INTERNATIONAL JOURNAL OF RESEARCH IN COMMERCE & MANAGEMENT

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INTRODUCTION

REVIEW OF LITERATURE

NEED/IMPORTANCE OF THE STUDY

STATEMENT OF THE PROBLEM

OBJECTIVES

HYPOTHESIS (ES)

RESEARCH METHODOLOGY

RESULTS & DISCUSSION

FINDINGS

RECOMMENDATIONS/SUGGESTIONS

CONCLUSIONS

LIMITATIONS

SCOPE FOR FURTHER RESEARCH

REFERENCES

APPENDIX/ANNEXURE

The manuscript should preferably be in *2000 to 5000 WORDS*, But the limits can vary depending on the nature of the manuscript.

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- Bowersox, Donald J., Closs, David J., (1996), "Logistical Management." Tata McGraw, Hill, New Delhi.

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ONLINE RESOURCES

- Always indicate the date that the source was accessed, as online resources are frequently updated or removed.

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STUDY ON OCCUPATIONAL STRESS OF WOMEN EMPLOYEES IN SELECTED BANKS IN KOTTAYAM DISTRICT, KERALA

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ABSTRACT

Work plays a critical role in the lives of individuals, which has contributed to the phenomenon of stress for both individual employees and the organizations. The highly competitive banking industry has levied varied requirements on employees resulting into stress. When it comes to women employees, the stress on account is even higher especially when she has to play the role of a mother as well as an employee. Women belonging to different classes have started entering into paid occupations like banking industry, as they are well-educated and the need to supplement the family. Working women at present are mostly working beyond normal business hours and are confronted by increasing workload every day. Many of them even carry work and responsibilities to home when they fail to maintain a perfect balance between work and life. The purpose of this paper is to analyze the problems of occupational stress and to access the strategy adopted to manage occupational stress among women employees.

KEYWORDS
banking industry, occupational stress, women employees.

JEL CODES
M12, J28.

INTRODUCTION

Stress is said to have an immense influence over the lives of individuals and the organizations. The employees in banking sector experiences much stress in their work and work environment. A generation ago, most of the women stayed at home and carried out the household responsibilities. This situation has now changed and women have started seeking employment outside their homes due to gross economic necessity followed by the desire to raise economic status, to have financial freedom, to make use of education, to pursue a career and the likes. Maintaining an effective balance between the workplace and the home appears to be causing significant problems for many working women.

Women play a dynamic role in India's banking sector. In fact, there are many Indian women who hold top position in banking industry. The policies of globalization and privatization led to competitive environment in banking sector by private sector and multinational environment. Banking sector has provided various job opportunities. There were many women CEOs in the country across bank groups. Arundhati Bhattacharya was leading the country's largest bank, State Bank of India, Chanda Kochhar was the CEO of private giant ICICI Bank and Shikha Sharma was the helm at Axis Bank. Women are likely to experience more stress, since they still carry more of the burden of childcare and domestic responsibilities than men do.

Work and family are the two most important aspects in women's lives. Balancing work and family roles have become a key personal and family issue for many societies. There are many facets in working mother's lives that subject to stresses. They deal with home and family issues as well as job stress on a daily basis. Imbalance between work and family life arises due to a number of factors. Various factors appear to strengthen the brunt of pressure on women. Stress experienced by women at a workplace affects not only their professional life, but also family life and social intercourses. In the women's opinion, an unpleasant workplace is such a workplace where the feeling of mental workload is connected with the lack of rewards (motivation), uncertainty resulting from organization of daily chores and lack of support from others.

In the present study the term occupational stress defined as a disorder associated with a job or work. The anxiety may be expressed in the form of extreme tension and anxiety and the development of physical symptoms such as headache or cramps, also called occupational neurosis. This is caused by worry or anxiety at work when a person feels that the demands and pressures of their job are more than they can handle. Stress at work can cause major damage to one's health and overall lifestyle and it is an area that should not be ignored. Family difficulties are miss interaction with family members that involve physical, emotional and psychological problems. Working mothers, as a label, refers to women who are mothers and who work outside the home for income in addition to the work they perform at home in raising their children.

SCOPE OF THE STUDY
The study concentrates on the occupational stress of women employees in selected banks in Kottayam district, Kerala. The banks selected by convenient sampling method are SBI, Federal Bank, ICICI Bank and South Indian Bank.

OBJECTIVES
1. To assess the factors within the banks causing stress among the women employees.
2. To assess the factors outside the banks causing stress among the women employees.

METHODOLOGY
This is a descriptive study based on primary data which has been collected using questionnaire from a sample of 100 women bank employees in Kottayam District in Kerala, who were identified by way of convenient sampling techniques. The data collected were properly analysed to arrive at a realistic result using appropriate statistical tools.

LIMITATIONS OF THE STUDY

Due to time and resource constraints the sample size of the study was barred to 100, so further study could be done by booming the sample size and as a result we could get exceptional explanations. There is farther scope for the research relating to the topic under study. Since the present study was detaining to Women bank employees in Kottayam District only, it is possible to enhance the scope of the study by multiplying the area of the study so as to cover entire Kerala. The study concentrates on occupational stress of women employees and is not intended as an exhaustive survey of all the aspects in the field of banking.

REVIEW OF LITERATURE

Dr. K. Chandrasekar (2011) found that environmental factors are conducive to work and he also found that factors that affect attitude of employees to work are interpersonal relationships, control over environment, shift, emotional factors, job assignment, overtime duty and extended work.

DayoAkintayo (2012) found that working environment is significantly related to workers' morale and also correlated with perceived workers' productivity.

R.Prakash Babu an K Vembu (2014) in their article "Occupational stress experienced by women employees in banking sector" identified that shifts in work, work load, role ambiguity, lack of involvement in decision making, in appropriate transfers, less peer support and changes in technology are some of the factor causes stress.

Rajesh K Yadav and Shriti Singh Yadav (2014) on the Impact of work life balance and stress management on job satisfaction among working women suggested that work life balance and stress management can be achieved by the factors responsible for job satisfaction.

Akkur Chandra Das (2016) conducted a descriptive cross- sectional study on the effects of stress among working women in different banks in Dhaka city, Bangladesh. The study resulted in some important findings that women faces stress due to low salary as compared to men, lack of growth and advancement, transfer and job insecurity. The study also recommends the government to adopt friendly and supportive measures to tackle the stress.

Parvathy Moha n et al., (2016) conducted a study to understand the level and factors of stress among women bank employees. Furthermore, this study also attempted to understand the difference between the level of stress among private and public women bank employees. A total of 60 bank employees were selected randomly from public and private sector banks of Kottayam District. Employees from SBI, Canara Bank, Federal Bank and ICICI Bank participated in this study. The primary data was collected using a structured questionnaire, and the secondary data was collected using published and unpublished records of Government Departments, branches of banks, Lead bank offices, and NABARD offices. For data analysis, statistical tools; like percentages, total score, mean score, t-test and ANOVA were used. The finding revealed that the stress is more in private sector women bank employees. It was also found that the officers are more stressed than clerks. As far as stressing factors are concerned, there are various stressors among women bank employees; like workload, dual role as an employee and as a wife, being up-to-date with new technologies, having to take the risk, long working hours, ambiguity in job role, increase in a number of customers, etc.

Kishori et al., (2016) made a study on work stress among bank employees to find out the level of stress, causes of stress and its impact on bank employees. The study was conducted among the SBI main branch employees at Tiruchirappalli district. Using a random convenient sampling technique, 100 employees were selected for the study, and the primary data collection questionnaire was used. For the purpose of the statistical analysis of the data, chi-square was used. The study revealed the presence of stress in banks. Furthermore, stress among bank employees is due to excess work load and work-life imbalance. Stress is hampering employees" physical and psychological well-being.

Manjunatha et al., (2017) conducted a research review to understand the stress among the bank employees. The sole aim of the research review was to find out the source and outcomes of job stress among bank employees. For data collection, this study relied on secondary data. Online journals and data available in the library were reviewed. In conclusion, it was found that technological growth, excess of work pressure, working life, performance pressure, inadequate planning at the workplace, long working hours, improper reward system, lack of job autonomy, organizational culture, role conflict etc. are few major factors inducing and increasing stress among bank employees. Furthermore, Work stress was afflicting employees equally to both males and females. Stress is increasing psychological problems among employees drastically. Besides this, healthy employees were more productive than unhealthy employees.

Mariappan et al., (2017) studied the factors of stress among bank employees of private and public sector bank of Sivagangai district, its impact on employees and coping strategies to reduce it. The study was conducted on a total of 43 banks; 26 public sector banks and 17 private sector banks. Canara Bank, Indian Bank (IB), Tamilnadu Overseas Bank (IOB), Bank of India (SBI), Mercantile Bank and City Union Bank Ltd, HDFC Bank, Lakshmi Vilas Bank, ICICI Bank, State bank Of India and Punjab National Bank were selected for the purpose. The result of the study enlightens that stress in the banking sector is not only hampering employees' performance but also health. Work-load, long working hours, role ambiguity, no support from high levels, delay promotion, target achievement etc., are some factors that are contributing to stress in bank employees.

Sambrani et al., (2018) studied job stress among the bank employee of HDFC bank Hyderabad. The sole purpose of the study was to figure out job stress and ways to reduce it among HDFC bank employees. The finding enlightens that 60% of the respondents agreed that they were constantly under stress.

Karim et al., (2018) researched the level of work stress among State Bank Of India employees working in Karimganj district, Assam. A sample of 84 employees was selected using the random sample technique. The study enlightened that the SBI employees are under a high degree of stress concerning powerlessness, the dimension of role overload, under participation, unprofitability.

Garg et al., (2019) conducted a study to understand the level of job stress and its impact on employees" job satisfaction among various bank employees of Haryana State. Furthermore, this study was also to know the extent to which each bank is different from each other based on job stress and job satisfaction. For this study, the respondents were selected from the staffs working in SBI, BOB, PNB, ICICI, HDFC, and AXIS banks. This study revealed that bank employees of each bank were under job stress, but they were satisfied to some extent too. Besides this, a significant correlation was found between job stress and job satisfaction. Job stress has adverse effects on job satisfaction level of employees.

ANALYSIS AND INTERPRETATION OF DATA

This section deals with the analysis and interpretation of data that have been collected on the basis of questionnaire provided at the end of this report. The primary data was collected from a sample size of 100 respondents. The data has been represented in the form of tables and respective interpretations of each are given below. The methods used for analysis of data were simple percentage and mean score.

TABLE 1: CLASSIFICATION OF WOMEN ON THE BASIS OF MARITAL STATUS

MARITAL STATUS	NO. OF RESPONDENTS	PERCENTAGE
Married	65	65
Unmarried	35	35
Total	100	100

FIGURE 1: CLASSIFICATION OF WOMEN ON THE BASIS OF MARITAL STATUS

Marital Status
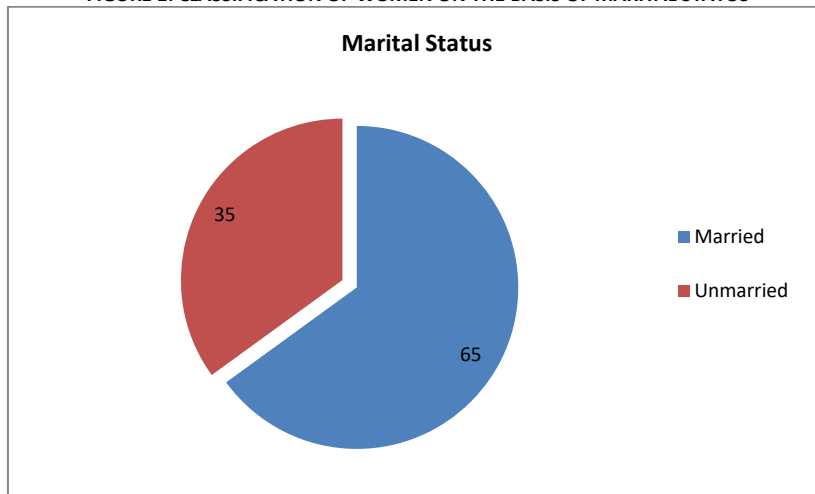
- Married
- Unmarried

Among the respondents 65% are married and 35% are unmarried women employees.

TABLE 2: CLASSIFICATION OF WOMEN ON THE BASIS OF WORK EXPERIENCE

WORK EXPERIENCE	NO. OF RESPONDENTS	PERCENTAGE
Less than 1 year	25	25
1 year – 5 years	53	53
Above 5 years	22	22
Total	100	100

FIGURE 2: CLASSIFICATION OF WOMEN ON THE BASIS OF WORK EXPERIENCE
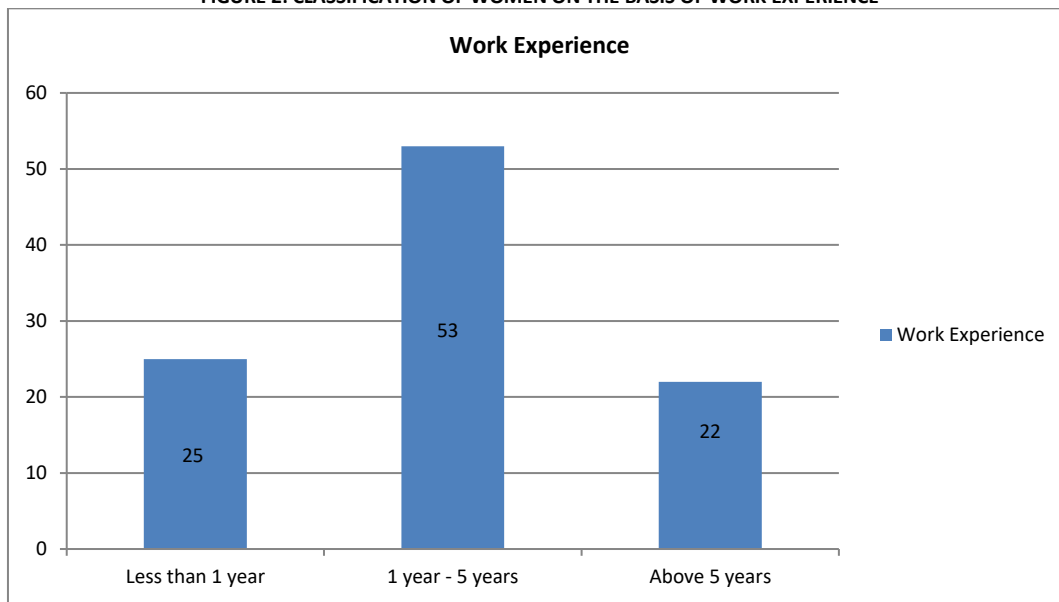
Work Experience

It is clear that, more than half (53%) of the respondents have a work experience of 1-5 years. 25% have an experience of less than 1 year and 22% have above 5 years work experience.

TABLE 3: CLASSIFICATION OF WOMEN ON THE BASIS OF BANK THEY WORK

TYPE OF BANK	NO. OF RESPONDENTS	PERCENTAGE
SBI	50	50
SIB	15	15
Federal Bank	20	20
Canara Bank	15	15
Total	100	100

FIGURE 3: CLASSIFICATION OF WOMEN ON THE BASIS OF BANK THEY WORK
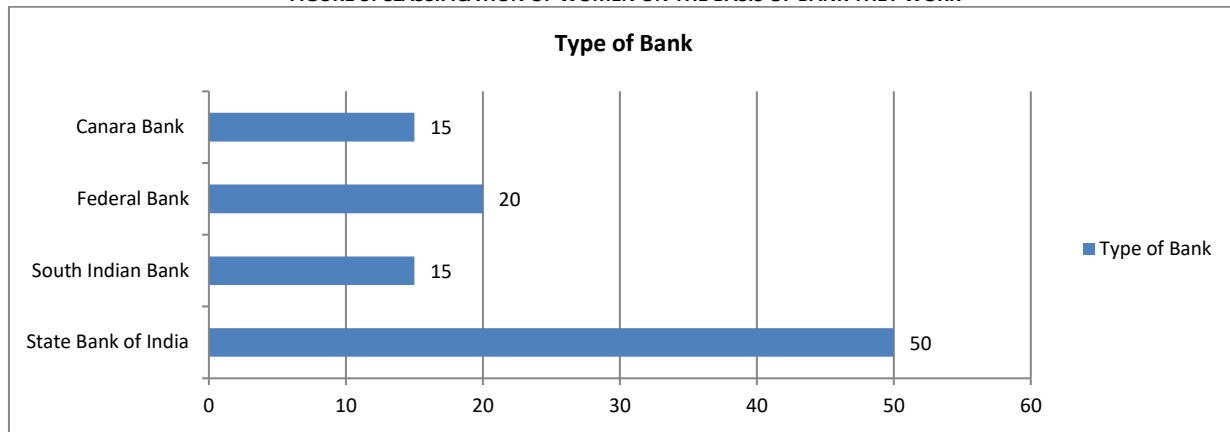
The above table reveals that 50% of the women bank employees are from State Bank of India and 15% of employees are each from South Indian Bank, and Canara Bank, 20% of the respondents are from Federal bank.

TABLE 4: CLASSIFICATION ON THE BASIS OF INTERNAL FACTORS OF STRESS AMONG WOMEN EMPLOYEES

INTERNAL FACTORS	MEAN
Unfavourable behaviour from managers	3.65
Long work hours in bank	3.95
Incompletion of work due to heavy work load	3.70
Target achieving difficulties	3.62
Disallowance of leave	3.55
Role conflict and role ambiguity	3.07
Lack of proper reward system for efficient and timely completion of work	3.63
Frequent technological changes	3.13
Transfers	3.18

FIGURE 4: CLASSIFICATION ON THE BASIS OF INTERNAL FACTORS OF STRESS AMONG WOMEN EMPLOYEES
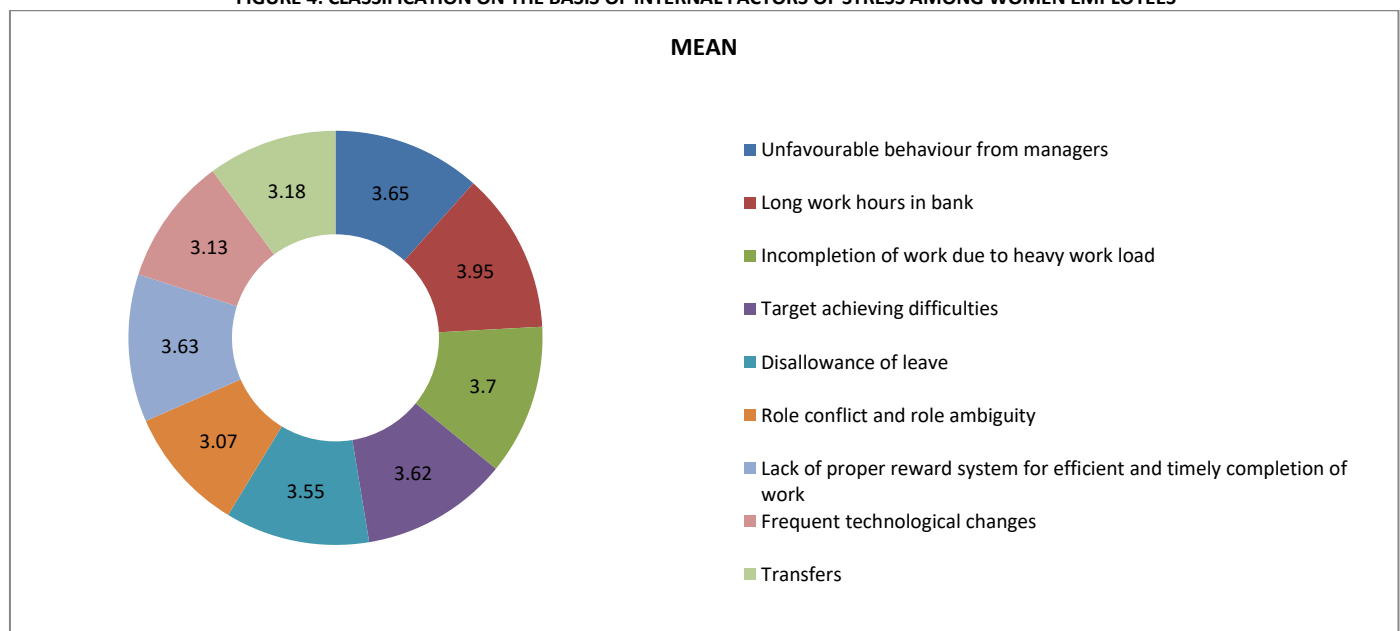
The above table depicts the factors within the bank that causes stress among women employees. 'Long work hours in bank', 'Incompletion of work due to heavy workload' and 'Unfavorable behavior from managers' are the major factors of stress within the bank.

TABLE 5: CLASSIFICATION ON THE BASIS OF EXTERNAL FACTORS OF STRESS AMONG WOMEN EMPLOYEES

EXTERNAL FACTORS	MEAN
Work during Covid-19 pandemic	3.34
Attitude of customers	2.94
Regulations from government	2.37
Problems at home	3.20
Lack of time to spend with family	3.25
Lack of leisure time	2.97
Educational background	2.09

FIGURE 5: CLASSIFICATION ON THE BASIS OF EXTERNAL FACTORS OF STRESS AMONG WOMEN EMPLOYEES
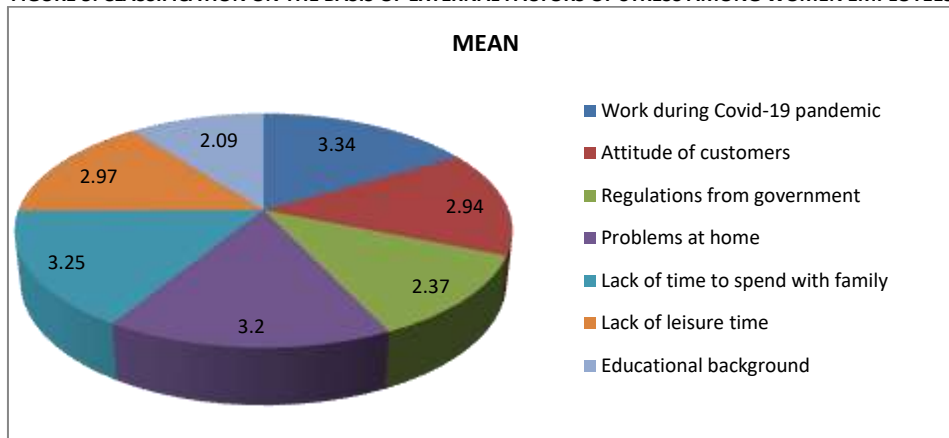
The above table depicts the factors outside the bank that causes stress among women employees. 'Work during Covid-19 pandemic', 'Lack of time to spend with family' and 'Problems at home' are the major factors of stress outside the bank.

FINDINGS AND SUGGESTIONS

FINDINGS

Women play a significant role in all fields now a day, but they face too much stress also. In the current study also, it revealed that working women, especially those working in banks, faces a lot of stress. The study was conducted among the women bank employees in Kottayam district only.

- Among the respondents, majority are married.
- Majority of the respondents are having a work experience of 1-5 years.
- Mainly four banks were selected for convince and they were SBI, SIB, Federal Bank and Canara Bank. Half of them are from SBI, the largest public sector bank.
- The important factors that cause stress from women employees within the banking industry are the long work hours, incompletion of work due to heavy workload and unfavorable behavior from managers.
- External factors causes stress are work during Covid-19 pandemic, lack of time to spend with family and problems at home.

SUGGESTIONS

- The stress will adversely affect the performance of the employees and it may lead to some serious diseases. The banking industry and the government should take some necessary measures to have a check over the working conditions of women in every field including bank.
- The working hours should be fixed and women should give some relaxation in it.
- Also, the authorities should treat every employee, irrespective of gender, equally.
- Many are facing the difficulty in completing the work on time due overload; division of work can be a solution.
- The Covid-19 pandemic has affected every single individual badly so as the bank employees too as they need to be present in banks every day some the smooth running of our economy. Women faced serious issues during the time. Special leaves, health care checkup, and first aid kits to the employees, awareness campaigns for customers, etc. may resolve this.
- Leisure programs for employees, family meets, get together; and so on give some relaxation to the employees.
- The employees should become knowledgeable about the impact of stress so that they can anticipate the stressful periods and plan accordingly in advance.
- Undertake stress audit at all levels in the organization to identify the areas of stress for improving the conditions of job.
- Adequate support must be extended from the top to make the women employees feel safe and secure. This will enhance their moral of work and efficiency.
- The grievance handling procedures should be made more transparent so as to increase the confidence level of employees and reduce their anxiety and tension related to their jobs.

CONCLUSIONS

Work and life are usually regarded as two sides of the same coin. Good life depends on good work and good earnings. Impoverished work and earnings deteriorate the quality of life. Good work does not imply good earnings and good earnings are not an indicator of good work. Thus, safe work and fair earnings caters to a contented life. Healthy work environment is vital in the case of women employees in the country who are to a large extent obliged to official as well as household responsibilities.

Most of women employees are performing their dual role of house wife and office staff in their career. They are the real ones practically applying managerial skills in day to day life for house hold accomplishments. It is true that the NPA level of banks is in a chronic stage due to the liberal lending without receiving adequate security. But women are more conservative in lending and usually they do not take much risk in this regard. So for the safety and security of the banking industry, women employees need to be strengthened and properly empowered. The above suggestions, it is hoped, would provide adequate background to the policy makers for reducing the stress level of women employees, which helps to increase their confidence level, performance and productivity so as to ensure sustainable development in the banking sector of the economy. The study has unveiled only some of the crucial issues of job stress of women employees in the selected banks. But they are susceptible to a lot of other issues in connection with job stress. The bank authorities and RBI have to formulate and implement both qualitative and quantitative programmers for the improvement of the work environment of women employees in the banking scenario of the country.

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ELECTRICITY DEMAND ANALYSIS AND FORECASTING IN TAIWAN

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ABSTRACT

In 2013, Taiwan authorises increase in oil and electricity prices to reduce the energy demand of the masses. However, this measure not only failed to achieve the expected policy goal, but also caused prices to rise. Hence, this study tries to discuss the electricity consumption and the different prices of the sectors. The econometric model of Kalman filter is the estimation of the demand elasticity of electricity in Taiwan. Due to electric demand is foreign trade oriented in Taiwan, we suggest to set a combination of stimulus packages to alleviate it.

KEYWORDS

electricity price. Kalman filter. electric demand.

JEL CODES

Q40, Q41, Q47.

1. INTRODUCTION

In the past, Taiwan's power technology was mainly based on fossil fuel power generation. From 1960 to 2014, not only did policy makers try to increase the rapidly growing economy of the GDP, but also the layout subsidized to export-oriented economies such as the price of electricity. On the one hand, the industrial competitiveness approach relied on preferential cost of production factors. On the other hand, the industry emphasised less on energy efficiency. Taiwan's per capita carbon emissions always be a big carbon emitter that the relevant authority monitors goods price volatility to remain the stable electricity tariff. Taiwan's electricity tariff rates have been adjusted twice a year in 2015. The adjustment of electricity prices timely helps in allocating resources efficiently. The issues of carbon emissions and greenhouse gases have gradually attracted international attention. Hence, Taiwan's power generation is devoted to elevate green energy, increase natural gas, decrease coal-fired, reach nuclear-free, and guarantee a stable power supply to reduce air pollution and carbon emissions. The share of green energy in the power generation ratio will increase from % 5 in 2016 to 20% in 2025. Furthermore, the generation capacity of natural gas will increase from its current 32,4% to 50% by 2025. The industrial sector particularly concerns about the increase in the ratio of renewable energy to natural gas power generation, which will lead to a substantial increase in the production cost of the product. Rising electricity price is chiefly concerned with all.

Numerous articles discussed the variables and categories of electricity consumption, such as consumer behaviours, the temperature, industry characteristics, electricity efficiency, electricity price, consumer price index, incomes, GDP, etc. The study of domestic energy demand estimated the connection of temperature and electric consumption (Pardoa et al., 2002; Chang et al., 2016). Using annual data would analyse the patterns of electricity consumption between electricity prices and economic growth (Shiu and Lam, 2004). Applying a co-integration and error-correction model established short-and long-run elasticities of the electricity's demand price and income with respect to price and income in the Korean service sector (Kyoung-Min et al.,2014). Applying Harvey's Structural Time Series Model estimated equations of gasoline demand and residential electricity demand in Saudi Arabia (Mohammad et al., 2021). The global electricity demand pays close attention to the electricity prices and income levels of user. This article is the estimation of price elasticities of electricity demand in Taiwan from 1991 to 2021 by applying the Kalman filter.

1.1. OBJECTIVES OF THE STUDY

1. To study the factors effecting the electricity demand in Taiwan.
2. To study the price and income elasticities of the electricity demand in Taiwan.

2. THE LITERATURE OF METHODOLOGY

2.1. GENERAL TOPICS

Numerous studies are based on electricity demand as the topic of discussion. The more common analysis methods include co-integration analysis and Granger's technique. The tool analysis of cointegration has an important contribution to the development of econometrics (Engle and Granger, 1987; Johansen, 1991). By seeking the method of cointegration to establish long-term relationships that affect the economic variables in Malaysia. There is a positive correlation between carbon dioxide and economic growth. The policy implications of this article initiated the recommendation for continuing the decoupling of economic growth from CO_2 emissions. Therefore, the advantage of using natural gas to generate electricity with less carbon emissions is used as a suggestion to lay the foundation for sustained economic growth and protection of the environment (Etokakpan et al., 2020).

Most countries choose fossil fuel power generation technology based on cost factors and power supply stability. Therefore, coal-fired power generation technology has become an indispensable basic option. This study's main objective is to apply Granger's technique to investigate the relationship between gross domestic product and energy price or consumption. The price of oil rises and may cause recessions in the U.S economy (Hamilton, 1983; Mork, 1989). To investigate the relationship between GDP and energy consumption, he used Taiwanese data from 1954 to 1997. By examining the energy usage of the four power generation technologies before and after this period, including natural gas, crude oil, electricity and coal, he found that they have a causal relationship with each other for economic growth (Yang, 2000).

Before setting energy prices, policymakers often use price trends in previous periods as a reference. However, the problem with co-integration analysis is that the relationship between variables must indicate to assume a long-term stable relationship. Hence, most studies are similar in assumptions that the price elasticity of electricity is constant through the periods inspected (Inglesi-Lotz,2011). According to this assumption, we understand that various variables will change over time. This means that the trend of electricity demand over time cannot be captured and it cannot be a reference standard for policy planners. While the international community is gradually advocating vigorously for reducing emissions, the renewable energy generation technology has relatively lenient control on policy compared with other energy sources. It means that the power infrastructure has been completely readjusted, from high-carbon petrochemical power generation to low-carbon natural gas and renewable energy power generation technology. The characteristics of renewable energy generation equipment are mainly natural resources, such as the sun and tides.

Therefore, new energy generation equipment is an intermittent equipment of the power, comparing to traditional petrochemical power generation technology. Many studies focused on electricity demand of the sectors, such as the industrial sector, the residential sector, the agricultural sector, and the power generation sector. Before responding to power demand, it is necessary to make many unpredictable changes in the time trend under the current limited information. The electricity demand will never be a stable state. Therefore, it is necessary for power plant operators that gain the information for reference of electricity demand and various variables.

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As far as the electricity sector is concerned, price and income flexibility may have become the most critical factors influencing electricity consumption decisions. The more increase in natural gas and renewable energy power generation, the more it will make the price of electricity that raises the cost of industrial development. It's absolutely vital that the social planners obviously required a set of trustworthy and referenced modules to respond to fluctuations in energy prices.

The Kalman filter can capture the characteristics of variables modified over time in the model. When the variables change over time, it can be used to capture the change of the variable under the inclusion of new information and effects, thereby predicting new trends and traces. This algorithm not only expands the OLS model, but the electricity demand is a better policy and business assessment tool (Morrison and Pike, 1977).

2.2. KALMAN FILTER APPLICATION

It's absolutely vital that understanding the customer's needs is to be the growing business. Electricity companies try to foresee future trends in electricity demand. This shows that most studies create a model to capture the effect of economic variables on energy demand. We can discover many estimated tools and assume that the time series data is stable states. It limited to assist the decision-making and evaluation of relevant unit's company managers.

The structural time series model is an invaluable instrument for conducting research of electricity demand. The algorithm of the model is written by Kalman filter, which can be used to analyse the trend (horizontal plus slope), seasonality and irregular components in the time series. In this paper, we tried structural models with real independent variable time series in Taiwan. We decomposed the electricity consumption of sector time series with a smooth trend and we focused on the trend and the cyclical component. The issues affecting the consumption of electricity are nothing more than income, electricity prices and economic growth. The scope of this research is the power demand of each department in a period of time. In the specific presentation of electricity demand of various sectors, the most obvious way of electricity consumption is the seasonal difference.

In this study, we tried to hold energy price reform to measure the consumption of electricity in Taiwan. Aggregate electricity demand is modelled as a function of the real electricity price, real income, sector's electricity consumption and so on. We considered the following equation:

$$E_t = a_1 Gdp_t + a_2 Trans_t + a_3 Sv_t + a_4 Eng_t + a_5 Ind_t + a_6 Inc_t + a_7 Res_t + a_8 Agr_t + a_9 Ind_{t\_p} + a_{10} Res_{\_p} + \varepsilon_t \quad \dots \quad (1)$$

where

In period t, E_t is the dependent variable, is the total electricity consumption, Gdp_t is the electricity consumption of gross domestic product, $Trans_t$ is the electricity consumption of transport sector, Sv_t is the electricity consumption of service sector, Eng_t is the electricity consumption of energy sector, Ind_t is the electricity consumption of industry, Inc_t is the national income, Res_t is the electricity consumption of residential sector, Agr_t is the electricity consumption of agricultural sector, Ind_{t_p} is the price of industrial electricity and Res_{t_p} is the price of residential electricity.

The electricity consumption of each department varies under the time trend, which fully reflects the difference in energy demand of each department. Taiwan's economic momentum is mainly export trade. According to export data, Taiwan's peak export season is in the third and fourth quarters. Therefore, depending on the products was produced by each department, it must be completed in advance. Because the industrial sector has the largest proportion of total electricity consumption, lots of evidence has a great influence on the total electricity consumption and the electricity demand of GDP. The three variables of total electricity consumption, economic growth and industrial sector have been processed for the time lag trend. Finally, based on the aforementioned factors, this article uses the sspace (state space) in the EViews 7.2 software to provide a simple and easy-to-use interface, using a powerful recursive Kalman filter algorithm for analysis (Hamilton 1994a, 1994b; Harvey, 1989), equation (1) becomes

signal $E_t = c(1)*total(-1) + c(2)*gdp(-1) + c(3)*ind(-1) + c(4)*res_t + c(5)*sv_t + c(6)*trans_t + c(7)*eng_t + c(8)*agr_t + sv1*ind_{t\_p} + sv2*res_{\_p} + sv3*inc_t + [var = \exp(c(9))]$ (2)

state sv1 = sv1(-1) (3)

state sv2 = sv2(-1) (4)

state sv3 = sv3(-1) (5)

3. DATA

Applying the Kalman filter algorithm traced the electricity demand of various sectors. At first, this study tries to use the AREMOS database of Taiwan Economic Data Center to estimate the electricity consumption in Taiwan. The aggregate electricity consumption is measured in kilowatt-hour. Secondly, the electricity fare is obtained by the Bureau of Energy, Ministry of Economic Affairs; whilst the data series on national income and consumer price index was obtained from the Directorate General of Budget, Accounting and Statistics, Executive Yuan.

This paper explores the substantial change of real variables. We must convert nominal variables into real variables, in which the income and the electricity price is divided by CPI (constant prices 2016). The database is from 1991Q1 to 2020Q1. Finally, we obtained the real variable rate of change to apply to the Kalman filter calculation model.

4. RESULTS AND DISCUSSION

4.1. ADF&PP TEST

The article used to capture the relationship between electricity price and electricity consumption which was the Kalman filter. Before using the econometric model evaluation, the statistical test will be provided assistance by verifying if the estimated parameters changed over time. For this study, we selected the statistical verification methods of ADF and PP. Because the p-value is smaller than the 5% significance level, regardless of how the ADF and PP tests rejected the null hypothesis that the parameters were stable. The results are displayed in Table 1. According to these results, we applied the Kalman filter model further.

TABLE 1

Variables	ADF	PP
eng_t	-8.528***	-20.916***
gdp_t	-8.322***	-49.275***
$Income_t$	-7.515***	-30.857***
ind_t	-9.243***	-22.865***
ind_{t-p}	-9.383***	-26.537***
$total_t$	-8.922***	-16.377***
$trans_t$	-5.642***	-25.054***
sv_t	-8.719***	-17.040***
Agr_t	-19.540***	-20.593***
Res_t	-6.927***	-24.740***
Res_{t-p}	-9.129***	-49.487***

Note: *Statistically significant at 10%; **statistically significant at 5%; ***statistically significant at 1%.

4.2. KALMAN FILTER

In the model, the Kaman filter was used to explore the trend of the electricity price, electricity consumption, and the variables in various sectors in the same period. Table 2 reports that the algorithm of structural time series model is the Kalman filter estimation results.

TABLE 2

Space Model		
Sample:1991Q2~2020Q1		
Included observations:116		
Variables	**Estimated coefficients**	**p-vale**
C(1)	-0.0912	0.0061
C(2)	0.0003	0.5276
C(3)	0.0228	0.2581
C(4)	0.0930	0.0009
C(5)	0.4927	0
C(6)	0.0506	0.0316
C(7)	0.0820	0.1285
C(8)	-0.0117	0.7615
C(9)	-8.5112	0
Variables	**Final State**	**p-vale**
SV1	-0.0027	0.8575
SV2	-0.0158	0.3593
SV3	0.0903	0.0067
Log likelihood	294.9693	
Akaike info criterion	-4.9734	
Schwarz criterion	-4.7556	
Hannan-Quinn criter	-4.8862	

c(1)represents the total electricity consumption in period t-1; c(2) represents the gross domestic production period t-1; c(3) represents the electricity consumption of the industry in period t-1 ; c(4) represents the electricity consumption of the residential sector in period t ; c(5) represents the electricity consumption of the service sector in period t ; c(6) represents the electricity consumption of transport sector in period t; c(7) represents the electricity consumption of the energy sector in period t; c(8) represents the electricity consumption of the agriculture sector in period t; c(9) represents the constant parameters of the estimation in period t; sv1 and sv2 represent the final estimates for the electricity price elasticity of industry and household and sv3 represents he final estimates for the income elasticity.

The main driving force of Taiwan's economic development is exports. The economic growth will inevitably affect the growth of electricity consumption. The relationship between the gross domestic product and electricity consumption almost shows to change in the same direction for the time period in in Figs. 1. Thus, it's vitally important to discuss electricity prices and electricity consumption in detail.

FIGURE 1
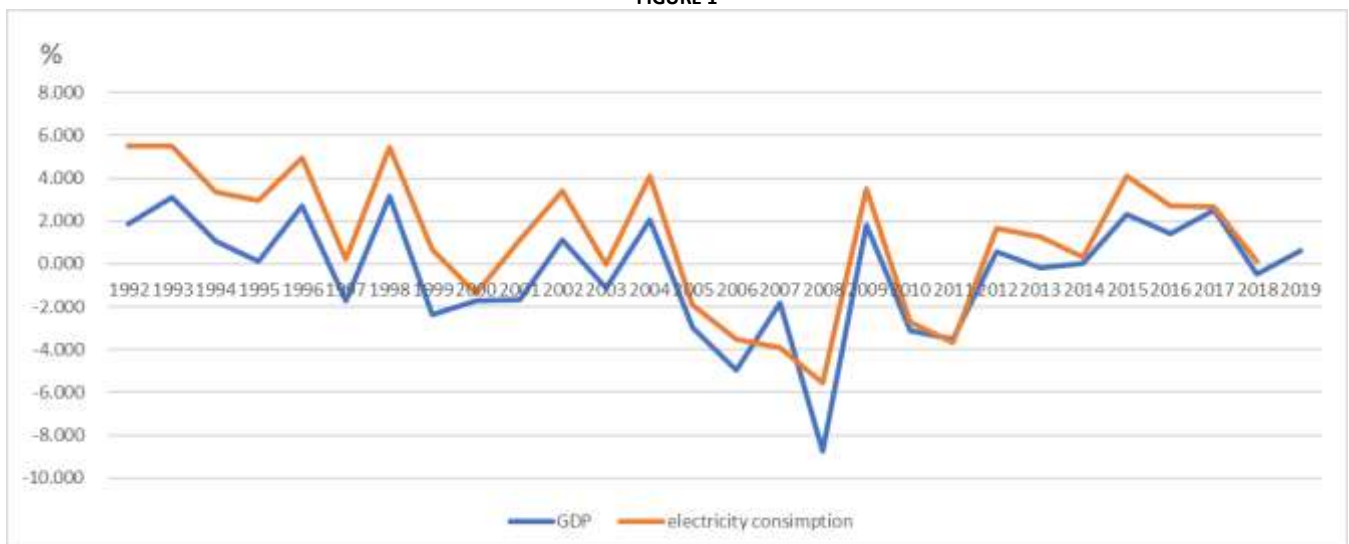
We try to describe the elasticity trajectory of income and industry/residential sector electricity price in Figs. 2 and 3. Most of the income elasticity changes in the same range as the price elasticity. This fact reveals that the electricity price alone cannot reduce the electricity consumption of the department.

Therefore, in order to reduce electricity consumption, the social planer has to form a complete set of policy incentive-supporting mechanisms, such as demand response and carbon tax, which have been common in recent years.

FIGURE 2
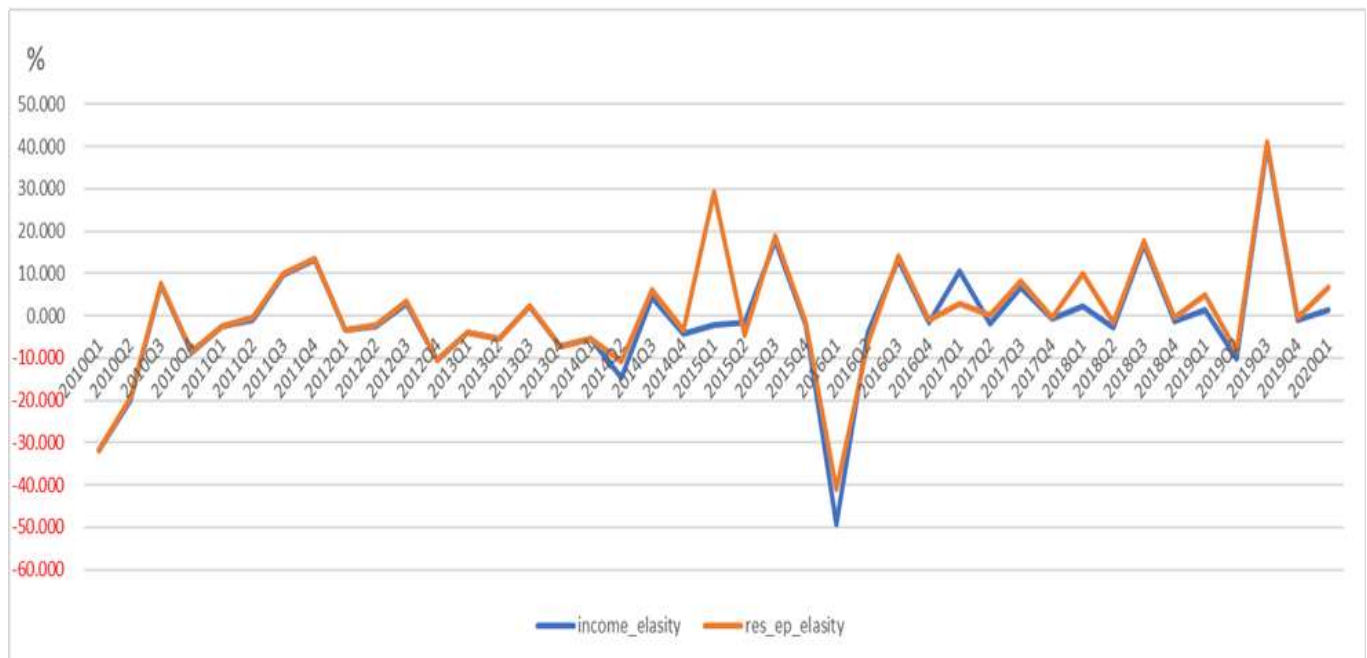
5. CONCLUSION

Electric demand rests with both electric valance and the inflation. In the previous decade, electric fees and consumption always are the major issue of energy policy in Taiwan. The main reason is that energy (electricity) prices will affect the consumer price index and industrial factor cost. The industrial sector occupies the highest electricity consumption of all sectors, accounting for 52% on average. In 2012, a substantial adjustment of energy prices did not change the behaviour of electricity consumption, but it caused the commodity price to fluctuate sharply. It has aroused people's expectations and may have led to rising prices. This is a far cry from the original policy goal of reducing electricity consumption.

Behaviour Shaping lies in the accumulation of daily life. The response of various sectors to the difference in electricity prices lies in the direction of electricity consumption. If it assumed that the electricity demand variable sequence was in a long-term stable state sequence once people faced the changes in prices, the current electricity consumption behaviour would be changed. The advantage of the Kalman filter algorithm model captured short-term data trends, wherein it was particularly suitable for the discussion of electricity demand.

The mode makes both ends of the supply and demand which process the goal of suppressing power consumption/generation. It can be regarded as a positive advantage of suppressing electricity demand. In recent years, many policies have proposed a comprehensive energy transition to decouple energy use from economic growth. For less developed countries or developing countries, it is a win-win trajectory for economic development and energy demand and it is a worthwhile approach.

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