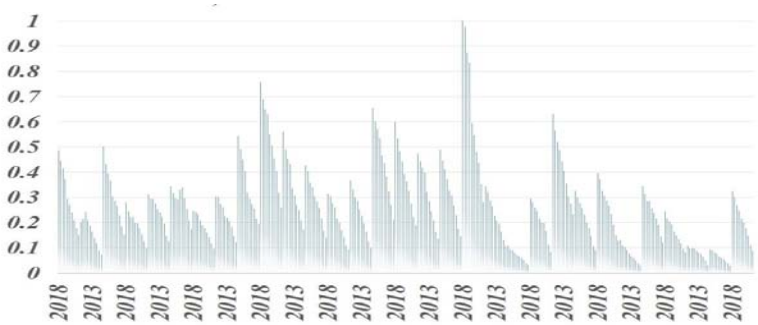


Figure 4: Standardized data distribution

It can be seen from the observation Figure 4 that after the standardization, the feature expression is more clear, which is conducive to the next model inspection work.

2) Fixed effect test based on OLS

Panel data has the characteristics of separating long-term variables and short-term variables, while fixed effect model focuses on the relationship between variables within the group, It is necessary to test the fixed effect model. The estimation method is OLS estimation, Two assumptions of fixed effect model are made.

Hypothesis 1: $E[\xi_i | x_i, a_i] = 0.$

Hypothesis 2: $Var[\xi_i | x_i, a_i] = \sigma^2 I_T$

The ξ in Hypothesis one is the independent variable interference term. Hypothesis 1: Assume that the ξ has no effect on the observed value, unobserved value and post observed value. Hypothesis 2: The general test of homovariance, Ensure that the model satisfies the blue estimate of OLS. And organize data into long data types.

The year (2009-2018) is the cross-section marker, the province (1-31) is the research individual, and each type of independent variable is the influencing factor.

The solution is based on Stata software, and the results are shown in Table 7.

Table 7: Fixed effect test model

Variables	GDP	$P>\|t\|$ [95% Conf.Interval]
Local	0.07766356	0.000
travel |	0.04812193	0.007
index	0.01040376	0.116
profit	0.10857042	0.001
population	0.00840291	0.011

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workloser	0.02157164	0.083
third	0.72645815	0.000
sigma_u	0.03622232	F =0 F(30,272)=29.86 Prob > F = 0.0000
rho	0.91812864	
sigma_e	0.01081659	

Among them, the F value is very close to 0, indicating that the fixed effect is very significant in this case. Among the seven independent variables, the consumer index and unemployment rate are not significant within the 95% confidence interval.

Local government expenditure, total tourism income, total profits of enterprises, resident population and tertiary industry income all have strong statistical significance. The statistics are shown in Table 8.

Table 8: Indicators passing the fixed effect test

Variables	GDP
Local	0.0776635
travel	0.0481219
profit	0.10857040
population	0.0084029
third	0.7264581

Among them, the third industry has the most significant impact on GDP, and the consumer index has the least impact on GDP.

We can know that all the selected indicators have positive significance for GDP growth within the statistical range. It shows that this test has passed hypothesis one and hypothesis two for panel data, and both of them are true.

3) Random effect model test based on GLS estimation

The number of indexes (N) is 10, and the time span (T) is 10 years. In this case, it is also possible to meet the random effect model, further test of the random effect model is needed.

Hypothesis 1 $E[\xi_i | x_i, a_i] = 0,$

Hypothesis 2 $Var[\xi_i | x_i, a_i] = \sigma^2 I_T,$

Hypothesis 3 $a_i \sim IID(\ 0\ ,\ \sigma_a^2\ ),$

Hypothesis 4 $Cov(\ a_i\ , x_{it}) = 0,$

Hypothesis 5 $u_i | x_i \sim IID(\ 0, \sigma^2 1_T + \sigma_a^2 A_T A_T^{'}).$

According to the above assumption, suppose that the distribution of each independent variable is constrained in a specific case, and the effect of each independent variable obeys the mean value of 0. The second is the description of random interference, which has no correlation with explanatory variables. The third term makes the two coefficients independent of each other.

Based on the above description, GLS estimation method can be used to obtain whether the panel data model conforms to the random effect test when the collected variables are close to the time span.

Organize data into long data types. The year (2009-2018) was used as the cross-section marker, the province (1-31) as the study individual, and each type of independent variable as the influencing factor. Use Stata software to solve the problem, and get the results as shown in Table 9.

Table 9: Test results of random effect mode

Variables	GDP	*P*>|*t*| [95% Conf. Interval]
Local	0.07772621	0.000
travel |	0.03259963	0.051
index	0.00628094	0.123
profit	0.14530897	0.000
population	0.00921631	0.332
workloser	0.06423435	0.000
third	0.71987214	0.000
sigma_u	0.03622232	F =0. F(30,272)=29.86 Prob > F = 0.0000
rho	0.91812864	
sigma_e	0.01081659	

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In 95% confidence interval, P value is 0, that is to say, five hypotheses are passed in this case. This case is suitable for the random effect model.

Table 10: Indicators passing the random effect test

Variables	GDP
Local	0.07766353
population	0.00840295
profit	0.14530897
workloser	0.06423435
third	0.71987214

The third industry has the most significant impact on GDP, and the resident population has the least impact on GDP. We can know that all the selected indicators have positive significance for GDP growth within the statistical range. At the same time, it shows that the test has passed all the hypotheses of panel data and satisfies the random effect.

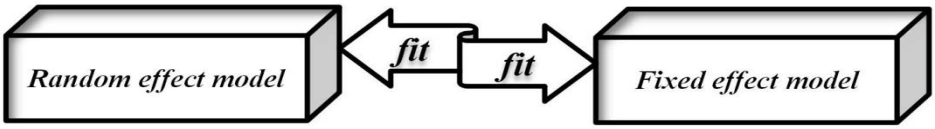


Figure 5: When both tests pass

The number of indexes (N) selected in this paper is 10, and the time span (T) is 10 years. In this case, both the fixed effect model and the random effect model are satisfied, and further model test is needed. At this time, Hausman test should be taken.

4) Model determination based on Hausman test

According to the reference [13], the difference between the random effect model and the fixed effect model is that it is very difficult to try to distinguish them in a high degree in the description of individuals. The fixed effect will consume a large degree of freedom, while the random effect is more universal on this basis. The proposed Hausman test can be used to distinguish them to some extent.

The test of the advanced random effect model will store the test results, then test the fixed effect of the model and save the result. Hausman test is used to get the final model, and then the method to test the two models simultaneously is established.

Table 11: Hausman test results

Variables	Value
Chi2(7)	382.02
Prob	0.0000

It is known from the output that the variance of parameter estimation of random and fixed effect models under this test is a positive definite matrix, which satisfies the test conditions. Under 95% confidence interval, P value is far less than 0.05. Therefore, we should choose fixed effect model as the explanation model of economic vitality.

5) Analysis of model test results

Using Hausman test, the fixed effect model is determined as the interpretation model of economic vitality, and the results are shown in Table 12.

Table 12: Test results of fixed effect model

Variables	GDP
Local	0.0776635
travel |	0.0481219
profit	0.108570420
population	0.0084029
third	0.7264581

Among them, the factors that have a positive impact on economic vitality (GDP) are the local government financial expenditure, the total annual revenue of local tourism, the total annual profit of local enterprises, the local permanent population and the GDP of the tertiary industry.

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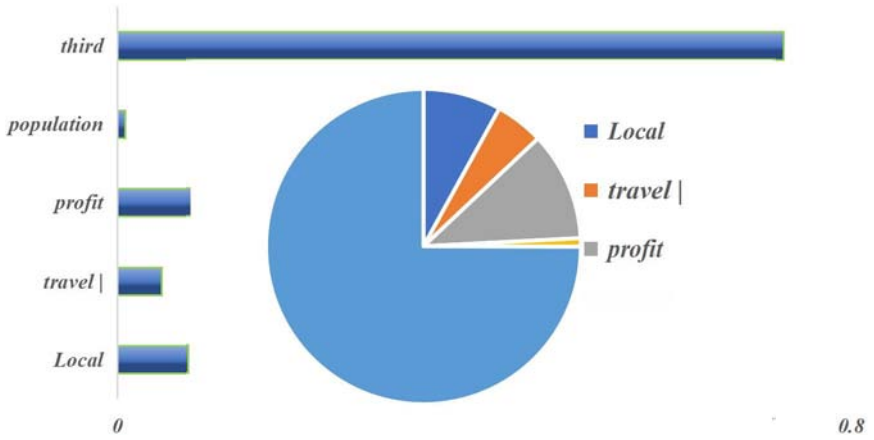


Figure 7: Contribution degree

According to figure 7, based on the fixed effect model, it can be concluded that the tertiary industry has the largest impact on the estimated vitality, followed by the annual income of enterprises (enterprise vitality), the input expenditure of local government (policy bias), the total income of local tourism, and finally the permanent population. Among them, the influence of the tertiary industry on economic vitality is more than 7 times that of enterprises, indicating that the third vitality can occupy most of the influence among the factors influencing economic vitality.

6) Activation scheme proposed based on fixed effect model

According to the fixed effect model shown in figure 4, the explanation degree of each factor to economic vitality has been given, and the following Suggestions are given according to the influence degree.

1. To increase the proportion of the tertiary industry in the overall economy, the tertiary industry plays an important role in the influencing factors, so it is necessary to strengthen the overall proportion of the tertiary industry in the current stage of social construction. Raising the economic proportion of the tertiary industry will greatly promote the improvement of economic vitality.
2. In the process of development, the region should combine its resource endowment and industrial foundation to find the optimal ratio of enterprise structure, complete the adjustment of enterprise structure as soon as possible, and develop appropriate leading industries to promote economic growth. Will be conducive to a steady increase in economic vitality.
3. Local government expenditure has a greater impact on economic vitality. The government needs to be tightly managed to make its spending transparent. We will increase government support for enterprises.
4. Entrepreneurship is encouraged. The government takes the lead in encouraging entrepreneurship, and social practices are carried out to transform enterprises.

According to the influence of individual factors on economic vitality obtained from the fixed model, the influence law of factors is summarized, among which policy adjustment (government expenditure) and enterprise vitality (annual total profit of enterprises) have a greater positive impact on economic vitality, and the implementation of policies in this respect should also be intensified.

7) The influence of changing trends of population and enterprise vitality on economic vitality

Seven variables were selected, GDP was taken as the expression of economic vitality, and the fixed effect model in the panel data model was used to draw the following conclusions:

The growth rate of permanent resident population has a positive impact on economic vitality, that is, the increase of permanent resident population will increase economic vitality in a small extent.

If the population grows too fast, it will increase the rate of job competition and lead to the rise of unemployment, which will have a negative impact on economic vitality. However, the growth decline of enterprise vitality directly affects the change of economic vitality and presents a positive correlation change.

The establishment of VAR-VCE dynamic volatility model

Based on the panel data in the first question, this section intercepts the local government expenditure of Beijing as a representation of economic policy and establishes a vector autoregressive model (VAR).

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Taking economic vitality as the research object, the stability of each factor is verified. Based on vector error correction model (VEC), the lag order and impact function response chart are given to describe the long-term and short-term impact of policy implementation on economic vitality.

III. Data Preparation

Based on the cross-section data of Beijing in the panel data of the whole country, this section conducts relevant test and Analysis on the data, and finally obtains five important factors that have a great impact on the economic vitality: local per capita GDP, local government expenditure, local tourism gross income, local people's living consumption index, and local resident population.

Among them, five kinds of data of Beijing, local per capita GDP, local government expenditure, local tourism gross income, local people's living consumption index, and local resident population are given in Figure 9 after standardization.

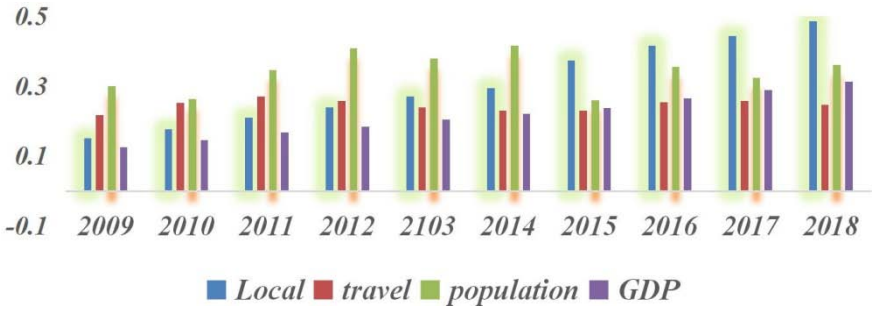


Figure 9: Normalized back view

It can be seen from Figure 9 that the local government expenditure has a certain increase in each year, basically showing a linear growth; There is no significant change in the local tourism income, which is relatively stable compared with other indicators, indicating that Beijing, as the capital of the country, is very successful in the construction of tourism culture; The resident population gradually declined after reaching the peak from 2012 to 2013, which indicates that Beijing's population has changed greatly and its GDP has grown steadily.

It is not obvious that GDP is affected by the fluctuation of various factors. To understand the dynamic influence of various factors on GDP, we need to carry out vector auto regression for this group of data.

The establishment of vector auto regression (VAR) model

Based on the statistical properties, a function containing the lag value of exogenous and endogenous variables is established to construct the model, which properly explains the influence of the dynamic changes of variables on the dependent variables.

VAR model is essentially a model of multi equation class. Based on the dynamic changes of multiple variables, the interaction between various variables is investigated. Any endogenous variable in the equation system is constructed as the expression of the lag term of any variable. Its general expression is

$$Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + \cdots + A_p Y_{t-p} + B_0 X_t + \cdots + B_r X_{t-r} + \cdots + B_r X_{t-r} + \varepsilon_t.$$

Where Y_t is the endogenous variable vector of K dimension, Y_{t-i} (i=1,2,…,p) is the vector of lag endogenous variable, X_{t-i} is the d-dimensional exogenous variable vector or lag exogenous vector. P and R are the lag orders of endogenous and exogenous variables, respectively. Ai is k-order coefficient, Bi is k-row-d-column coefficient matrix, these matrices need to be estimated by specific methods. The last term is a vector composed of k-dimension random error terms. According to the solution of the following figure, we can get the estimation coefficient.

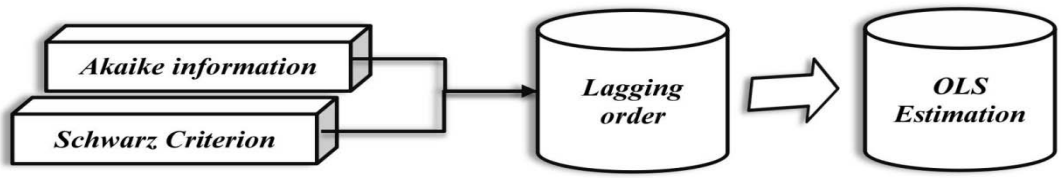


Figure 10: Model inspection process

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Firstly, the lag order of AVR model is determined according to AIC information criterion and SC criterion when the minimum value is taken, then the lag order is substituted into the meta model, and the coefficient of AVR model can be obtained by OLS estimation.

The establishment of VEC

When multiple time series are unstable, Johansen method is used to test whether there is co integration relationship. If there is co integration relationship, VEC model can be established to analyze the dynamic relationship of its multi pass model.

$$\Delta Y_t = \alpha ECM_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-1} + \varepsilon_t$$

In the formula, ECMt-1 is the error correction term. Compared with AVR model, the error correction term is an important feature to distinguish the two.

The error correction term reflects the long-term equilibrium relationship of each variable, and the deviation of long-term equilibrium can be corrected by quick short-term adjustment. Before establishing VEC model, Johansen test is needed to determine the stability and reliability of the model.

a) Model summary

To determine the regression type of a group of vectors, we need to conduct multiple tests, and finally we can determine whether the model has a correction term. Next, we summarize the model to construct a complete VAR-VEC model.

b) Solution of the model

In this section, we first judge the stability of time series, and then do ADF test on vector series to judge its stability.

Then, the first-order second-order difference is used to judge its stability. The cointegration test of the original data is carried out, and the satisfied model type is obtained.

Finally, the stability of the model is judged, and the dynamic influence of policy implementation on economic vitality is obtained.

1) ADF unit root test of vector sequence

First, all the time data are tested by ADF test, and the difference order is 0. The lag order is 1- 2, and the test results are shown in Table 13.

Table 13: Zero order difference ADF unit root test results

	T-Statistic	*P*	State
lnGDP	-1.679	0.088	Uneven
lnLocal	-2.507	0.012	Uneven
lntravel	0.107	0.745	Uneven
lnindex	-0.058	0.6614	Uneven
lnpopulation	-0.858	0.342	Uneven
lnworkloser	-0.402	0.537	Uneven

It can be seen from Table 13 that under the time test of order 0 raw data, the t-values of six kinds of t-tests are greater than the comparison data under the confidence interval of 95%, shows that the time series of this group of data do not pass the ADF test of the original data, and further differential test is needed. Carry out difference differentiation on the original data, and continue ADF test on the data after difference, and the results are shown in Table 14.

Table 14: ADF test results after first-order difference

	T-Statistic	*P*	state
lnGDP	-1.911	0.325	Uneven
lnLocal	-2.911	0.049	Uneven
lntravel	-1.871	0.345	Uneven
lnindex	-1.785	0.359	Uneven
lnpopulation	-4.444	0.004	Even
lnworkloser	-1.608	0.475	Uneven

It can be seen from table 14 that under the ADF time series test, the T value of lnpopulation t test in six species is less than the comparison data under the confidence interval of 95%.

Among the six kinds of data, only the population has passed the first-order difference test. The first-order difference of this group of data is not zero, so further difference test is needed.

Carry out the second-order difference differentiation on original data, and continue the ADF test on the data after the difference, and the results are shown in Table 15.

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Table 15: ADF test results after second-order difference

	T-Statistic	*P*	state
lnGDP	-11.634	0.000	Even
lnLocal	-9.1682	0.000	Even
lntravel	-11.720	0.000	Even
lnindex	-11.937	0.000	Even
lnpopulation	-5.342	0.000	Even
lnworkloser	-11.918	0.000	Even

It can be seen from Table 15 that all the data after the second-order difference have passed the ADF test, that is to say, this group of data is zero in the second order, and then the inter group cointegration test is carried out.

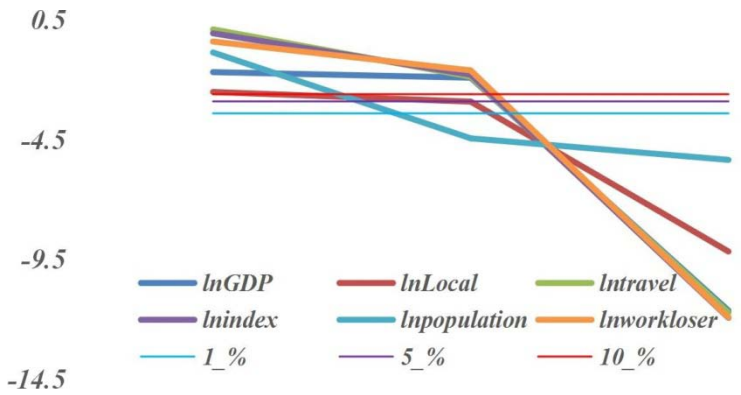


Figure 12: Visualization of three tests

Figure 12 shows the visual information of three points of each variable under three tests. The confidence intervals of the middle three levels are 1%, 5% and 10% respectively. After the first-order difference, only lnpopulation passed the test; After the second-order difference, all the data pass the test, that is, the group of data is the second-order zero integer data.'

2) Johansen co integration test of variables

According to ADF test, the original variable is a second-order zero integer sequence, that is to say, the original variable is an unstable sequence. First, Johansen co integration test is carried out to find out whether there is a co integration relationship between its combinations.

The test method is to calculate the trace statistics trace and the maximum eigenvalue Max eigevalue. Using the cyclic statistical hypothesis, the existence of cointegration logarithm is assumed. Table 16 shows the Johansen co integration test results.

Table 16: Cointegration test results

Hypothesized No. of CE(s)	Trace Statistic	0.05 Critical Value	Prob.**
None *	255.6213	95.75366	0.0000
At most 1 *	161.7542	69.81889	0.0000
At most 2 *	100.2905	47.85613	0.0000
At most 3 *	41.58610	29.79707	0.0014
At most 4	7.115546	15.49471	0.5642
At most 5	0.998791	3.841466	0.3176

From the trace statistics trace in Table 16, it is assumed that none is the sequence without cointegration.

Under this assumption, the trajectory value is 255.6213, which is greater than the critical value of 95.7537, if the original hypothesis is rejected, there is at least one co integration relationship.

In the case of 5% confidence level, the original assumption is that there are at least four sets of co integration relationship whose trajectory value is less than the critical value, and the determination of the fourth set of co integration relationship is rejected by the assumption.

There are at least three cointegration relations in the linear combination of time series with surface instability.

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c) Establishment and solution of VEC Model

When the original data series are non-stationary time series and Johansen co integration test shows that there are at least three co integration relationships in the series. In order to establish a proper VEC model, it is necessary to determine the optimal lag order of the model. The stability of the model is explained by AR root graph and Roland causality analysis.

Finally, the impulse response chart is given, and the long-term and short-term effects of policy implementation on economic vitality are analyzed.

1) Determination of lag period based on AIS-SC minimization criterion

When the model is not integrated and stable, multiple VAR models with different lag periods can be established first.

According to the relationship of multiple research variables, the values of each AIC and SC can be recorded and compared.

The optimal lag period of the model can be selected according to the principle of reaching the minimum at the same time. The results in Table 17 are calculated by Eviews software.

Table 17: AIS-SC calculation results

D	AIC	SC
VAR(0)	-21.2662	-21.1206
VAR(1)	-46.448	-45.4286
VAR(2)	-48.0552	-46.16191
VAR(3)	-48.7483	-45.98121
VAR(4)	-48.81	-44.16917
VAR(5)	-48.9	-41.38534
VAR(6)	-49.09	-38.70157
VAR(7)	-49.1406	-35.87832
VAR(8)	-49.2197	-31.0836

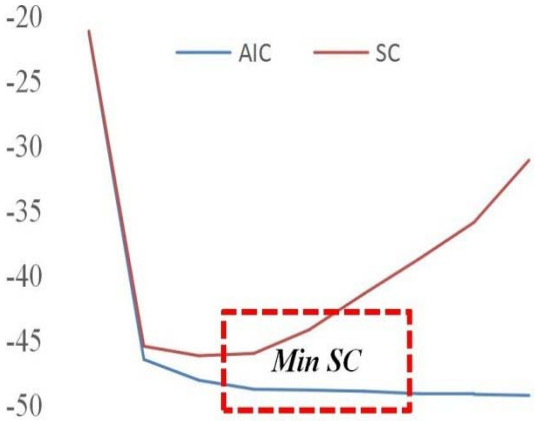


Figure 14: Change with order.

It can be seen from Table 17 that AIs value decreases with the increase of VAR (N) lag period, presenting a monotonic decreasing state, SC has a minimum at VAR (3). According to AIS information standard and SC standard, the optimal lag time is selected as the third- order lag time.

2) Determination of VEC model parameters

According to the above analysis, through the co integration test, there are at least three groups of co integration relationships between time series, which can be used to build EVC model.

According to AIS-SC criterion, this model is a third-order lag model, and VAR (3) model should be established. The parameters of the model based on OLS estimation are shown in Table 18.

Table 18: Results of OLS estimation of VEC Model

	lngdp	lnlocal	lntravel	lnindex	lnpop	lnworklose
C	1	-0.7287	-0.76511	1.809693	-0.23384	0.892205
V	0	-0.00682	-0.08337	-0.34303	-0.02693	-0.1565

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Table 18 shows the cointegration formula with the maximum log likelihood.

Thus, the final co integration equation can be written as

$$\ln gdp = 0.73\ln travel + 0.77\ln travel - 1.08\ln index + 0.23\ln pop - 0.89\ln worklose - 4.21937.$$

Through the co integration relationship, we can see that the long-term equilibrium relationship between economic vitality and local government expenditure, local tourism revenue and local resident population is positive;

There is a long-term negative correlation between economic vitality and local residents' living index and local unemployment rate. According to the test results (see Appendix 1), write the VEC model as

$$\Delta Y_t = \alpha ECM_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-1} + \xi$$

The specific coefficients are described as follows:

$$\Delta LY_t = \begin{bmatrix} 0.005 \\ 0.089 \\ 0.077 \\ -0.018 \\ 0.234 \\ 0.043 \end{bmatrix} + \begin{bmatrix} -0.459 \\ -0.061 \\ 0.130 \\ 0.125 \\ -0.052 \\ -0.201 \end{bmatrix} \Delta LY_{t-1} + \cdots + \begin{bmatrix} 0.004 \\ 0.088 \\ 0.076 \\ -0.018 \\ 0.233 \\ 0.043 \end{bmatrix} VECM_{t-1} + \xi_t .$$

In the formula

$$LY_t = (LY1_t, LY2_t, LY3_t)',$$

The last remainder is

$$VECM_{t-1} = \ln gdp - 0.73\ln travel - 0.77\ln travel + 1.08\ln index - 0.23\ln pop + 0.89\ln worklose + 4.21937.$$

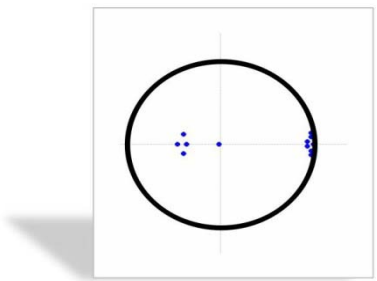


Figure 15: Unit root test

Figure 15 is the AR root test. The absolute value of the root is less than one, that is, all the roots are in the plane of the unit circle, and the stability test of the model is passed. The impulse function is applied to the model to observe the long-term and short-term effects of economic policies on economic vitality.

It can be seen from Figure 16 that the promotion effect of economic policies on economic vitality gradually declines after 1-3 periods, and the economic vitality has increased since the third period, Because the experience of implementation after the implementation of economic policies can be applied, which has a secondary effect. After the fourth period, the promoting effect gradually decreased, the decreasing

3) Analysis of VEC Model

Before analyzing the model, we need to use the AR root graph method to test the stability of the model, Then, according to the experimental results, the impulse response of VEC model is given, and the long-term and short-term effects of policy implementation on economic vitality are given under certain circumstances.

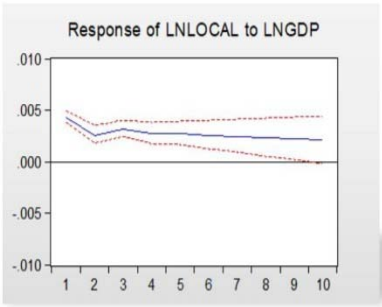


Figure 16: impulse response

trend was relatively slow, and the long-term positive correlation effect continued.

d) The model of problem 3

This section aims at question 3. Firstly, we establish a scientific economic vitality index system as the standard of data selection. Secondly, the minimum average difference method is used to screen the data, and the index is initially extracted; Further, the factor analysis method is used to select the main influencing factors, and finally the comprehensive score of each factor is weighted to give the ranking of urban economic vitality.

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The construction principle of index system of economic vitality

In order to select effective data to measure the economic vitality of each city, the following five principles are given in this paper, and the general process is as follows:

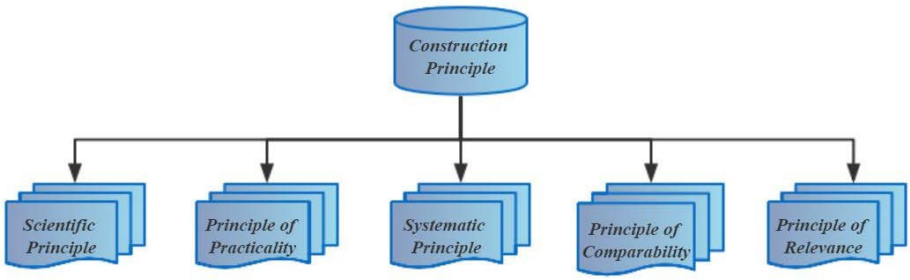


Figure 17: Selection of indicators

1) *Scientific Principle:* The selection of measurement indicators must be based on scientific principles, and can truly and objectively reflect the impact of various factors on urban economic vitality. The scientific comprehensive index evaluation system of urban economic vitality is the basis of correct analysis and evaluation of regional economic vitality.
2) *Principle of Practicability:* The construction of evaluation index system is mainly theoretical analysis, which will be affected by the data sources of each index in practical application. Therefore, the availability and reliability of data sources should be ensured in the process of re selecting indicators.
3) *Systematic Principle:* There should be a certain logical relationship between indicators, which should not only reflect economic vitality from different aspects.
4) *Principle of Comparability:* The data of each city should conform to comparability, so the data of each city can be compared horizontally and vertically.
5) *Principle of relevance:* The comprehensive evaluation index system of regional economic vitality should be an organic combination of a series of related indexes.

i. *Data filtering*

The minimum mean square deviation method is used to screen the preliminary data. The observation, value is x_{ij} , where *i* is the number of evaluation objects, i.e. the number of cities, *j* is the number of evaluation indexes, there are 19 cities, each city has 14 indexes. First, the average value and mean square deviation of index j are calculated.

$$\begin{cases} \overline{x_j} = \dfrac{1}{n}\sum_{i=1}^{n} x_{ij}, \\ S_j = \sqrt{\dfrac{1}{n}\sum_{i=1}^{n}(x_{ij} - \overline{x_j})^2}. \end{cases}$$

Then the minimum mean square deviation of all indexes is calculated, such as:

$$s_{j_0} = \min_{1\le j\le m}\{s_j\}$$

If the minimum mean square deviation is close to 0, then the index be eliminated and calculated in turn. x_j corresponding to S_j can

Finally, 9 indexes meeting the requirements can be selected from 14 indexes, namely, local GDP, financial expenditure, added value of the primary industry, added value of the tertiary industry, real estate investment, number of college students, population, per capita wage and road traffic noise level.

e) Factor Analysis

Using factor analysis method, the extracted nine indicators, including 190 sample data from 19 cities in 2009-2018, are dimensioned down, and then the coefficient matrix is multiplied by the standardized factor to calculate the score and find out the factors that have the greatest impact on economic vitality.

$$F_i = \alpha_{i1}x_1 + \alpha_{i2}x_2 + \cdots + \alpha_{ip}x_p, (p = 1, 2, \cdots, m).$$

Where Fi is the score of the i factor; x1, x2 , xp is the standardized value of the index; the corresponding coefficient is the comp-onent score co-efficient; The total factor score is equal to the weighted arithmetic mean of the scores of each factor, that is:

$$F = \sum_{i=1}^{10} b_i F_i$$

Where is the total factor score, Fi is the score of the first influencing factor; Bi is the contribution of the first factor, and factor contribution = variance contribution rate / total variance interpretation after the factor rotation.

f) Measurement of economic vitality of regional cities

Before measuring the economic vitality of each city, the relationship between variables and factor analysis is further verified through the variance of common factors.

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Table 13: Common factor variance extraction

	Initial	Extraction
Local GDP	1.000	0.943
Financial expenditure	1.000	0.923
Primary industry	1.000	0.730
The tertiary industry	1.000	0.965
Real estate investment	1.000	0.826
Population size	1.000	0.908
Per capita wage	1.000	0.908
Road traffic noise level	1.000	0.725

The common factor variance can effectively reflect the strength of its interpretation ability.

The larger the common factor variance extracted between variables, the stronger the ability to be interpreted by the common factor.

Most of the variable factors proposed by the extracted common factor variance are explained to a higher degree than 70%.

Therefore, the extraction effect is better, the information of the original data loss is less, and the data extracted is more reliable.

For the factor whose characteristic root is greater than 1, data analysis is carried out based on SPSS software, and two factors are finally obtained, as shown in the table below, with the explanation of total variance.

Table 20: Total variance

Component	Total	Cumulative%	Cumulative%
1	4.196	46.618	41.315
2	2.390	73.174	73.174
3	0.940	83.622	
4	0.859	93.168	
5	0.403	97.641	
6	0.147	99.271	
7	0.048	99.807	
8	0.017	100.00	
9	2.134E-16	100.00	

From Table 20, it can be seen that the cumulative variance contribution rate is 73.174%, indicating that the first two factors contain 73.174% of all indicator information, and the extracted information is large and highly representative. Therefore, it can be seen that factor analysis is effective in extracting original variable information.

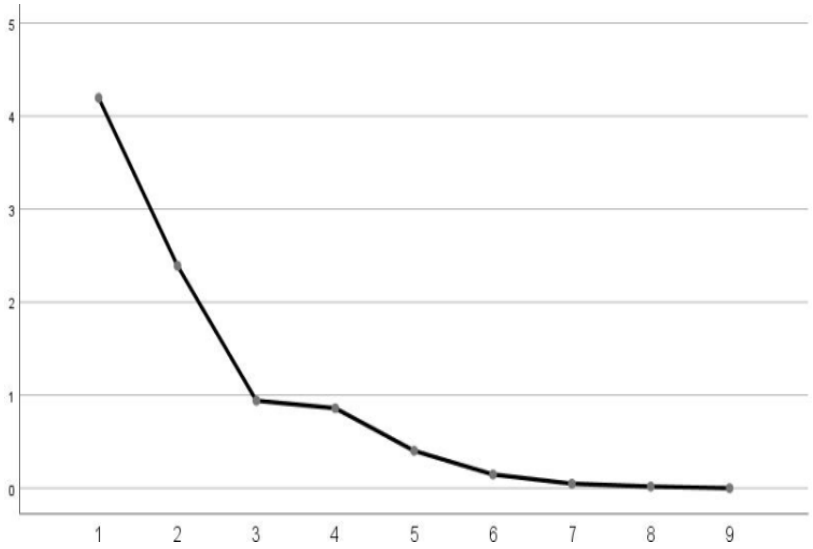


Figure 18: Gravel map

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It can also be seen from the gravel map that the information contributed by the first two factors in the overall influence factors represents that the broken line is relatively steep, and the slope of the broken line is relatively gentle after that, so it can be considered that the two factors extracted are relatively reasonable.

Table 21: Component matrix

Level	1	2
Local GDP	0.877	-0.418
Financial expenditure	0.837	-0.472
Primary industry	0.338	0.785
The tertiary industry	0.838	-0.511
Real estate investment	0.907	-0.058
College Students	0.328	0.221
Population size	0.700	0.647
Per capita wage	0.700	0.647
Noise level	0.002	-0.475

It can be seen that the primary industry, tertiary industry, college students, population and road traffic noise level are factor 1, which reflects the level of social production and security. Therefore, factor 1 can be named as social production and security factor; local GDP, financial expenditure, real estate investment and per capita wage are factor 2, which reflects the government regulation and control. Therefore, the Factor 2 is called government regulation factor. The contribution rate of factors is analyzed by the method of normal maximization variance, and the conversion correlation coefficient is obtained, which shows the correlation of two factors.

Table 22: Component transformation matrix

Component	1	2
1	0.858	0.514
2	-0.514	0.858

It can be seen from Table 22 that in the component transformation matrix, the value of component one has changed, and the value of component two has also changed. It is necessary to extract the component matrix of the factor load matrix.

Table 23: Component score coefficient matrix

Name	1	2
Local GDP	0.269	-0.043
Financial expenditure	0.273	-0.067
Primary industry	-0.100	0.323
The tertiary industry	0.281	-0.081
Real estate investment	0.198	0.090

According to the component score coefficient matrix, local GDP, fiscal expenditure, tertiary industry, tertiary industry and real estate investment have a positive impact on the ranking; the primary industry has a negative impact on the ranking. The expression of each influence factor is given according to Table 23.

$$F_1 = 0.269x_1 + 0.273x_2 - 0.1x_3 + 0.281x_4 + 0.198x_5$$

$$- 0.02\ x_6 + 0.04\ x_7 + 0.04\ x_8 + 0.102\ x_9,$$

$$F_2 = -0.043x_1 - 0.067x_2 + 0.323x_3 - 0.081x_4 + 0.09x_5$$

$$+0.119x_6 + 0.318\ x_7 + 0.318\ x_8 - 0.170\ x_9.$$

Taking the variance contribution rate of each factor as the weight, the weighted analysis is carried out. After weighted average, the growth index scores are as follows:

$$ECO_{it} = 0.42315F_1 + 0.31859F_2.$$

The final weight value of each influencing factor is obtained by factor analysis, and the comprehensive score of each factor is obtained by factor score

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weighting function. The sub factor ranking and comprehensive factor ranking of each city are shown in Table 24.

Table 24: Score ranking

Ranking	Region	F1	F2	ECO
1	Shanghai	3.6862	-0.39976	1.395594
2	Beijing	3.29621	-0.30356	1.265118
3	Shenzhen	1.74076	-1.65827	0.190887
4	Guangzhou	1.44806	-0.04957	0.582473
5	Tianjin	0.95879	-0.03063	0.386366
6	Chongqing	0.71899	4.61688	1.767943
7	Wuhan	0.6182	0.05686	0.273524
8	Chengdu	0.41483	0.93521	0.469336
.	.	.	.	.
13	Changsha	-0.08978	-0.2578	-0.11923
14	Qingdao	-0.11201	-0.13905	-0.09058
15	Ningbo	-0.2036	-0.56477	-0.26405
16	Dongguan	-0.45746	-0.10278	-0.22174
17	Shenyang	-0.55388	-0.49867	-0.38771
18	Kunming	-0.72876	-0.11422	-0.33748
19	Suzhou	-0.8454	-0.05926	-0.36816

It can be seen from the ranking table that the cities such as Beijing, Shanghai and Guangzhou rank the second, third and fourth respectively in the ranking, which indicates that the central economic zone of the country has high stability and is not easy to change. The highest ranking is Chongqing. Shenyang is ranked next, and the transfer of its industrial center may be one of the reasons for this result.

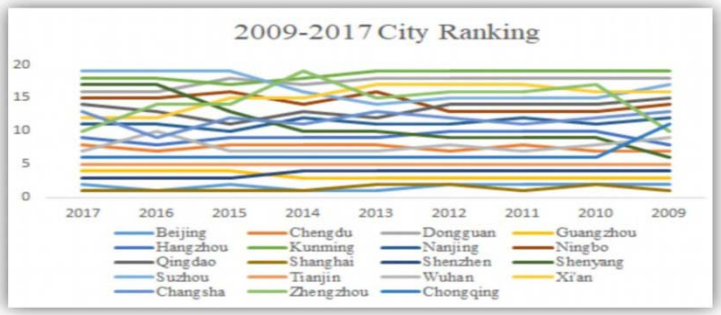


Figure 19: Regional rankings over the past decade

It can be seen from Figure 19 that the ranking of Kunming and Ningbo fluctuates greatly. Considering that the local industrial structure is not obvious enough, it is necessary to strengthen the industrial structure adjustment to improve its economic vitality. Shenyang's ranking is declining year by year, which may also be related to local policies and development strategies, so it needs to be noticed in time.

g) Comparative analysis of factors affecting economic vitality

In the above, according to the factor analysis method, two main factors that affect economic vitality are social production and security factors and government regulation factors, which have a positive correlation with economic vitality.

According to the 9 influencing factors selected above, the secondary industry, house price, total retail sales of social goods, number of hospitals and number of post offices all have a positive impact on the economic vitality. Comparative analysis is made on each factor to see if there is any difference.

1) Model Establishment

In order to test the accuracy of the index system established to measure economic vitality, considering that the individual effect of each index is not observable and the time effect is not observable, a panel data model is established to test it, and the following model is established:

$$eco_{it} = \alpha + \lambda_t + x_{it}\beta + \varepsilon_{it}.$$

In the formula, eco_{it} is a comprehensive index system to measure economic vitality, x_{it} is an

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independent variable of N rows and K columns. The factors affecting economic vitality can be divided into

- Social security system: Number of hospitals and Post offices.
- Processing and production: The secondary industry.
- Consumption level: house price, total retail sales of social goods.

2) Descriptive statistics

In order to analyze the regional economic vitality more specifically, it is necessary to understand the distribution characteristics of each data.

Through descriptive statistical analysis of the data, the basic information of each variable (including sample number, mean value, standard deviation, minimum value and maximum value) is obtained as shown in the Table 25.

In order to analyze the regional economic vitality more specifically, it is necessary to understand the distribution characteristics of each data.

Through descriptive statistical analysis of the data, the basic information of each variable (including sample number, mean value, standard deviation, minimum value and maximum value) is obtained as shown in the Table 25.

Table 25: Sample description

Variable	N	Mean	Std.Dev	Min	Max
ECO	190	0.0378	0.52172	-0.69594	1.76794
The secondary industry	190	4121.7130	1882.6090	824.59	9732.54
housing price	190	10072.9401	6383.3838	3442.00	47936.00
Total retail sales	190	4194.3943	2340.76137	956.40	12668.70
Number of hospitals	190	402.517	279.8720	101.0	1606.0
Number of post offices	190	1048.345	1847.4835	131.0	16374.0

It can be seen from Table 25 that the average value of eco is close to 0, indicating that the statistical effect is very good. The fluctuation of house price is large, which is in line with China's national conditions. The number of hospitals is quite different, which deserves the attention of local government. The number of post offices is on the high side in some areas, resulting in waste of resources.

3) Correlation analysis

Table 25 is the basic situation of the data. After the description and statistics of the data, the correlation analysis of the data is carried out. If the correlation of some indicators is too low, it may lead to the low chi square significance value, which needs to be screened. Then, Pearson correlation coefficient is selected to measure the correlation between the variables.

If the correlation between the explained variables and the explained variables is high, the study of the model is intentional However, if the correlation between explanatory variables is too high, it may lead to collinearity among variables, which may affect the results of the model. The following studies the correlation between the two variables, analyzes the correlation between the two variables and tests its significance.

Table 26: Correlation Analysis

Correlation	ECO	The secondary industry	Housing price	Retail sales	Number of hospitals	Number of post offices
ECO	1	0.728	0.287	0.842	0.723	0.732
The secondary industry	0.728	1	0.517	0.737	0.346	0.548
Housing price	0.287	0.517	1	0.555	0.151	0.345
Retail sales	0.842	0.737	0.555	1	0.320	
Number of hospitals	0.723	0.346	0.151	0.320	1	0.482
Number of post offices	0.732	0.548	0.345	0.661	0.482	1

From the correlation analysis results of Table 26, it can be concluded that the correlation coefficients between all explanatory variables and the interpreted variables are significant, and there is no strong correlation between the explanatory variables.

Therefore, there is no multicollinearity between the explanatory variables. In order to further study the collinearity among the validation variables, the model was validated by using the VIF test, and the results are shown in the Table 27.

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Table 27: VIF test results

	t	Saliency	Tolerance	VIF	1/VIF
Constant	-36.622	0.000			
Added value of Secondary industry	5.175	0.000	0.404	2.473	0.404
Housing price	-3.072	0.000	0.513	1.950	0.513
Number of Hospitals	19.921	0.000	0.581	1.720	0.581

It can be seen from the table that the VIF value of the explanatory variable and the control variable is less than 5, that is to say, the multicollinearity among the variables is low, which will not have a great impact on the results of the model. Therefore, the following modeling and regression analysis can be continued. Continue with the residual analysis

Table 28: VIF test results

	Sum of squares	Freedom	Mean square	*F*	Saliency
Regression	48.802	5	9,760	679.722	0.000
Residual	2.642	184	0.014		
Total	51.444	189			

From the analysis of variance, it can be seen that the F value is far greater than 1, which shows that the differences among the factors are statistically significant, that is, the interaction effect among the factors is more significant. Fixed effect model and mixed model are tested by F test, random effect model and mixed model are tested by BP test, fixed effect model and random effect model are tested by Hausman test, and they are compared:

Table 29: Residual analysis results

F test		BP test		Hausman test	
Detection value	*p*	Detection value	*p*	Detection value	*p*
9.46	0	3041.69	0	125.3	0

According to the model test results, if the p value corresponding to the F test is 0, less than 0.05, it means that the fixed effect model is due to the mixed model;

If the p value corresponding to the BP test is also 0, less than 0.05, it means that the random effect model is better than the mixed model;

If the p value corresponding to the Hausman test is 0, it means that the fixed effect model tends to be selected. See Table 30 for regression results of fixed effect model to be selected after inspection:

Table 30: Fixed effect regression results

ECO	Coef	*p*
F1	0.41315	0
F2	0.31859	0
Added value of secondary industry	0.000659	0
Housing price	0.00893	0.0007
Retail sales of social goods	0.0156	0.001498
Number of hospitals	0.00755	0.135
Number of post offices	0.00149	0.043

From Table 30, we can see the regression results of the model, and the fixed effect model is selected after the test. The correlation coefficients of the first principal component, the second principal component, the second industry, the house price, the retail sales of social goods, the number of hospitals and the number of post offices are all positively correlated with Eco, indicating that they all have a positive impact on economic vitality. From the perspective of economic vitality, the secondary industry, house price, retail sales of social goods, number of hospitals and number of post offices are all positively related to economic vitality. In these variables, when one variable changes, the other variables remain unchanged, then the economic vitality changes in the same direction. Therefore, it can be further proved that the economic vitality index system

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constructed in this paper can accurately measure the economic vitality.

IV. A Development Plan Based on the Perspective of the Decision Maker

This section first reviews questions 1 to 3 above, and obtains the general universality of the model established in this paper. Finally, according to the results, it proposes measures conducive to improving economic vitality and promoting economic development.

a) Conclusion review

From question 1 to question 3, we can roughly divide the index system of urban economic vitality into indicators of economic growth, indicators of attractiveness to capital and production factors, indicators of employment and residents' quality of life, indicators of innovation capacity and indicators of intellectual property protection.

Which chose the per capita GDP, fiscal revenue, education and human capital, income levels, employment, innovation and intellectual property rights protection for data collection, processing, modeling and analysis, and it can analysis indicators and economic vitality all remain positive correlation, therefore, we can analysis from the perspective of the above and advise the sustainable development of the economic vitality of benign and stronger regional competitiveness.

Suggestions on the benign sustainable development of Beijing's economic vitality

Economic vitality includes not only the speed, stability and results of economic growth, but also the average quality of life of the people, such as the level of education and health standards, as well as the overall progress of the economic structure and social structure.

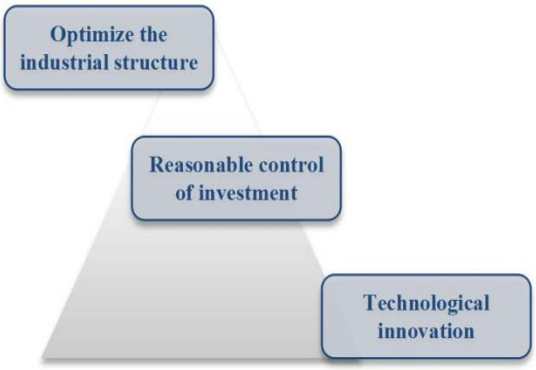


Figure 20: ORT development strategy

In view of the excessive factors affecting economic vitality, we roughly divide the policy into three parts, including optimizing industrial structure (O), rationally controlling investment intensity (R) and technological innovation (T), namely ORT development strategy.

b) Optimizing the industrial structure

1) Vigorously developing the tertiary industry

The third industry is an important indicator of a country's economic development. And the tertiary industry has the characteristics of less investment, short cycle, quick effect and high wages of employees. Vigorously developing the tertiary industry can rapidly expand employment fields and jobs, avoid labor surplus, and improve residents' income. For modern cities, residents not only have material needs, but also pursue spiritual level. This development trend promotes the region to continuously develop new industries to meet the needs of the people, so as to improve residents and to improve the quality of life. Therefore, we vigorously develop the tertiary industry, which has a significant role in promoting the sustainable development of economic vitality.

c) Strengthening the development of primary and secondary industries

For the adjustment of Beijing's economic structure and the promotion of its regional competitiveness, it is necessary to develop the tertiary industry while strengthening the primary industry and expanding the scale of the secondary industry. The first industry is the basic industry of the national economy, strengthening the first industry, and laying the foundation for the development of the second industry and the third industry.

d) Reasonable control of investment

Investment is an important part of GDP, but also an element of economic vitality. The growth of investment is of great significance to the promotion of economic vitality. In China, investment is mainly divided into private investment, government investment and foreign investment. From the perspective of Beijing, as a first-tier city, a large number of foreign enterprises and state-owned enterprises invest in Beijing in various forms. However, unreasonable investment may cause the princess of resources, leading to the imbalance of social and economic development. Therefore, Beijing

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should control the scope of investment and improve the efficiency of investment.

e) Technology innovation

Science and technology are the primary productive forces, and innovation is a force that can not be ignored to drive economic development. Innovation is conducive to the optimization and transformation of China's economic growth mode. Economic vitality comes from the sound growth of economy.

We should strengthen the policy support for the investment in science and technology of enterprises, guide the flow of resources such as projects, funds and talents to enterprises, and establish an innovation support system with enterprises as the main body. Cultivate and develop the next generation Internet, new generation mobile communication, Internet of things, navigation and location services, biomedicine and other high-tech strategic emerging industries. Accelerate the construction of high-end talents gathering special zone, and actively introduce and cultivate high-end talents.

V. Model Evaluations

a) Advantages

The advantages and disadvantages of model factor analysis and panel data model are analyzed.

1) Factor analysis: Through dimensionality reduction of a variety of impact indicators, the main factors are extracted from the complex factors, and a few factors are used to describe the relationship between many indicators, that is, several closely related indicators are classified into the same category, each category of indicators becomes a factor, and the economic vitality is measured by a few factors. It simplifies the problem, measures most of the information of economic vitality, and gets more scientific and accurate information at the same time.
2) Panel data model: Compared with the traditional time series model, the panel data model can provide more data points, increase the degree of freedom of data and reduce the degree of collinearity between explanatory variables, thus improving the effectiveness and accuracy of model estimation; Panel data model is more conducive to reflect the randomness of the gap between individuals. In this paper, panel data model can not only reflect the information between the given factors, but also reflect the information of a certain factor through the study of other influencing factors.

b) Improvements needed

When using panel data model to study influence factors, there are some difficulties in variable design and data collection, some errors in factor prediction, and selection difficulties in influence factors; panel data analysis of time series of factors is short, which can only reflect the data characteristics in the short term, not the long-term changes of factors.

VI. Promotion and Application of the Model

In this paper, three models are established: Panel Data Model (fixed effect model and random effect model), Avr-Ave model, and principal component index system model. The Var-Vec model has great generalization. Applicable fields are:

Research on agricultural economic development based on var. Because of its unique ability to test the dynamic fluctuation, AVR can solve the research difficulties in the agricultural economy which are greatly affected by the quarterly seasonality.]

Oil price evaluation. International oil has been affected by many aspects, among which the fluctuation of international political content has a great impact. The VAR model can highlight the impact of oil price changes in the short term and make adjustments at any time.

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Effets Économiques de la Pandémie de Covid-19 Dans la CEMAC

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Abstract- This paper analyzes the effects of Covid-19 on the economies of the CEMAC countries. In order to do so, our study was based on the estimates and forecasts of the International Monetary Fund (IMF, 2020). This work uses a descriptive approach to describe the effects of the covid 19 pandemic on CEMAC economies. It emerges that the covid-19 pandemic has a negative impact on the economy of the subregion. Four indicators were selected to analyze this negative impact. They are oil prices, economic growth, external debt and external trade. With regard to the price of oil, it appears that the price of oil will fall from $27 per barrel at the beginning of the year to $13 per barrel by the end of 2020. With regard to economic growth, CEMAC countries are expected to experience an economic recession in 2020 marked by a growth rate of -3.7%.

Keywords: *covid-19, impacts, economic growth, external debt, foreign trade.*

GJMBR-B Classification: *JEL Code: M29*



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Effets Économiques de la Pandémie de Covid-19 Dans la CEMAC[1]

TIMBI Sézard [α], Ambassa Martin [σ] & Tagne Joel Stephan [ρ]

Résumé- Le présent article analyse les effets de la Covid-19 sur les économies des pays de la CEMAC. Pour y parvenir, notre étude s'est fondée sur les estimations et les prévisions du Fonds monétaire international (FMI, 2020). Ce travail d'utiliser une approche descriptive pour décrire les effets de la pandémie de la covid-19 sur les économies de la CEMAC. Il ressort que la pandémie de covid-19 impacte négativement l'économie de la sous-région. Quatre indicateurs ont été retenus pour analyser cet impact négatif. Il s'agit du prix du pétrole, de la croissance économique, de la dette extérieure et du commerce extérieur. Au sujet du prix du pétrole, il ressort que le prix du pétrole chutera de 27$ le baril en début d'année à 13 $ le baril en fin 2020. S'agissant de la croissance économique, les pays de la CEMAC devront enregistrer en 2020 une récession économique marquée par un taux de croissance de -3.7%. En ce qui concerne la dette extérieure, il ressort que les pays de la CEMAC enregistreront un creusement de la dette de 6.8% du PIB pour se situer à 38.1% du PIB en fin 2020 contre 32.4 en 2019. Enfin, relativement à l'impact sur le commerce extérieur les pays de la CEMAC enregistreront une contraction des exportations à hauteur de 8.9% du PIB.

Motsclés: covid-19, impacts, croissance économique, dette extérieure, commerce extérieur.

Abstract- This paper analyzes the effects of Covid-19 on the economies of the CEMAC countries. In order to do so, our study was based on the estimates and forecasts of the International Monetary Fund (IMF, 2020). This work uses a descriptive approach to describe the effects of the covid 19 pandemic on CEMAC economies. It emerges that the covid-19 pandemic has a negative impact on the economy of the subregion. Four indicators were selected to analyze this negative impact. They are oil prices, economic growth, external debt and external trade. With regard to the price of oil, it appears that the price of oil will fall from $27 per barrel at the beginning of the year to $13 per barrel by the end of 2020. With regard to economic growth, CEMAC countries are expected to experience an economic recession in 2020 marked by a growth rate of -3.7%. With respect to external debt, CEMAC countries will see their debt increase by 6.8% of GDP to 38.1% of GDP by the end of 2020, compared to 32.4 in 2019. Finally, with respect to the impact on external trade, CEMAC countries will experience a contraction in exports of 8.9% of GDP.

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Keywords: covid-19, impacts, economic growth, external debt, foreign trade.

I. Contexte

Dans les faits, le 31 décembre 2019, s'est déclenchée dans la région de Wuhan en Chine la maladie à coronavirus 19 (dorénavant la Covid-19). Celle-ci s'est rapidement propagée à travers le monde et a fait de nombreuses victimes. A ce jour (21 janvier 2021), l'on dénombre plus de 2,058,227 décès à l'échelle mondiale et 95,321,880 de cas enregistrés depuis sa survenue malgré les mesures barrières et de confinement mises en place dans les pays (OMS, 2020). S'agissant précisément des pays de la CEMAC, l'on dénombre à ce jour 59 179 cas et 898 décès (World0meter, 2021)

La lutte contre cette pandémie a favorisé l'instauration de plusieurs mesures et des décisions qui semblent cependant impactée négativement sur l'économie mondiale. Pour illustration, de nombreuses révisions économiques ont été faites. Le FMI (2020) prévoit par exemple une baisse du taux de croissance économique mondial de 0,3 point, passant de 3,3 à 3% cette même année. Il prévoit une baisse de 6, 1 % du taux de croissance dans les pays avancés et 1% dans les pays émergents et en développement. De même, il prévoit une contraction de 1,6%[2] en Afrique Sub-saharienne. Quant à L'OMC (2020), le commerce chuterait entre 13% et 32% en 2020. En outre, l'UNCTAD[3] (2020) prévoit une révision des gains des plus grandes entreprises multilatérales et suggère que les flux d'investissement direct étrangers pourraient baisser entre 30% et 40% courant 2020-2021. Cette révision à la baisse des prévisions affecte toutes les régions du monde.

Au plan théorique, la question des impacts de la covid-19, a fait l'objet de nombreux débats pluridisciplinaires. Dans le domaine économique, de manière générale, une quasi-unanimité semble émerger sur les effets négatifs de la Covid-19 bien que des aspects avantageux peuvent être relevés. Pour illustration, les travaux de Bizoza et Siboman (2020).

[1] Papier présenté à la Conférence du 19 novembre 2019 à l'occasion des 12e Journées d'Excellence de la Faculté des Sciences Economiques et de gestion de l'Université de Ngaoundéré.

[2] Une baisse de 5,2 points par rapport aux prévisions de 2019.
[3] The United Nations Conference on Trade and Development

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révèlent que, le commerce extérieur et les PME devraient être négativement affectés par la Covid-19. Maliszewska et Mattoo (2020) trouvent que, l'économie mondiale devrait enregistrer une baisse du produit intérieur brut de 2% par rapport à la référence mondiale, de 2,5% pour les pays en développement et de 1,8% pour les pays industriels. Par ailleurs, ils indiquent que les baisses sont près de 4% inférieures à la référence mondiale dans une pandémie amplifiée.

De manière singulière, les pays de la CEMAC[4], sont à cet effet confrontés à des impacts négatifs de la Covid-19 pour au moins deux raisons. La première raison, est liée au fait que les pays de la CEMAC sont fortement dépendants des recettes pétrolières. Cependant, le prix du pétrole a enregistré une forte baisse. La deuxième raison est liée au fait que comme dans tous les pays du monde, les pays de la CEMAC ont fermé leurs frontières terrestres, aériens maritimes et routières paralysant ainsi, le tourisme, le commerce et les recettes fiscales. Face à ce contexte marqué par une contraction de la demande et une réduction de la productivité, une question émerge: *quels sont les effets macroéconomiques de la pandémie de covid-19 sur les pays de la CEMAC ?*

II. Problématique

De nombreux travaux ont tenté d'expliquer les dysfonctionnements intervenus au sein des économies du fait des pandémies. Ces implications économiques de la flambée sont généralement appelées "Coronanomics" (Eichengreen, 2020), ou encore le "Cygne noir" (Petro, 2020). Suivant la vision macroéconomique, la covid-19 est une pandémie à grande échelle dont les effets se font sentir dans des économies entières ou dans des régions plus vastes pour deux raisons. La première tient au fait que l'infection est elle-même répandue, et la seconde à l'idée que le commerce et l'intégration des marchés (marché des capitaux et/ou du travail), finissent par propager le choc économique au-delà des frontières.

Sur le plan théorique, les effets de covid-19 peuvent être étudiés dans le cadre d'une part des théories qui ont mis en évidence les effets négatifs des pandémies ou des catastrophes naturelles sur l'économie et dans le cadre du modèle DA-OA notamment la théorie néo-keynésienne des chocs d'offre et de la demande d'autre part. Par exemple, Peckham (2013) et Jordà et al. (2020) étudient les effets macroéconomiques des pandémies à partir de la théorie des transmissions des crises.

Selon cette approche, les effets macroéconomiques des crises sont le produit de la contagion issue de la propagation du choc sanitaire d'un pays à un autre. Toutefois, deux courants s'opposent sur cette transmission des crises. D'une part, les partisans des théories contingentes qui montrent l'existence d'un phénomène de contagion pendant une crise particulière (Kaminsky et Reinhart, 1999) et d'autre part, les défenseurs de la théorie non contingente des crises qui remettent en cause cette existence en expliquant la transmission des chocs par les interdépendances normales entre les pays (Masson, 1999; Forbes et Rigobon, 2002).

Le modèle DA-OA est quant à lui le modèle de base d'études des fluctuations économiques (Mankiw, 2013). Par hypothèse, les pandémies peuvent être ressenties comme des chocs transitoires à la baisse du taux naturel sur de tels horizons. Par exemple, Baldwin et Tomiura (2020) analysent les effets potentiels de la pandémie de la covid-19. Ils soulignent qu'elle est à la fois un choc de demande et un choc d'offre. Du fait d'une pandémie, des chocs de demande négatif (la modification à la baisse des richesses des individus ou encore la baisse voire la stagnation des dépenses publiques de l'État) déplacent la courbe DA vers la gauche entrainant un ralentissement de l'activité économique. De plus, des chocs d'offre négatif tels que la hausse des prix des matières premières accroît les coûts de production et réduit la quantité que les producteurs sont disposés à offrir à n'importe quel niveau de prix, ce qui déplace la courbe d'offre agrégée de court terme vers la gauche, entraînant un ralentissement de l'activité économique.

Sur le plan empirique, l'impact économique de la covid-19 peut être abordé sous deux prismes. Le premier met en évidence les effets sur les objectifs de la politique économique résumé dans le carré magique de Nicholas Kaldor à savoir la croissance économique, la stabilité des prix, le chômage et l'équilibre extérieur. Le second prisme analyse les effets sur les différents marchés à savoir le marché des biens et services, le marché du travail, le marché des capitaux ou des fonds prêtables, le marché de la monnaie et financiers. Nous privilégions la deuxième option dans le cadre de cette présentation. L'analyse de ces effets se fera, par ailleurs, à l'aide d'un parallèle avec les effets économiques des catastrophes naturelles ou des pandémies passées. Sur la loi de Walras, nous abordons l'effet sur les trois premiers marchés

Premièrement, il existe un quasi-consensus de l'effet du covid-19 sur le marché des biens et services. Correia et al. (2020) estiment que cette pandémie a réduit l'activité manufacturière d'environ 20%, tandis que Barro et al. (2020) estiment que l'impact négatif sur le PIB est globalement d'environ 6 à 8%. Baldwin et Tomiura (2020) trouvent que la covid-19 a ralenti considérablement les flux commerciaux agrégés et

[4] CEMAC est la Communauté Economique et Monétaire d'Afrique Centrale regroupe six pays qui sont le Cameroun, le Congo, le Gabon, la Centrafrique, la Guinée Equatoriale, et Tchad. La CEMAC compte à ce jour 593 décès (OMS, 2020)

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qu'une détresse manufacturière et une contagion du côté de l'offre sont imminentes en raison de distorsions de la chaîne d'approvisionnement international. Mckibbin et Fernando (2020) trouvent une chute de l'économie américaine de 4.8% au cours du premier trimestre avec une contraction de 5% au cours de la même année. La Commission Européenne (2020) estime pour elle un déclin de 7.25% du PIB en 2020, avec tous les pays tombant dans la récession. A travers un choc tel que vécu à cause de la covid-19, la demande d'investissement est susceptible de diminuer, car la pénurie de main d'œuvre dans l'économie supprime le besoin d'investissements élevés. Du fait du confinement, les agents économiques peuvent subir les effets de la covid-19. Les agents vont connaître une baisse du niveau de leur consommation habituelle entraînant une baisse de leur bien-être, une baisse voire une stagnation de leur revenu et donc de leur pouvoir d'achat notamment pour des pays où les agents vivent au jour le jour. Les entreprises vont enregistrer une baisse de leur profit due à la baisse de la production, une augmentation de leurs coûts de production, etc.

Deuxièmement, l'effet de la covid-19 sur le marché des capitaux est avéré. Ces effets peuvent être observés aussi bien sur le marché des capitaux internes (marché du crédit bancaire, marché de l'assurance) ou sur le marché des capitaux internationaux (transferts des fonds des migrants, Investissements Directs Etrangers). En effet, de par leurs natures, les banques sont vulnérables en période de récession économique à cause de la probabilité des prêts non-performants et la possibilité de banqueroute dans des cas extrêmes. Leoni (2013) trouve par exemple que la propagation du VIH dans les pays en développement est associée à des fortes augmentations de la rotation des dépôts. Il attribue cela à la nécessité de payer les traitements individuels forçant des retraits de dépôts à grande échelle. Dans la même veine, Lagoarde et Leoni (2013) développent un modèle théorique qui montre que la probabilité d'un effondrement du secteur bancaire d'un pays en développement augmente à mesure que la prévalence conjointe de groupes de pandémies augmente. Une grande partie des institutions de microfinance et les prêts bancaires aux pauvres subissent des pressions pendant les épidémies car, tous les membres des groupes subiront des pressions, le choc global (Skoupas, 2003). De même, les travaux de Jordà et al. (2020) indiquent qu'à moyen et long terme la covid-19 entrainera une récession économique avec des taux de rendements réels sensiblement déprimés. Ainsi, les pandémies conduisent à une rareté ou à passage à une épargne de déprimés. La survenue d'une pandémie crée des perturbations sur le fonctionnement interne des économies à travers la baisse des flux de capitaux tels que les transferts de fonds et les investissements directs étrangers. Le FMI (2020) estime que la baisse des transferts de fonds des pays à revenus élevés aux pays à revenus moyens à des impacts négatifs dans plusieurs pays en développement alors que Bloom et al. (2018) ont analysé les effets potentiels du covid-19 en rapportant une baisse des IDE.

Troisièmement, la covid-19 a des effets non négligeables sur le marché du travail. En effet, du fait de la fermeture des activités, spécialement dans les populations à faibles revenus, les économies nationales se contractent conduisant à une hausse dramatique du taux de chômage et de la pauvreté. La Banque Mondiale (2020) estime par exemple que 11 millions de personnes tomberont dans la pauvreté en Asie de l'Est et du Pacifique. En se référant au modèle théorique de Mortensen et Pissarides (1994) qui décrit les fluctuations globales du chômage, il est possible d'établir le lien entre la pandémie du Covid-19 et le marché du travail. Ce modèle suppose d'une part un taux constant de pertes d'emplois et d'autre part la neutralité des travailleurs et des entreprises vis-à-vis du risque (Shimer, 2005). Dans cette situation, les chocs orientent les décisions des employeurs en matière de création d'emplois et fluctuations du chômage. Ce modèle théorique présente une volatilité du chômage trop faible face au choc global (Costain et Reiter, 2008). En effet, à l'équilibre, le salaire absorbe largement les chocs de productivité du travail. Par conséquent, ces chocs auront peu d'impact sur le niveau d'embauche et de chômage (Mortensen et Pissarides, 1994). Par ailleurs, le modèle de croissance classique suppose que le capital est détruit dans les guerres, mais pas dans les pandémies; les pandémies peuvent induire une relative rareté de la main-d'œuvre et/ou un passage à une épargne de précaution plus importante (Jordà et al. 2020). Une pandémie de grippe devrait entraîner: une baisse de la main-d'œuvre à différents degrés dans différents pays en raison d'une augmentation de la mortalité et des maladies; une augmentation du coût des affaires; un déplacement des préférences des consommateurs des secteurs exposés; et une réévaluation du risque pays à mesure que les investisseurs observent les réponses des gouvernements (McKibbin et Sidorenko, 2006). Toutefois, malgré la compression des effectifs, la covid-19 peut aussi favoriser le développement du télétravail.

III. Méthodologie

Dans le cadre de ce travail, nous analysons les effets de la covid-19 dans les pays de la CEMAC à partir des faits stylisés recueillies des projections, des estimations et des scénarii du Fonds Monétaire International (FMI, 2020). Les données qui ont permis ces analyses proviennent des statistiques des autorités nationales de la CEMAC et de la BEAC. Il revient à cet effet de procéder à une analyse descriptive fondée sur ces estimations.

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IV. Analyse des Effets de la Covid-19 sur les Économies de la Cemac

Avant d'analyser les effets proprement dits, nous jetons un regard sur les mécanismes par lesquels la covid-19 peut affecter les économies de la CEMAC.

a) Les canaux de transmission de la covid-19

L'analyse des effets économiques de la covid-19 sur les économies de la CEMAC peut se faire à l'aide de ses différents canaux de transmission. En effet, perçue comme un choc, la covid-19 peut affecter l'économie à travers une action sur les différentes composantes de la demande globale. En nous inspirant d'un modèle simple d'économie ouverte, trois canaux de transmission de la covid-19 peuvent être relevés à savoir le canal de la demande international et du prix des matières premières, le canal du financement international et le canal de l'offre et de la demande intérieure.

En matière de commerce international, les pays de la CEMAC sont fortement dépendants des pays actuellement touchés par la pandémie à savoir l'Europe et la Chine. Les exportations demeurent très peu diversifiées et sont constituées principalement de produits primaires. La baisse de la demande des principaux partenaires commerciaux et l'effondrement actuel des cours des matières premières impactent sur le volume et la valeur des exportations, l'équilibre du compte courant et des finances publiques.

Les pays de la CEMAC pour le financement de leur économie bénéficient des ressources extérieures de plusieurs sources. Il s'agit notamment des emprunts et des dons (partenaires bilatéraux et multilatéraux), des émissions de bonds, des investissements directs étrangers et autres financements directs et des transferts de migrants. A titre d'illustration, les dons et les emprunts extérieurs ont représentés en moyenne 15 % de l'ensemble des ressources budgétaires des Etats. Ainsi, le ralentissement observé actuellement dans les pays avec la montée du chômage, la baisse des revenus des populations, l'accroissement des charges financières et des partenaires bilatéraux réduisent le volume des financements extérieurs. Toutefois, des financements d'urgence comme ceux de la Banque Mondiale peuvent compenser éventuellement la baisse des ressources extérieures. L'effet sur les transferts des migrants est réel. La persistance actuelle de la crise affecte les capacités financières de la diaspora.

Les effets actuels de la crise touchent l'économie de la région en affectant l'offre de production locale. En effet, le tissu productif local dépend des inputs importés et les biens de production comme les machines-outils. Avec les frictions actuelles que connait la chaine de distribution internationale et l'arrêt de la production dans plusieurs pays, les entreprises locales dépendantes seront impactées ainsi l'offre locale manufacturière. De même, on assiste à une contraction de l'offre intérieure à la suite de l'effritement de la demande intérieure.

En effet, la perte du revenu des ménages du fait des licenciements et du confinement, la baisse des transferts des migrants et la réduction de la commande publique en lien avec la réduction des ressources de l'Etat conduit à une baisse de la demande ce qui a une conséquence sur les services et notamment la branche du transport, du tourisme etc…

b) Impacts de la covid-19 sur les économies de la CEMAC

i. *Impacts négatifs sur les recettes pétrolières*

L'expansion de la COVID-19 à l'échelle mondiale a suscité d'innombrables changements. Ces changements ont eu pour objectif de limiter à la mesure du possible le niveau de contamination de la pandémie. S'il est difficile d'évaluer avec certitude l'efficacité des mesures de confinement et des mesures barrières adoptées dans les différents pays tels que le soulignent les experts, il n'en demeure pas moins que ces mesures ont contribué à limiter la propagation de cette pandémie (OMS, 2020). Au regard des décisions prises pour contenir la pandémie, l'économie mondiale a été confrontée à un ralentissement des activités. Ce ralentissement est à l'origine d'arrêt d'activités dans certains secteurs, un ralentissement d'activités dans d'autres et enfin des dépôts de bilan par ailleurs. Les pays de l'Afrique subsaharienne en général et ceux de la CEMAC en particulier ont été confrontés à ce choc économique. Plusieurs canaux de transmission ont favorisé ce choc économique. Sans être exhaustif on peut citer, la chute des prix de pétrole et la chute des recettes touristiques. Au sujet de la chute des prix du pétrole, le ralentissement de l'activité économique mondiale a entrainé une baisse de la demande de pétrole, ce qui a eu pour effet la chute des prix du pétrole. Tel que le montre la figure 1 ci dessous, le prix du pétrole a atteint son plus bas niveau depuis plusieurs années.

Selon les estimations du PREF-CEMAC (2020), les pertes de recettes pétrolières devraient atteindre 992,5 milliards de FCFA. Par ailleurs, cette dégradation des prix du pétrole entrainerait une baisse de recettes budgétaires d'au moins 0.5% du PIB et une baisse des dépenses publiques à hauteur de 0.9% du PIB. D'autres pertes devraient être enregistrées. Notamment les pertes liées au tourisme. En effet, tous les pays du monde ont procédé à la fermeture de leurs fronctières. Cette décision a favorisé l'arrêt des transports aériens, la fermetures des hôtels et la réduction des échanges commerciaux. Ce qui nécessairement a eu un impact négatif sur les finances publiques. Car, ces pays devraient renoncer aux recettes liées aux taxes à l'hebergement, la restauration, et les activités de service.

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ii. *Impact négatif de la COVID-19 sur la croissance économique dans la CEMAC*

La COVID-19 a eu des effets drastiques sur l'économie réelle. De manière globale, les projections du FMI (2020) révèlent que les pays de la CEMAC en 2020 enregistreront un recéssion économique. En effet, le taux de croissance projetté pour 2020 se situe à -3.7% soit un niveau de recession comparé à l'année 2019 où les pays de la CEMAC ont enregistré un niveau de croissance positive de 2%. Cette performance économique négative est plus importante que celle enregistrée par les pays de l'Afrique Sub saharienne (ASS) en générale, qui se situe à -3.2%. De nombreux facteurs sont susceptibles d'expliquer cette recéssion. En effet, il s'agit de la réduction des activités liées à l'exploitation du pétrole et les activités non pétrolières. Selon les statistiques, les rendements des activités petrolières dans la CEMAC seront de 8% moins important que ce qui avait été envisagé avant la covid-19 du fait de la chute des prix. Cette chute a favorisé la contraction de la demande et la faible mobilisation des recettes pétrolières. Ce qui justifie le fait que la croissance économique soit plus impactée négativement dans les pays tels que le Congo et la Guinée Equatoriale qui affichent des structures économiques faiblement diversifiées. Les performances négatives qu'affichent la croissance petrolière soient -2.6% en 2020 contre 2 % en 2019 dans la CEMAC, confirment les effets négatifs de la COVID-19. S'agissant des composantes non pétrolières, il ressort que cette recéssion économique est tributaire à la réduction des recettes fiscales. En effet, les statistiques nous indiquent qu'avant la COVID-19, les projections des recettes fiscales étaient estimées à 17.5% du PIB. Les nouvelles projections quant à elles nous soulignent que les revenus fiscaux pourraient s'élever à 15.1% du PIB. Soit une réduction des recettes fiscales de 2.4% du pib. Cette perte fiscale est la résultante de la fermeture et l'arrêt des activités dans plusieurs secteurs de l'économie à l'instar du tourisme, du transport aérien et du commerce extérieur.

iii. *Impact négatif de la COVID-19 sur la dette extérieure*

L'expansion de la COVID-19, a entrainé un creusement de la dette publique dans la CEMAC en 2020, les projections du FMI indiquent que la dette publique s'élevera à 38.6% du PIB. Soit une augmentation de la dette de 6.8% du PIB. Cette augmentation de la dette publique est corrélée à une perte de 6 252 milliards FCFA du PIB dans la CEMAC tel que l'illustre la figure 3 ci-dessous. La tendance de la dette publique extérieure avant la Covid-19, oscillait autour de 31% du PIB. Cet accroissement de la dette publique trouve ses fondements d'une part dans la nécéssité des autorités publiques de prendre en charge les frais liés aux dépenses de santé. A ce sujet, l'observation des faits stylisés révèle que la structure des dépenses publiques a été modifiée. En effet, les autorités de la CEMAC ont opté à renoncer à certaines dépenses liées au fonctionnement pour priviligier les dépenses relatives à la prise en charge de la Covid-19. Cet accroissement de la dette extérieure est matérialisé, par les appuis financiers des organismes internationaux tels que le FMI à travers les facilités élargi de crédit rapide et la Banque Mondiale. Il faut noter que le recours des Etats de la CEMAC auprès de ces institutions s'est fait dans un contexte marqué par une forte baisse des prix du pétrole, des conflits civils dans certains pays, des flux de réfugiés et des sécheresses. La croissance économique étant au plus bas depuis 20 ans et les réserves de change régionaux ayant baissé rapidement et ne se trouvant plus qu'à deux mois d'importations.

iii. *Impact négatif de la COVID 19 sur le commerce extérieur*

Les mesures de confinement adoptées pour limiter la Covid-19 ont eu des effets négatifs sur le commerce extérieur. Dans la CEMAC, le niveau d'exportation enregistré est bien plus faible que celui de 2019. En effet, les projections du FMI indiquent qu'en 2020, le niveau d'exportation s'élèvera à 25.4% du PIB contre 34.3% en 2019 soit une réduction de 8.9% (Voire figure 4). Cette réduction des exportations a été principalement marquée dans le secteur pétrolier. En effet en 2020, les exportations pétrolières s'élèveront à 13.4% contre 20% en 2019. Ainsi, l'observation de ces statistiques nous renseigne que la baisse des recettes d'exportation de pétrole ne serait que partiellement compensée par une baisse des importations, à la suite d'une baisse de l'activité et de la demande intérieure. Le solde du compte financier resterait globalement stable, en partie grâce à l'émission précédente d'euro-obligations par le Gabon. Tout en supposant une augmentation significative des financements extérieurs exceptionnel, les réserves extérieures devraient enregistrer une légère augmentation en 2020, bien en deçà des projections et objectifs précédents d'environ 2,3 milliards d'euros à fin 2020. Néanmoins, compte tenu de la réduction projetée des importations de biens et services, la couverture des réserves des importations resterait à environ 3.5 mois des importations de l'année pour 2020. Ceci rejoint les travaux de Maliszewska et *al*. (2020), pour qui, la pandémie du covid-19 a augmenté les coûts du commerce international des importations et des exportations de 25%.

V. Recommandations de Politiques Économiques

Les impacts négatifs de la Covid-19 sur les économies des pays de la CEMAC, nécessitent la mise en œuvre des politiques économiques adéquates. La présente étude formule plusieurs recommandations:

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- Notre étude préconise le desserrement de la politique monétaire dans la CEMAC. En effet, les statistiques nous indiquent une contraction de crédits. La monnaie au sens large est projetée à 2.7% en glissement annuel en 2020 contre 5.9% en 2019. Un desserrement de la politique monétaire tel que la baisse observée du taux directeur de la BEAC qui est passé de 3.5% à 3.25%. En effet, il ressort une contraction du crédit au secteur privé. Le crédit au secteur privé pour 2020 est estime à 6972 milliards FCFA en 2020 contre 6988 milliards FCFA en 2019 ;
- La mise en place des réformes fiscales incitatives. En effet, à la suite des difficultés rencontrées par les entreprises, notre étude suggère que les autorités nationales de la CEMAC instaurent des dépenses fiscales pour des périodes limitées aux secteurs d'activités les plus touchés par la pandémie. Il s'agit par exemple, du tourisme, du transport aérien, de l'hébergement, de la restauration et du secteur pétrolier;
- L'étude suggère la subvention des coûts d'internet par les Etats qui pourrait faciliter le maintien de l'emploi à travers le e-commerce ou encore le télétravail. Par ailleurs, la disponibilité des services numériques permet de renforcer l'efficacité des mesures budgétaires en permettant de développer la déclaration et le paiements des impôts en ligne ;
- Nous suggérons le recours aux stabilisateurs automatiques bénéfique pour les économies de la CEMAC. En effet, les pays de la CEMAC sont caractérisées par une forte présence du secteur informel. Par le fait de la covid-19, la baisse des recettes fiscales qui en découle ne sera pas compensée par une diminution des dépenses. Cette mesure peut donc permettre de stimuler l'économie;
- Notre étude suggère le soutien aux ménages et aux entreprises à travers notamment l'augmentation des allocations familiales afin de leur permettre de moins ressentir les flambées inflationnistes qui peuvent survenir du fait de la pandémie du côté des ménages, des exonérations fiscales et douanières sur les produits de santé du côté des entreprises;
- Les pays de la CEMAC sont majoritairement[5] exportateurs de pétrole. Ils devront, de ce fait, affronter un choc plus long. Il serait dans ce sens judicieux de mettre en place un soutien budgétaire discrétionnaire. Il peut s'agir concrètement d'un soutien aux entreprises dont les activités sont orientées principalement vers l'exportation non seulement du pétrole, mais aussi d'autres matières premières.

[5] En dehors de la République Centrafricaine

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Effect of Product Quality, Promotion and Service on Customer Satisfaction at UD. Bali Rahayu

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Abstract- Customer satisfaction is one of the important things a company maintains in order to maintain business continuity because customer satisfaction will be able to increase profits for the company. This research was conducted to examine the influence between variables of product quality, promotion and service on customer satisfaction at UD. Bali Rahayu. The population in this research is 90 UD customers. Bali Rahayu with the slovin formula. The data collection method in this research uses a questionnaire technique by giving a set of questions to customers using a Likert scale which is then tested by validity and reliability tests and classical assumptions. Multiple linear regression analysis techniques are used in this study by obtaining results where simultaneously and partially product quality, promotion and service have a positive and significant effect on customer satisfaction at UD. Bali Rahayu.

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Effect of Product Quality, Promotion and Service on Customer Satisfaction at UD. Bali Rahayu

A. A. Media Martadiani [α], Dewa Ayu Putu Niti Widari [σ] & Ita Sylvia Azita Aziz [ρ]

Abstract- **Customer satisfaction is one of the important things a company maintains in order to maintain business continuity because customer satisfaction will be able to increase profits for the company. This research was conducted to examine the influence between variables of product quality, promotion and service on customer satisfaction at UD. Bali Rahayu. The population in this research is 90 UD customers. Bali Rahayu with the slovin formula. The data collection method in this research uses a questionnaire technique by giving a set of questions to customers using a Likert scale which is then tested by validity and reliability tests and classical assumptions. Multiple linear regression analysis techniques are used in this study by obtaining results where simultaneously and partially product quality, promotion and service have a positive and significant effect on customer satisfaction at UD. Bali Rahayu.**

I. Introduction

In the current era of globalization, competition in the business world is very fierce, this competition requires business people to be able to maximize their company's performance in order to compete in the market. In facing this increasingly broad industrial competition, it requires companies to change the format of their business strategy. This causes the management of each company to be challenged to try competitively to face competitors (Kotler and Armstrong 2016). One of them is the development of manufacturing companies, many furniture companies are becoming number one companies. This is due to the existence of good sales management in a company. In addition, more and more manufacturing companies, such as in the furniture sector, do not only rely on their version of the product sales system, but they also adjust between the types of wood used and the quality of furniture products.

UD. Bali Rahayu is one of the furniture companies in Badung Regency, UD. Bali Rahayu as an institution that is engaged in selling furniture. UD. Bali Rahayu is located at Tumbak Bayuh highway, Mengwi, Badung Regency. At this time UD. Bali Rahayu has 35 employees with characteristics and abilities according to their respective fields of ability, where the number of employees is 35 consisting of 21 men and 14 women. If seen from the number of male employees more than women, this is because UD. Bali Rahayu prefers male employees who go directly to the field than female employees. The highest level of employee education is Junior High School, namely 12 people, SMA as many as 10 people, SD as many as 8 people and S1 as many as 5 people. If viewed from the level of education, the number of junior high school employees is more than other education levels, this is because UD. Bali Rahayu prioritizes teamwork and expertise in working to achieve company goals and can advance UD. Bali Rahayu.

According to Kotler in Vesilia Adriani (2015) satisfaction is the feeling of being happy or disappointed by someone that arises because of comparing the perceived performance of the product (or results) against their expectations. If performance fails to meet expectations, customers will be dissatisfied. If the performance is as expected, the customer will be satisfied. If the performance exceeds expectations, the customer will be very satisfied or happy. Product quality is an important thing that every company must strive for if it wants the products to be competitive in the market. According to Kotler and Armstrong (2016), product quality is the product's ability to perform its function, this includes the useful life of the product, reliability, ease, use and repair. (Wahyu & Gorda, 2017: 325) in Alhilal Hamdi (2020). However, through observations made at UD. Bali Rahayu still found several problems related to product quality, namely, namely the incompatibility of the products sent with those ordered by customers and the quality of the products that still had defects in some corners of the furniture.

Apart from product quality, the thing that plays a role in increasing consumer satisfaction is promotion. Promotion is one of the variables in the marketing mix which is very important for companies to implement in marketing their products or services. According to Kotler and Armstrong (2018: 76), "Promotion means activities that communicate the merits of the product and persuade target customers to buy it", meaning that promotion is an activity that communicates the benefits of a product and persuades target consumers to buy the product. According to Hermawan (2016) the notion of promotion is one of the priority components of marketing activities that inform consumers that companies are launching new products that tempt consumers to purchase activities. Promotion is designed as attractive as possible to reach the wider community through various media, this is so that companies can communicate with consumers. Simple promotional objectives according to Kuncoro (2016) are

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divided into three types, namely Providing customer information about new products or features, Reminding customers of company brands, influencing customers to buy.

Several observations made on UD customers. Bali Rahayu, there are several complaints related to promotions, namely the company has not paid maximum attention both materially and non-material to its promotional activities, so that many potential customers and customers do not know there is a promo / discount at UD. Bali Rahayu. The quality of service ideally occurs by improving services that meet customer expectations, are straightforward and provide customers with quality services. This agrees with Lupiyoadi (2012: 176), "Service quality is an activity or series.

II. Literature Review

a) Customer satisfaction

Customer satisfaction is a description of the difference between expectations and performance received. If expectations are high, while performance is mediocre, then satisfaction will not be realized so that consumers will be disappointed (Priansa, 2017: 211). Research conducted by Vesilia Adriani and Realize (2018), Mitha Alifia Roselina and Asih Niati (2019) and Alhilal Hamdi, Raymond (2020) found that product quality, promotion and service have a positive and significant effect on customer satisfaction.

H1: Product quality, promotion and service have a positive and significant effect on customer satisfaction at UD. Bali Rahayu.

b) Product quality

Product quality is a product or service characteristic that depends on its ability to satisfy customer needs that are stated or implied by Kotler and Armstrong (2016). Research conducted by Brigitte Tombeng, Ferdy Roring and Farlane S. Rumokoy (2019), Malik Ibrahim and Sitti Marijam Thawil (2019) and Yoga Pratomo (2019) found that product quality has a positive and significant effect on customer satisfaction.

H2: Product quality has a positive and significant effect on customer satisfaction at UD. Bali Rahayu.

Promotion

Promotion is the last activity of the marketing mix which is very important because most markets are more of a buyer's market, where the final decision of buying and selling transactions is strongly influenced by consumers Daryanto (2017). Research conducted by Triyadi, Udin Ahidin and Jasmani (2019), Daniel Septian and Asron Saputra (2020) and Reny Wilija Sihite and Nora Pitri Nainggolan (2020) found that promotion has a positive and significant effect on customer satisfaction.

H3: Promotion has a positive and significant effect on customer satisfaction at UD. Bali Rahayu.

c) Service

Service is an activity or a series of activities that are invisible to the eye that occurs as a result of interactions between consumers and employees or other things provided by the service provider company in question to solve consumer problems for customers of Ratminto (2016). Research conducted by Abdul Gofur (2019), Jimmy Fachmy, Syahnur Said, Mapparenta (2019) and Christin Regina and Agus Hermani DS (2020) found that service has a positive and significant effect on customer satisfaction.

H4: Service has a positive and significant effect on customer satisfaction at UD. Bali Rahayu.

The population in this research is 90 customers based on accidental side. Accidental sampling technique according to Sugiono (2017: 73) that the technique of determining the sample based on chance, namely customers who accidentally meet the researcher can be used as a sample, if it is considered that the person who happened to be met matches the data source. Data collection techniques in this study using interviews, interviews, documentation and questionnaires. Where the questionnaire was distributed to 90 UD customers. Bali Rahayu by giving a set of questions using a Likert scale and then tested with validity and rebilth instruments as well as classical assumption test with multiple linear regression analysis technique.

III. Results and Discussion

Results of Validity Test Against Respondents at UD. Bali Rahayu

No.	Variable	Instrument	Value r	Description
1	Customer Satisfaction (Y)	y1	0,663	Valid
		y2	0,672	Valid
		y3	0,693	Valid
2	Product Quality (X1)	x1.1	0,438	Valid
		x1.2	0,859	Valid
		x1.3	0,833	Valid
3	Promotion (X2)	x2.1	0,731	Valid
		x2.2	0,437	Valid
		x2.3	0,563	Valid

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		x2.4	0,810	Valid
		x2.5	0,539	Valid
4	Service (X3)	x3.1	0,376	Valid
		x3.2	0,540	Valid
		x3.3	0,744	Valid
		x3.4	0,475	Valid
		x3.5	0,730	Valid

Based on the table above, it shows that all research variables, namely customer satisfaction, product quality, promotion and service have a Pearson correlation greater than 0.3 so that it can be stated that the statement is valid and can be used as an instrument for collecting research data.

Reliability Test Results Against Respondents at UD. Bali Rahayu

No.	Variable	Value of Cronbach's Alpha	Description
1	Customer Satisfaction	0,757	Reliabel
2	Product Quality	0,794	Reliabel
3	Promotion	0,748	Reliabel
4	Service	0,726	Reliabel

Based on the table above shows that the research instruments, namely customer satisfaction, product quality, promotion and service have a Cronbach alpha value greater than 0.70 so that it can be stated that the statement in the questionnaire is reliable. This means, if the measurement is done again with the same symptoms, the measurement can give consistent results.

Data Normality Test Results
One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		90
Normal Parameters[a,b]	Mean	,0000000
	Std. Deviation	1,24031695
Most Extreme Differences	Absolute	,057
	Positive	,040
	Negative	-,057
Test Statistic		,057
Asymp. Sig. (2-tailed)		,200[c,d]

Based on the results of the data normality test in the table above, it shows the Asymp value. Sig (2-tailed) of 0.200 is greater than 0.05, so it can be explained that the data used is data that is normally distributed.

Multicolonierity Test Results

No.	Variabel	Value Tolerance	VIF
1	Customer Satisfaction	0,638	1,566
2	Promotion	0,599	1,669
3	Service	0,664	1,505

Based on the results of the multicollinearity test in the table above, it shows that the tolerance value is greater than 0.1 and the Variant Inflation Factor (VIF) value is smaller than 10 so that it can be explained that the data used in this study are data that do not experience multicolloniearity symptoms.

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Heteroscedasticity Test Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3,163	,540		5,862	,000
	X1	-,044	,045	-,121	-,988	,326
	X2	-,015	,032	-,060	-,470	,639
	X3	-,076	,031	-,300	-2,489	,115

Based on the table above, the results of the heteroscedasticity test for all variables have a sig value. > 0.05, so it can be explained that the data used did not experience heteroscedasticity symptoms.

Simultaneous Significant Test Results (Test F)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	67,184	3	22,395	14,066	,000[b]
	Residual	136,916	86	1,592		
	Total	204,100	89			

Based on the results of simultaneous testing, it was obtained that the F value was 14.066 with a significant value of 0.000 <0.05. This shows that there is a significant influence simultaneously variable product quality, promotion and service on customer satisfaction at UD. Bali Rahayu.

Statistical Test Results t

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	6,091	1,010		6,029	,000
	X1	,170	,084	,224	2,022	,046
	X2	,123	,059	,238	2,083	,040
	X3	,123	,057	,232	2,145	,035

Based on the test results, it was found that the variables of product quality, promotion and service on customer satisfaction had a smaller significance value of 0.05, so there was a partially positive and significant influence of each variable.

IV. Discussion

Effect of Product Quality on Customer Satisfaction. This proves that product quality has a partially significant positive effect on customer satisfaction at UD. Bali Rahayu. This influence indicates that product quality can increase customer satisfaction. Effect of Promotion on Customer Satisfaction This proves that promotion has a partially significant positive effect on customer satisfaction at UD. Bali Rahayu. This influence indicates that increased promotion can increase customer satisfaction. The Influence of Service on Customer Satisfaction, this proves that service has a partially significant positive effect on customer satisfaction at UD. Bali Rahayu. This influence indicates that service improvement can increase customer satisfaction.

V. Conclusion

Based on the description of the discussion regarding the influence of product quality, promotion and service on customer satisfaction, it can be concluded as follows:

1. Variable product quality, promotion and service simultaneously have a significant effect on customer satisfaction UD. Bali Rahayu. This shows that the increasing quality of products, promotions and services carried out will also increase customer satisfaction at UD. Bali Rahayu.
2. Variable product quality has a positive effect on customer satisfaction UD. Bali Rahayu. This shows

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that the increasing quality of the product that is carried out will also increase customer satisfaction at UD. Bali Rahayu.

3. Promotion variables have a positive effect on customer satisfaction UD. Bali Rahayu. This shows that the increasing promotion given will also increase customer satisfaction at UD. Bali Rahayu.
4. Service variables have a positive effect on customer satisfaction UD. Bali Rahayu. This shows that the better the service performed, the customer satisfaction will also increase at UD. Bali Rahayu.

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Assessment of Long Run Relationship between Exchange Rate and Manufacturing Sector's Output: Evidence from Nigeria

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Abstract- The main aim of this research is to examine the relationship between exchange rates and manufacturing output in Nigeria. The research paper made use of secondary data in reaching the objectives of this research work. Data were sourced mainly from Central Bank of Nigeria (CBN) Statistical Bulletin, CBN Statement of Accounts and Annual Reports, and the Nigerian Bureau of Statistics publications. The variables for which data are sourced include: manufacturing output, manufacturing capacity utilization, exchange rate, government expenditure, inflation rates and interest rate for the period 1980 to 2020. The result of the regression estimate showed that Exchange rate and government expenditure on manufacturing sector variables has a positive and significant impact on manufacturing productivity, while consumer price index and manufacturing capacity utility rate variables has a negative and significant impact on manufacturing productivity but interest rate, has negative and insignificant impact on manufacturing productivity during the study period.

Keywords: manufacturing output, manufacturing capacity utilization, exchange rate, government expenditure, inflation rates and interest rate.

GJMBR-B Classification: JEL Code: D51



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Assessment of Long Run Relationship between Exchange Rate and Manufacturing Sector's Output: Evidence from Nigeria

Olubunmi Omotayo [α] & Alani Olusegun [σ]

Abstract- The main aim of this research is to examine the relationship between exchange rates and manufacturing output in Nigeria. The research paper made use of secondary data in reaching the objectives of this research work. Data were sourced mainly from Central Bank of Nigeria (CBN) Statistical Bulletin, CBN Statement of Accounts and Annual Reports, and the Nigerian Bureau of Statistics publications. The variables for which data are sourced include: manufacturing output, manufacturing capacity utilization, exchange rate, government expenditure, inflation rates and interest rate for the period 1980 to 2020. The result of the regression estimate showed that Exchange rate and government expenditure on manufacturing sector variables has a positive and significant impact on manufacturing productivity, while consumer price index and manufacturing capacity utility rate variables has a negative and significant impact on manufacturing productivity but interest rate, has negative and insignificant impact on manufacturing productivity during the study period. The study concluded that Exchange rate, government expenditure on manufacturing sector, consumer price index, manufacturing capacity utility, and interest rate influences manufacturing output. In order to boast the level of Manufacturing output in Nigeria, there is the need for the government to manage or control the exchange rate in order stimulate export and support export-led growth, particularly in the provision of incentives and soft loans for export of locally produced manufacturing output.

Keywords: manufacturing output, manufacturing capacity utilization, exchange rate, government expenditure, inflation rates and interest rate.

I. Introduction

In the universe today the manufacturing sector is generally regarded as being capable of accelerating the growth and development process in a country's economy. A major reason for this is as a result of the nature of activities that has taken place in this sector which has brought about significant linkages that has contributed across all other sectors. The Nigerian manufacturing sector is still underdeveloped with very low level of capacity utilization and contribution to aggregate output in spite of the fact that it has been considered as one of the fastest growing sector in Nigeria since 1973 and 1974 (Ojo, 1990; Obadan, 1994). The low level of development in this sector has often been attributed to increasingly dependence on the external sector for import of essential manufacturing inputs (Okigbo, 1993).

The exchange rate which is the price of one currency in terms of another currency which has been a veritable instrument of economic management and therefore it is been regarded as one of the most important macroeconomic indicator used in assessing the overall performance of an economy. Douglas and Jike (2005) noted that movements in exchange rate are known to have ripple effect on other economic variables such as interest rate, inflation rate, unemployment rate, terms of trade, and so on. These factors especially notethe importance of exchange rate to the economic well-being of every country which deals with both domestic and international goods and services.

According to Obaseki (2001) the Central Bank of Nigeria has implemented different techniques in the management of the exchange rate of the naira. Also Obadan (2002) believed that past exchange rate policies have been designed with a bias towards demand management in Nigeria, as the supply side has always been limited by the monoculture base of the economy, where foreign exchange inflow is dominated by oil export proceeds.

a) *Significance of the study*

The unique role of every government is to be able to stabilize her economy by ensuring a favorable balance of the countries exchange rate with other growing economies so as to increase the level of production. The main aim of the study is to find lasting solution to the problems or relationship that exists between the rate of exchange and the growth of manufacturing output in Nigeria. This research study is meant to provide necessary information to researchers, economic stakeholders, financial advisers on the impact of exchange rates on the performance of Nigeria manufacturing sector.

b) *Research questions*

In order to achieve adequate research results, the research question to be answered is "What is the relationship between exchange rate and manufacturing output in Nigeria?"

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c) *The scope of the study*

The study is aimed at examining the relationships between exchange rate and manufacturing output in Nigeria between 1980-2020. The structure of this study is to evaluate the relationships between exchange rate and manufacturing output in Nigeria.

II. Literature Review

a) *Conceptual review*

Exchange rate has been defined as the value or price of a particular currency expressed in terms of some other currency. The word exchange rate has been defined by many scholars in terms of its function or role. Lawal (2016) defined exchange rate as the price at which purchase and sale of foreign currency takes place, which is the amount of one currency that must be paid in order to obtain one unit of another currency. Sanusi (2002) defined the exchange rate as the relative price of two assets in one country in terms of another. The exchange rate plays a critical role in an economy because imports and exports constitute a large part of the economy.

Globally exchange fluctuation is seen as the bed rock to all economic activities across all countries in the world today. Douglas and Jike (2005) noted that fluctuation in exchange rate are known to have ripple effect on other economic variable like interest rate, inflation rate, unemployment rate, terms of trade and many more. In fact all these factors show the importance of exchange rate to economic productivity of every country that deals in international trade. Over time the Nigeria exchange rate has changed from a regulated regime to a deregulated regime. Dada and Oyeranti (2012) agreed that the exchange rate of the naira was relatively stable between 1973 and 1979 during the oil boom era and when agricultural products accounted for more than 70% of the nation's gross domestic products (GDP).

b) *The importance of manufacturing sector to an economy*

Historically, the growth in manufacturing output has been a key element in the successful transformation of most economies that have seen sustained rises in their per capita incomes. In developing and underdeveloped countries, performance in terms of growth and development in this area has been poor over the last decades. The unavailability of high-quality data constitutes a major problem or impediment for relevant research on African industry, and previous economic research on Africa has therefore been based on aggregate data. Opaluwa, Umeh and Abu (2010) opined that the manufacturing sector plays catalytic role in a modern economy and has many dynamic benefits that are crucial for economic transformation.

According to Opaluwa et al. (2010) noted that in an advanced country, the manufacturing sector is a leading sector in many respects; it is an avenue for increasing productivity in relation to import substitution and export expansion, creating foreign exchange earning capacity, raising employment, promoting the growth of investment at a faster rate than any other sector of the economy, as well as wider and more efficient linkage among different sectors.

c) *Theoretical review of literature*

The theoretical framework that will be used during the course of this study is the Modified Mundell–Fleming IS-LM Model that are reviewed in this work, as demonstrated by Jhingan (2011).

- *The Modified Mundell–Fleming is-Lm Model:* also known as the IS-LM-BoP model will be the theoretical base of this study. The model is an extension of the traditional IS-LM Model extended by Jhingan (2011) as a mathematical representation of Keynesian macroeconomic theory. While the traditional LM-SM deals with a closed economy, the Mundell–Fleming model describes an open economy and portrays the short-run and long-run relationship between an economy's nominal exchange rate, interest rate, and output with the assumption that output is demand determined. The demand side of the economy consists of three markets, namely; the goods, money and the foreign exchange market, all of which must simultaneously be in equilibrium for the economy to be in equilibrium.

d) *Empirical review of literature*

According to Lawal (2016) examined the effect of exchange rate fluctuations on manufacturing sector output in Nigeria from 1986 to 2014, a period of 28 years. He made use of secondary data and data on manufacturing output, Consumer Price Index (CPI), Government Capital Expenditure (GCE) and Real Effective Exchange Rate (EXC) were sourced from the CBN statistical bulletin. The data were analyzed using the Autoregressive Distributive Lag (ARDL) technique and the result of the analysis showed that exchange rate fluctuations have a long run relationship with manu facturing sector output. The result showed that exchange rate has a positive but insignificant relationship with manufacturing sector's output.

Ehinohem and Oladipo (2012) researched into the relationship between exchange rate and manufacturing performance in Nigeria between 1986 and 2010. They employed the ordinary least square (OLS) technique and found that exchange rate depreciation has no significant impact on manufacturing output in Nigeria. In their research they found out that in Nigeria, exchange rate appreciation has a significant relationship with domestic output. Also, it was found in

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their research that appreciation of exchange rate has significant impact on manufacturing output. They observed that inflation has positive effect on manufacturing output. They suggested that the Nigerian government should focus on giving subsidy to the manufacturing sector to cushion the negative effect of exchange rate movement on manufacturing.

III. Research Methodology

a) Sources of data

Data were sourced mainly from the publications of the Central Bank of Nigeria (CBN) namely; CBN Statistical Bulletin, CBN Statement of Accounts and Annual Reports, and the Nigerian Bureau of Statistics publications. The variables for which data are sourced include: manufacturing output, manufacturing capacity utilization, exchange rate, government expenditure, inflation rates and interest rate for the period 1980 to 2020.

b) Data analysis technique

The analysis of this study is based on time series data for the Nigerian manufacturing sector, exchange rates and other macroeconomic data. Due to the linearity nature of the model formulation, Ordinary Least Square (OLS) estimation techniques of regression analysis will be adopted in obtaining the numerical estimates of the coefficients in the model using Statistics/data analysis (Eview8) econometric software. A multiple regression model is used in the estimation. The model seeks to investigate the relationship between exchange rate and manufacturing output in Nigeria. The estimation period is restricted to the period from 1980 to 2020.

c) Model specification

The model is to investigate the relationship between exchange rate and manufacturing output in Nigeria. This is stated below with the dependent variable as manufacturing output, while the explanatory variables are: manufacturing capacity utilization, exchange rate, government expenditure on manufacturing sector, inflation rates and interest rate. Thus adopting Nnanna (2001) approach to measuring manufacturing sectoral growth and performance and the model is a modified version of Lawal (2016) and Akinlo(2015).

The model for this study is specified thus;

$$\text{MAN-O} = f(\text{MCU, EXR, GEMS, INT, CPI})$$

Where;
MAN-O = manufacturing output
MCU = manufacturing capacity utilization
EXR = Exchange rate
GEMS = government expenditure on manufacturing sector
INT = interest rate
CPI = consumer price index as a proxy for inflation
The functional form of this model can be written in econometric format thus;

$$\text{MAN-O} = \beta 0 + \beta 1\ \text{MCU} + \beta 2\ \text{EXR} + \beta 3\ \text{GEMS} + \beta 4\ \text{INT} + \beta 5\ \text{CPI} + \mu$$

Where $\beta 0, \beta 1, \beta 2, \beta 3, \beta 4, \beta 5$ are the unknown parameters used in estimating the model
μ is the error of disturbance.

d) Estimation technique

The augmented dickey fuller unit root test was employed to determine the stationarity and other properties of the variables in the model in order to determine the time series characteristics of each variables, followed by the autoregressive distributed lag of co-integration and error correction model was used to analyze the dynamic nature (long run and short run) of the relationship between the dependent variable(manufacturing output) and the independent variables (exchange rate, manufacturing utility capitalization, consumer price index, government expenditure on manufacturing sector and interest rate) and lastly the residual test was conducted to test for the stability reliability of the model.

e) Unit root test

This is used to test the stationarity and this is done using the augmented dickey fuller test (ADF) with the hypothesis which states as follow: if the absolute value of the augmented dickey fuller (ADF) test is greater than the critical value either at 1%, 5%, 10% level of significance then the variables are stationary either at order zero, one or two. The augmented dickey fuller test equation is specified below as follow:

f) Presentation of results and empirical analysis

This chapter presents the result and the interpretations of our analyses. The chapter begins with summary statistics followed by the trend analysis of manufacturing output, exchange rate, government expenditure on manufacturing sector, consumer price index, manufacturing capacity utility rate, and interest rate. Also, statistical properties of variables were examined through Augmented Dickey Fuller test in order to determine the time series characteristics of each variables, followed by autoregressive distributed lags of co integration and error correction model was

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used to analyze the dynamic nature (long run and short run) of the relationship between dependent variable (manufacturing output) and the independent variables (exchange rate, government expenditure on manufacturing sector, consumer price index, manufacturing capacity utility rate, and interest rate) and lastly, residual test was conducted to test for the stability reliability of the model.

Table 1: ARDL Bounds Test

Test Statistic	Value	K
F-statistic	6.725666	5
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.08	3
5%	2.39	3.38
2.5%	2.7	3.73
1%	3.06	4.15

Source: Author's computation

Using the ARDL bounds test, the result above shows that with the assumption of weak exogeneity on manufacturing output, exchange rate, government expenditure on manufacturing sector, consumer price index, manufacturing capacity utility rate, and interest rate. The hypothesis of no long run relationship can be rejected at 5% significant levels as the F-statistic for the model is greater than 5% of both I (0) and I (1) bounds of 2.27 and 3.28 respectively. Thus, this shows existence of long-run relationship between manufacturing output, exchange rate, government expenditure on manufacturing sector, consumer price index, manufacturing capacity utility rate, and interest rate.

g) ARDL analysis

This subsection presents the result obtained from estimating the ARDL unrestricted error correction (short run or dynamic) model and the ARDL long-run (static) model in equation. Following this result, this study examines and estimates both short-run dynamics and the long-run relationships between manufacturing output, exchange rate, government expenditure on manufacturing sector, consumer price index, manufacturing capacity utility rate, and interest rate.

Table 2: Long run multiplier coefficient of ARDL

Variables	Coefficient	Std. Error	t-Statistic	Prob.*
INTR	-0.060043	0.073852	-0.813017	0.4473
LOG(GEMS)	6.427274	1.290657	4.979846	0.0025
EXR	0.068764	0.007138	9.632927	0.0001
CPI	-0.326663	0.067977	-4.805461	0.0030
MCUR	-0.717435	0.101174	-7.091117	0.0004
C	-7.027398	5.204740	-1.350192	0.2257

h) Long-Run ARDL Model analysis

It is confirmed from the result that Exchange rate and government expenditure on manufacturing sector variables had positively significant impact on manufacturing productivity, while consumer price index and manufacturing capacity utility rate variables has negative significant impact on manufacturing productivity and interest rate, has negative insignificant impact on manufacturing productivity.

The co integration equation is:

$$MANN = -7.027398 - 0.060043INTR + 6.427274LOG(GEMS) + 0.068764EXR - 0.326663CPI - 0.717435$$

There is need to emphasize here that the result discussed above do not analyze the short-run relationship of the respective variables on manufacturing output. When co integration exists, the Engle-Granger Theorem establishes the encompassing power of the error correction mechanism over other forms of dynamic specifications. The next section reports the results of the Error Correction Mechanism.

Table 3: ARDLECM

Variables	Coefficient	Std. Error	t-Statistic	Prob.*
D(INTR)	0.162882	0.025574	6.368966	0.0007
DLOG(GEMS)	0.1916669	0.440341	4.352691	0.0048
D(EXR)	-0.005920	0.002350	-2.519337	0.0453
D(CPI)	0.020931	0.003394	6.166324	0.0008
D(MCUR)	0.070811	0.018697	4.272564	0.0052
CointEq(-1)*	-0.516487	0.053226	9.703573	0.0001

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R-squared	0.970245	Mean dependent var	0.277825
Adjusted R-squared	0.918174	S.D. dependent var	0.575917
S.E. of regression	0.164742	Akaike info criterion	-0.516205
Sum squared resid	0.325680	Schwarz criterion	0.471440
Log likelihood	30.77548	Hannan-Quinn criter.	-0.179389
Durbin-Watson stat	2.372996		

Source: Author's computation

IV. Research Findings and Discussion

a) Short-Run (Dynamic) ARDL Model analysis

The Table 4.5 above shows the short run (dynamics) results. The optimal lag combination for the models is obtained via Schwartz Information criterion (SIC). The result in table 4.5 is the Error Correction Mechanism. It is the dynamic adjustment to the disequilibrium in the short run. It can be observed that INTR, CPI, GEMS and MCUR had positive impact on MANN while EXR had negative relationship MANN.

The results showed that INTR have a positive significant relationship with MANN at 5% significant level. This implies that as INTR increases MANN increases. The result, further shows that a 1% increase (decrease) in INTR on average, leads to about 0.162% increase (decrease) on MANN. This means that INTR contributed to MANN in Nigeria. This implies that as interest rate increases, the manufacturing output would increase. This does not conform to the a priori expectation.

Also, GEMS was found to have a positive significant relationship with MANN. This implies that as GEMS increases MANN increases. The result further shows that a 1% increase (decrease) in INFR on average leads to about 1.917% increase (decrease) on MANN. This implies that as more budgetary allocation is allocated to the manufacturing sector, the manufacturing output would increase. This conforms to the a priori expectation.

Furthermore, CPI was found to have a positive significant relationship with MANN. This implies that as CPI increases MANN increases. The result, further shows that a 1% increase (decrease) in INFR, on average leads to about 0.0209% increase (decrease) on MANN. This implies that as Nigeria has a general price level increases manufacturing output would increase. This conforms to the a priori expectation.

In addition, the results showed that MCUR have a positive significant relationship with MANN at 5% significant level. This implies that as MCUR increases MANN increases. The result also shows that a 1% increase (decrease) in MCUR on average leads to about 0.0799% increase (decrease) on MANN. This means that MCUR contributed to MANN in Nigeria. This conforms to the a priori expectation.

However, EXR is found to have a negative significant relationship with MANN. The result implies that as EXR increase MANN decreases. The result further shows that 1% increase (decrease) in EXR would lead to about 6.39 % decrease (increase) in MANN. This implies that as exchange rate increases, the manufacturing output reduces. This conforms to the a priori expectation.

The coefficient of most importance is the ECM coefficient. From the result the ECM term is well defined, that is negative and statistically significant at 5% level. The coefficient is -0.516which indicates approximately 51.6 percent of the previous year's disequilibrium in manufacturing productivity is been corrected by INTR, GEMS, EXR, CPI and MCUR. This also shows the speed at which the model converges to equilibrium. The magnitude of this coefficient implies that nearly 51.6 percent of any disequilibrium in manufacturing output is corrected by the some of the selected variable within one period (one year). The implication is that the present value of manufacturing output will adjust to changes in INTR, GEMS, EXR, CPI and MCUR

b) Summary of the Findings

The co-integration estimate showed the existence of a long run relationship among the variables in the estimated model.

The result of the regression estimate showed that Exchange rate and government expenditure on manufacturing sector variables has a positive and significant impact on manufacturing productivity, while consumer price index and manufacturing capacity utility rate variables has a negative and significant impact on manufacturing productivity but interest rate, has negative and insignificant impact on manufacturing productivity during the study period.

V. Conclusion

The focus of this study is on the relationships between exchange rate and manufacturing output in Nigeria over the period 1980 to 2020. Based on the regression estimates, the study concluded that exchange rate is a key determinant of manufacturing output in Nigeria. The study also concluded that Exchange rate, government expenditure on manufacturing sector, consumer price index, manufacturing capacity utility, and interest rate influences manufacturing output. Thus, the relationship between exchange rate and manufacturing output depends on the Exchange rate, government expenditure on manufacturing sector, consumer price index, manufacturing capacity utility, and interest rate.

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VI. Recommendation

From the findings discussed above, the following recommendations are offered in order to improve the relationship between exchange rate and manufacturing output in Nigeria:

In order to boast the level of Manufacturing output in Nigeria, there is the need for the government to manage or control the exchange rate in order promote export and support export - led growth, particularly in the provision of incentives and soft loans for export of locally produced manufacturing output. This will enable foreign exchange more available to the economy.

There is the need for Government to establish and implement policies that will encourage and protect infant industries so as for the new industry to compete in the international market.

Finally, there is the need to strengthen monetary policies in order to improve the exchange rate, maintain and improve the Manufacturing capacity utilization and increase Manufacturing Output in Nigeria.

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Acknowledgments

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The following is the official style and template developed for publication of a research paper. Authors are not required to follow this style during the submission of the paper. It is just for reference purposes.

Manuscript Style Instruction (Optional)

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11'", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

Structure and Format of Manuscript

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

a) A title which should be relevant to the theme of the paper.
b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
d) An introduction, giving fundamental background objectives.
e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
f) Results which should be presented concisely by well-designed tables and figures.
g) Suitable statistical data should also be given.
h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
j) There should be brief acknowledgments.
k) There ought to be references in the conventional format. Global Journals recommends APA format.

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The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.



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Author details

The full postal address of any related author(s) must be specified.

Abstract

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

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A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, “What words would a source have to include to be truly valuable in a research paper?” Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

Abbreviations

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

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Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.

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Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

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Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

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Tips for writing a good quality Management Research Paper

Techniques for writing a good quality management and business research paper:

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of management and business then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.



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7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

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10. Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

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12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.
Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

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22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

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Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.

Mistakes to avoid:

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- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.



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- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

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Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.



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Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

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Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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