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E-mail: research@ bostoncollege.edu.np | URL: www.bostoncollege.edu.np

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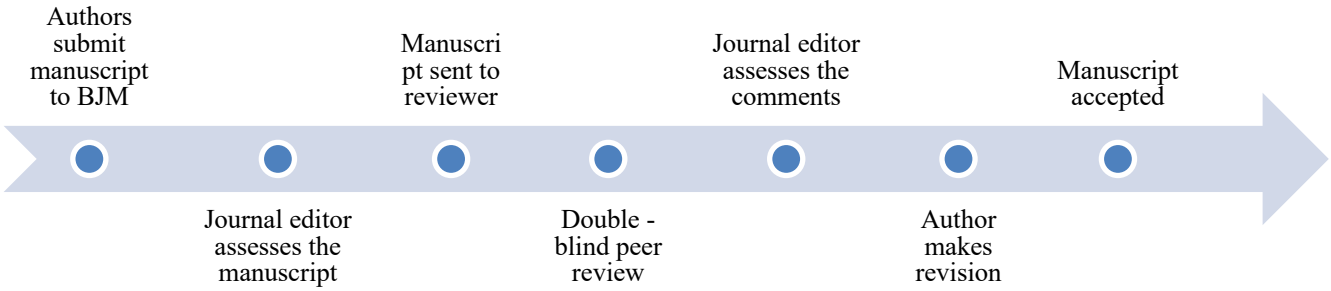

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Contents

PHARMA SCIENTISTS REFLECTION ON R&D IN NEPALESE PHARMACEUTICALS: A QUALITATIVE STUDY

- *Post Raj Pokharel[1], PhD*

Abstract

Pharmaceutical companies are greatly regulated and monitored by both the government and the public. R&D is mandatory, core, and plays a significant role in the pharmaceutical industry. Considering this aspect, a qualitative study is done taking information from eleven key pharma scientists from four different pharmaceutical companies. The key participants for this study were Nepalese pharmaceutical scientists who were engaged in the R & D department. In addition to this, the expertise of quality control, quality assurance, production, and pharmaceuticals leaders specific to pharma executives were also taken into consideration. The study findings are categorized into four themes consisting of R&D challenges, factors influencing R&D, R&D spending, and financial aspects. The study results showed that higher investment for R&D, the complexity of clinical trials, administrative issues in the governing body, low output in research, and reduced R&D efficiency of pharmaceuticals company are the key R&D concern where the expected costs to develop a new drug, anticipated lifetime revenues from a new drug, and policies and programs that influence the supply of and demand for prescription drugs are the factors influencing R&D.

The study concluded that the portion of the pharmaceutical industry requires innovation, investment, and intelligence for the expected level of research and development. Further, R&D is not as such R&D in Nepalese pharmaceuticals as the true amount of investment is still the prime concern for exploiting the effective rate of return from drug manufacturing.

Key Words: R&D, qualitative research, pharmaceutical investment, profitability

I. Introduction

Pharmaceutical companies are greatly regulated and monitored by both the government and the public (Jirasek, 2017). R&D is the core (Kim, 2014) and plays a significant role in the pharmaceutical industry (Erickson & Jacobson, 1992). It has a noteworthy effect on gaining superior performance (Ho et al., 2005). For instance, Bhagat et al. (2001) study reported that an increase in R&D investment leads to increased EPS (earning per share) of pharmaceutical companies. Similarly, research-based pharmaceuticals have a high portion of R&D intensity (Tjandrawinata & Simanjuntak, 2012). The realized importance of research and development (R&D) for the introduction of new products especially in Nepalese pharmaceuticals is the central issue of the study. The question of highly capital-intensive, effort to introduce and the expertise of existing human resources, called pharma scientists and their availability in Nepalese pharmaceuticals is another focus of the study.

[1] Pokharel is the Head of Research Department at Boston International College

The concept behind R&D in pharmaceuticals states that pharmaceutical companies develop and produce drugs for relieving diseases. The most noteworthy actions in the industry consist of medicine development, production of the active pharmaceutical ingredient called primary production, and production of the drug distribution system, e.g., vials or pills called secondary production. It's obvious that evolving and introducing a new medicine incurs a substantial amount of phase and money, since new drugs have to go through a series of clinical trials prescribed by regulatory authorities based on the prescribed standard. These trials involve testing the medicine on a large number of patients and intensive care their response to the medicine while using other patients given a placebo as a reference group. The trials should show not only the efficacy of the medicine but also find possible side effects and the pharmacokinetic properties of the drug.

Each country has its authority, which needs to approve the medicine, such as DDA in Nepal, and FDA in the US. Based on the established guidelines, pharmaceutical companies attempt to get the medicine approved in one country and thereafter use mutual recognition for getting the approval in other countries or the company can just get it approved in each country (Davis, 2003). Common for all authorities in all countries is that they need to approve the drug before it can be sold in the respective countries.

In Nepal, the most influential regulatory body is the DDA. This authority puts up Medicine Registration Guidance (DDA, 2016) and Drugs Registration Rules, 2038 for how pharmaceutical companies in Nepal should behave. Most noteworthy are the prescribed clinical trials, which require companies to test their medicine on a sizable population in a controlled manner such that the proven efficacy of the drug and any possible side effects are discovered. In the context of Nepalese pharmaceutical companies, DDA has made it mandatory to have all pharmaceutical companies own R&D departments and comply with the process for product registration as per WHO-GMP guidelines and pharmacopeia standards (DDA, 2016). However, no evidence was found introducing new products of their own in Nepal. A research-based pharmaceutical company is still not yet evident.

Thus, this study is highly motivated to present the status of R&D and its development in the Nepalese context connecting with the reflection from scientists who devoted their work for R&D in Nepalese pharmaceuticals.

II. Literature Review

Pharmaceuticals' history is fundamentally backed by the mythological origin of Ayurveda and has a strong link with Brahma, the God of Creation. "Ayurveda originated in the 10th century BC, but its current form took shape between the 5th century BC and the 5th century AD. In Sanskrit, Ayurveda means 'science of life"(WHO, 2001, p. 12). Khakurel (1996) mentioned in his presentation that Nepalese people use medicinal herbs before 500 AD. Similarly, "Allopathic medicine refers to the broad category of medical practice that is sometimes called, Western medicine, biomedicine and scientific medicine (or, modern medicine)" (WHO, 2001, p. 11).

Ayurveda has been a national medical system in Nepal (Kunwar & Leboa, 2017). Ayurveda is referred to as the "Mother of all healing". Pharmaphorum (2020) also mentioned, "origins of the pharmaceutical industry lie back with the apothecaries and pharmacies that offered traditional remedies as far back as the Middle Ages, offering a hit-and-miss range of treatments based on

centuries of folk knowledge". R&D of pharmaceutical products is necessarily a lengthy process (Elmquist & Segrestin, 2007, as cited in Kim, 2014).

In response to the importance of innovation in pharmaceuticals, the (WHO, 2002, as cited in IFPMA, 2004) reported that:

> "*Out of more than 5,000 identified diseases, the number of disease genes discovered so far is 1,253 and the molecular characterization of clinical disorders exists for more than 1,700 diseases. Even for those diseases with a relationship to disease genes, the molecular sequences needed to design a drug are largely unknown. That leaves a significant number of medical conditions whose origins are unknown and which consequently lack appropriate treatments*" (p. 13).

CBO (2021) claimed that the pharmaceutical industry devoted $83 billion to R&D expenditures in 2019 for discovering and testing new drugs, developing incremental innovations such as product extensions, and clinical testing for safety-monitoring or marketing purposes. Similarly, CBO (2021) stated three factors of R&D spending in pharmaceutical companies namely "anticipated lifetime global revenues from a new drug, expected costs to develop a new drug, and policies and programs that influence the supply of and demand for prescription drugs"(p. 5).

Developing a new medicine is a long process in pharmaceuticals, as it is subject to many strict requirements or guidelines called Good Manufacturing Practices (GMP) issued by the Food and Drug Administration (U.S. Food and Drug Administration, 2021). The harder requirements set by the regulatory authorities for proving better efficacy than existing treatments (DiMasi and Grabowski, 2007) to safeguard patients by putting high demands on quality and cleaning to avoid (cross) contamination in production (Grunow et al., 2003) take longer and are less likely to return a sellable drug afterward (DiMasi, 2002). It is evident that out of 10,000 compounds screened, 250 enter pre-clinical trials and 1 drug eventually reaches the market (PhRMA, 2012). Thus, R&D pipelines are no longer thriving with an abundance of potential blockbuster drugs (Hunt et al., 2011). As generic manufacturers launch cheap copies after patent expiration, companies have to be good at developing their drugs fast, if they want to use the exclusivity of the patent protection for recouping their investment and turning a profit.

Lee and Choi's (2015) study of Korean pharmaceutical companies showed that investment in R&D is determined by liquidity rather than return on investment or sales growth of the company.

III. Research Methods

The study followed a grounded theory approach (Martin & Turner, 1986) in which qualitative data was obtained from direct interactions with pharma scientists while seeking research and development in the pharmaceutical company. Based on Yin (2016), this study believes that qualitative inquiry in R&D can assist in the appropriate contribution to pharmaceutical decision-making. The interview information is envisioned to present the results found in the discussion by availing a more thoughtful view of the phenomenon associated with R&D investment. Pharmaceutical scientists were purposively chosen. The key participants for this study were Nepalese pharmaceutical scientists who were engaged in the R & D department. In addition to this, the expertise of quality control, quality assurance, production, and pharmaceuticals leaders specific to pharma executives were also taken into consideration.

Table 1 Demographic characteristics of participants in the study (N=11)

	Interview Participants		***Interview Participants***
Age Group		*Education*	
25-35	*3*	*Graduate*	*8*
35-45	*5*	*Doctoral*	*3*
45>	*3*	*Experience (years)*	
Marital Status		*5 to 10*	*5*
Single	*5*	*11 to 20*	*4*
Married	*6*	*20>*	*2*

IV. Data Collection

During obtaining data relevant to pharmaceutical scientists' opinions, enough opportunities were provided to the respondents to share their opinions. Individual interviews with eleven pharma scientists were taken around 10 to 20 minutes each. Research participants were given comfortable time to deliver their opinion relevant to R&D issues, investment, and related areas. The researcher pretended to be an active listener (Yen, 2016) to gain more insights into the title. Participants were encouraged to add more and more remarks on the pertinent issues of the topic. The conversations were transcribed and also copied free opinions based via message box. After getting back all the information, the data were coded and then categorized into four themes R&D challenges, factors influencing spending for R&D, R&D spending, and financial aspect. In the findings section, data obtained from the interview are presented.

V. Ethics

Since, this study is purely qualitative in nature, reliability, basically strives on the stability of pharma scientists' reflection towards R&D among eleven responses which have been keenly analyzed using data code, categorizing the data into four separate themes and also thematizing the data to validate the core idea under study. The study used the reference from Lincoln and Guba's (1985) study for the right "trustworthiness" equivalent for internal validation, external validation, reliability, and objectivity. Similarly, for internal consistency, the reference from Creswell and Poth (2013) was also considered for assessing the "accuracy" of the information.

In this study, pharma executive heads were interviewed; however, their opinions are cross-matched with the pharma scientists working in R&D. This is a way of assuring the validity of research to cross-validate information and capture a different dimension of the four themes of this study. Data during the interaction session were typed and written statements via message box have been directly copied and pasted to the data sheet by the primary researchers. Based on the statements, key notes/points/themes were coded and sorted into categories, then arranged into themes using cross-sectional thematic analysis by the primary researcher. The process of categorizing the data and the formation of themes was cross-checked. This process elicited primary and secondary themes very closely aligned with those formed by the researcher. From the themes, unifying constructs were identified.

VI. Research Findings

The finding of this study is categorized as per the key themes of the study consisting of R & D challenges, factors influencing R&D, R&D spending, and financial aspect. The following section consists of a detailed discussion of how the five dimensions of R&D in pharmaceuticals.

R&D Concern

R&D concern in the Nepalese pharmaceuticals industry is vital as opined by the majority of the respondents during the interaction phase of data collection. They also opined that there exist numerous challenges in R&D such as a higher burden of approval, complex research required for new drugs, higher capitalized cost for R&D, the complexity of clinical trials, lower risk tolerance of regulators, and society, low output in research and reduced R&D efficiency of Pharmaceuticals Company.

Factors influence spending for R&D

During the discussion relevant to reflection on R&D, frequent statements were under discussion on factors influencing R&D in Nepalese pharmaceuticals. Based on this, key factors were outlined as the expected costs to develop a new drug, anticipated lifetime revenues from a new drug, and policies and programs that influence the supply of and demand for prescription drugs.

R&D Spending in the pharmaceuticals

While interacting repeatedly with the research participants relevant to factors that influence R&D, the repetitive nature of R&D spending statements was underlined such as:

- *Invention, or research and discovery of new drugs*
    - o *Development, or clinical testing, preparation and*
    - o *submission of applications for DDA approval, and*
    - o *design of production processes for new drugs*
- *Incremental innovation, including the development of new dosages and delivery mechanisms for existing drugs and the testing of those drugs for additional indications*
- *Product differentiation, or the clinical testing of a new drug against an existing rival drug to show that the new drug is superior*

Financial aspect

The research participants considered the financial aspect as the key part of pharmaceuticals R&D. One of the pharmaceuticals scientists' perceptions about the financial aspect as per his experience:

> *Initially, the investment in R&D labs with laboratory equipment is very high for Nepalese pharmaceutical investors. Secondly, the sourcing of raw materials for R & D seemed higher due to the high rate for small quantities and the high rate for courier charges. Raw materials sourced from third countries like Germany, England, … incur high rates. The cost for reference standards, frequent trials, and hiring experts for the product introduction are very high, and management, sometimes felt, a delay in decision-making due to the high amount of investment.*

The key financial indicators have been directly associated with the R&D investment as perceived by the respondents. Among the financial indicators, the most repetitive indicators perceived by the respondents in connection with R&D aspects are:

· Inventory of R&D specific to raw materials, reference standards, and quality testing competency has a positive influence on R&D

- Easy and subsidized bank financing for R&D materials has a positive influence on R&D investment
- Expected return on investment has a positive influence on R&D
- The expected increase in sales has a positive influence on R&D

Existing status of R&D

Pharmaceutical companies' major requirement is having their R&D lab. During the interaction with pharma scientists, they claimed that a few companies were having R&D activities in their lab but few of them were in the quality control lab. The opinion and actual aspect of R&D was found contradictory in the sense of necessity and requirements. Dr. Duganath, relevant to the context of the existing status of R&D in Nepalese pharmaceuticals companies stated:

> *Few companies are found investing a huge portion around more than 10% of the total investment in R&D departments including plants, machinery, system, people, raw materials trials, and people. Rabbits and rats were also used to test the efficacy of the products which was a good practice in R&D trials.*

VII. Discussion

The above explanation shows that the research and development in the Pharmaceuticals Company in Nepal are influenced by financial indicators such as current ratio, debt, return on investment, and sales growth (Lee & Choi, 2015; Pokharel, 2017; Pokharel, 2018; Pokharel, 2019). Specifically, investment in laboratories, quality control, retaining pharmaceutical scientists with a comfortable working environment, and the expected level of return on investment in R&D have given great attention to Nepalese pharmaceutical investors.

VIII. Conclusion

It can be concluded that a portion of the pharmaceutical industry requires innovation, investment, and intelligence for the expected level of research and development. R&D is not as such R&D in Nepalese pharmaceuticals as the true amount of investment is still the prime concern for exploiting the effective rate of return from drug manufacturing.

Although the attempt of introducing new products in the companies is made, it is necessary to update to the tune of R&D-based pharmaceutical companies having an adequate number of pharmaceuticals of research, comfortable quality control laboratories, the right number of pharmaceuticals scientists, and visionary investors.

References

Bhagwat, Y., DeBruine, M., & Gondhalekar, V. (2001). R&D leverage – A measure to evaluate the impact of R&D on earnings of pharmaceutical companies. *Journal of Research in Pharmaceutical Economics, 11*(3-4), 55 – 68.

Davis, H. (2003). The licensing of medicines, UK medicines information, Liverpool, United Kingdom.

Congressional Budget Office (2021). Research & development in the pharmaceutical industry.

Creswell, J., & Poth, C. (2013). Qualitative inquiry and research design: Choosing among five approaches (Fourth ed.). Los Angeles: SAGE Publications.

Department of Drug Administration (2016). *Medicine Registration Guidance*.

DiMasi, J. A. (2002). The value of improving the productivity of the drug development process Faster times and better decisions, PharmacoEconomics, 20 (Suppl 3), 1-10.

DiMasi, J. A., & Grabowski, H. G. (2007). The cost of biopharmaceutical R&D: Is biotech different?, *Managerial and Decision Economics*, 28 (4-5) 469-479.

Elmquist, M., & Segrestin, B. (2007). Towards a new logic for front-end management: From drug discovery to drug design in pharmaceutical R&D. *Creativity and Innovation Management, 16*, 106-120.

Erickson G., & Jacobson, R. (1992). Gaining Comparative Advantage through Discretionary Expenditures: The Returns to R&D and Advertising. *Management Science*, 38(9) (September), 1264 – 1279.

FDA (2004). Innovation or stagnation: challenge and opportunity on the critical path to new medical products, Food and Drug Administration.

Grunow, M., Gunther, H. O., & Yang, G. (2003). Plant co-ordination in pharmaceutics supply networks, OR Spectrum, 25 (1) 109-141.

Ho, Y. K., Keh, H. T., & Ong., J. M. (2005). The Effects of R&D and Advertising on Firm Value: An Examination of Manufacturing and Nonmanufacturing Firms. *IEEE Transactions on Engineering Management,* 52(1), 3 – 14.

Hunt, V., Manson, N. & Morgan, P. (2011). A wake-up call for Big Pharma, McKinsey & Company, McKinsey Quarterly.

International Federation of Pharmaceutical Manufacturers Associations (IFPMA) (2004). The pharmaceutical innovation platform: Sustaining better health for patients worldwide.

Jirasek, M. (2017). R & D investment behavior of U.S. pharmaceutical firms. International Journal of Innovation Science, 9(2).

Khakurel, B. K. (1996). The regulation of herbal medicines in Nepal. Presented at the Eighth international conference of drug regulatory authorities, Manama, Bahrain, 11 November 1996.

Kim, H. R. (2014). Formulation of a success model in pharmaceutical R&D: Efficient innovation
model. *SAGE Open*, 1-9.

Kunwar, R. M., & Leboa, C. (2017). Ayurveda in Nepal. *INDRENI, 25th Anniversary Edition*, 49-51.

Lee, M., & Choi, M. (2015). The determinants of research and development investment in the pharmaceutical industry: Focus on financial structures. *Osong Public Health Res Perspect, 6*(5), 302-309.

Lincoln, S. Y., Guba, E. G. (1985). Naturalistic inquiry. Thousand Oaks, CA: Sage.

Martin, P. Y., & Turner, B. A. (1986). Grounded theory and organizational research. *The Journal of Applied Behavioral Science*, 22(2), 141.

Pharmaphorum (2020).A history of the pharmaceutical industry. https://pharmaphorum.com/r-d/a_history_of_the_pharmaceutical_industry/

Pharmaceutical Research and Manufacturers of America (PhRMA) (2012). Pharmaceutical Industry Profile 2012, Pharmaceutical Research and Manufacturers of America, Washington, DC.21. Homepage of the U.S. Food and Drug Administration

Pokharel, P. R. (2017). A Survey of contemporary pricing policy: Nepalese pharmaceuticals Products. http://dx.doi.org/10.2139/ssrn.3634388

Pokharel, P. R. (2017). Promotional Tools Effect on Pharmaceuticals Marketing. Saptagandaki Journal, 8, 79-84., Available at SSRN: https://ssrn.com/abstract=3675182

Pokharel, P. R. (2018). A review: Model used for analyzing pharmaceuticals profitability http://dx.doi.org/10.2139/ssrn.3634476

Pokharel, P. R. (2019). Costing matters or not ? Case of Nepalese pharmaceuticals companies. http://dx.doi.org/10.2139/ssrn.3634472

Scannell, J. W., Blanckley, A., Boldon, H., & Warrington, B. (2012). *Diagnosing the decline in pharmaceutical R&D efficiency. Nature Reviews Drug Discovery, 11(3), 191–200.*

Tjandrawinata, Raymond R., & Simanjuntak, D. G. (2012): *Factors affecting productivity of research-based pharmaceutical companies following mergers and acquisitions.*

World Health Organization (2001). Legal Status of Traditional Medicine and Complementary/Alternative Medicine: A Worldwide Review.

World Health Organisation (WHO) (2002). Genomics and the world health. Report of the Advisory Committee on Health Research, Geneva 2002.

Yin, R. K. (2016). *Qualitative research from start to finish* (2nd ed.). The Guilford Press, New Work, London.

BILATERAL TOURISM RELATIONS BETWEEN NEPAL AND INDIA

- Dr. Khom Raj Kharel, Dr. Yadav Mani Upadhyay and Omkar Poudel

Abstract

The tourism economy has a potential contribution to the economic development of a country. The tourism industry quantitatively contributes to a country in terms of foreign exchange earnings, employment generation, and gross domestic product (GDP) as well as contributes to the nation employing social and cultural exchanges. This research paper is concerned with the contribution tourism industry to the Nepalese and Indian economies. The tourism industry is a multi-industry and multi-product as well tourist demand is complementary and has to be met by several goods and services, which are not only spatially disparate but also functionally different. Tourist products are highly perishable and the bulk of tourist facilities have an in-built inflexibility. This paper initially reviews the concern and using a model, it deals with the factors affecting the economic impacts associate with tourism. The economic impact is measured in terms of direct employment, foreign exchange earnings, and GDP due to the flow of total tourists' arrival of tourists in different fiscal years by using a simple linear regression model and correlation. Results reveal that there is a positive economic impact of the tourism industry in both economies.

Key Words: *Tourism economy, Comparison, Contribution, Impact, Economic development*

I. Introduction

Tourism economy coordinates different components of its product to create a package service, so that helping to earn revenue, employment and foreign currencies. The tourists products are the highly perishable and magnitude of tourists' facilities have to be built inflexibility. The expenditures made by the tourists are also multi-product in nature. A dollar spent by a tourist transmits impulses to different sectors of the economy. The growth of tourism has had a significant impact on all aspects of economic, socio-cultural and physical environment of a country. The outcome of growing tourism cannot be considered as an isolated phenomenon. Thus, it has come up as an important connecting in gearing up the pace of socio-economic development world over. Tourism size and its quality contain many activities which form and correlate horizontally and vertically with other productive activities sectors, making the economic wheel rounding and growing continuously (Jenkins & Henr,1982).

Most of industrialized and emergent countries consider creating a powerful tourism industry an important element for their economic growth in the long term based on services provided and grounds of these services to be found which in the end contributes to the developing of the country's infrastructure. According to the World Travel & Tourism Council's (WTTC) annual research in 2018, travel and tourism is one of the world's booming industries, generating approximately US$ 8.8 trillion annually and contributing 319 million jobs to the world economy and more than 600 million international tourists visit different parts of the world every year (Mahatara, 2019*).*

Tourism sector has been contributing significantly to the world economy. As per the WTTC 2019, the tourism economy contributes US$ 8.9 trillion to the world's GDP which covers 10.3 percent of global GDP. The tourism sector generates 330 million jobs where 1 in 10 jobs around

the world. The world capital investment from tourism sector was $ 948 billion US dollar which presents 4.3 percent. The world tourism sector $ 1.7 trillion visitors' exports i.e., 6.8 percent of total exports and 28.3 percent of global service exports (WTTC, 2019).

Nepal and India hold great potential for tourism development, which can stimulate economic growth and development. Tourism sector is the main instrument for regional development with positive economic impact on the income, employment and production. Significance of tourism industry could be judged by calculating the contribution made by tourist receipts to national income and employment generation in the country. The main economic significance of tourism lies in the fact that money usually earned by a person at his normal residence is spent in the place visited by him.

Nepal and India both have great potentiality to become a top destination for tourists as the nation is famous for its snowcapped mountains, abundant flora and fauna, exciting trekking routes and rich cultural and religious diversity. As per the report 2017 covers 136 economies, of which China ranks 15th, India 40th and Nepal 103rd in global rankings. Both countries are highly potential for development of tourism economy. The general objective of the study is to analyze the tourism economy of Nepal and India on comparative manner.

II. Research Review

Tourism is one of the most important industries in the world which gives a significant source of economic outcomes and the possibility and opportunity for employment. It is also a complex industry which requires huge capital investment and resources as well. For finding the research problems various national and international research documents and journals have been reviewed.

The research article conducted by Zurub et al. (2015) has found that the majority of developed economies consider tourism as a fundamental industry for their economic growth because it depends on other productive sectors making the infrastructure of a zone and cycling its economic wheel. They used the descriptive statistics to analyze the time evolution of the concerned socio-economic phenomenon, the tourism industry's contribution to the gross domestic product (GDP) by using data from the selected countries.

Stynes (1997) has found that the principal motivation for a business to serve tourists is generally economic. A good understanding of tourism's economic impacts is important for the tourism industry, government officials and the community as a whole. The researcher has attempted to define the key concepts and explain the basic methods for estimating the impacts of tourism. Tourism's economic impacts are important considerations in state, regional and community planning and economic development. The author has applied the Input-output mathematical model that describes the flows of money between sectors within a region's economy. The author has used the descriptive and analytical research design.

The impact of tourism on any destination generally depends among other things, on a variety of factors such as volume, type and seasonality of tourism activities. Tourism is also to a large extent determined by structure of the host economy, differences in socio-cultural characteristics between hosts and visitors, and the characteristics and fragility of the local environment. The unplanned tourism activities can pollute nature and cultural environment as much as it influences

the social and economic life styles in the host country (Shrestha & Shrestha, 2000). Malhotra (1995) has focused that tourism effects the economy of destination area cannot be questioned however the extent of this effect, its implications and repercussions are debatable. There are countervailing forces at play within an economy the costs and benefits accruing from tourism are not immediately quantifiable.

Anupriya & Rajasekaran (2016) has conducted a study toward tourism and its financial impact on the Indian GDP. The findings of the study that travel and tourism industry focuses on the economic and social contribution which promotes sustainable growth for industry. Malik &d Nusrath (2014) had reviewed the tourism development in India, they pointed that tourism industry has the significant contribution to Indian GDP, employment and foreign exchange earnings. They analyzed the changes in number of tourist arrivals from 1997-2012, increase in economic growth rate and development of tourism.Tourism contributes in the significant growth of economic, social, cultural, education and political sectors. The growth of tourism sector has resulted in employment generation, foreign exchange earnings, capital investment, socio-economic growth, increasing in the contribution to GDP (KC & Leelavathi, 2016).

Different study paper and research works has found that there is significant role of tourism economy of a country. There has also been significant contribution and impact of this sector in the economy. The contribution and economic impact of tourism economy related development consists broadly of benefit and costs. Many studies around the world reveal that in the economic development strategies of any country establishment and expansion of the tourism sector has played a critical role. The experiences of many countries have shown that tourism is capable of bringing substantial economic benefits.

By reviewing the different research papers, it has been found that there is significant contribution and economic impact of tourism industry in the economy. Those studies are mainly related to the role of tourism industry in economic development. The contribution and impact of tourism on employment, GDP and foreign exchange earnings etc. have been studied on tourism economy. The research papers have been conducted on different country context. In the context of bilateral study of Nepal and India, such compressive study has not been yet, so the focus of this paper is to analyze the contribution and economic impact of tourism industry special reference to Nepalese and Indian.

Many studies around the world reveal that in the economic development strategies of any country establishment and expansion of the tourism sector has played a critical role. There have been conducted many studies toward the contribution and economic impact of tourism industry in different countries, in case of Nepal and India such bilateral comprehensive study has not been done. Developing tourism economy of Nepal and India has a difficult task because both countries have been facing policy problems, socio-economic problems, insecurity and good hospitality as well infrastructure and climatic issues.

III. Research Methodology

This study is based on secondary data and descriptive and analytical research design is applied to analysis and reviews the different sectors of tourism industry. All analysis and discussion have been based in published source of secondary data (2000/01-2018/19) which have been published by Ministry of Finance as Economic Survey, Ministry of Tourism of Nepal and Ministry of

Tourism of India, Department of Tourism of both countries, World Travel and Tourism Council (WTTC), Nepal Rastra Bank, Central Bureau of Statistics (CBS) and other different associations which are related with tourism economy. The economic impact is measured in terms of foreign exchange earnings, employment generation, and contribution to gross domestic product (GDP).

To show the relationship of dependent variables and independent variables, and measuring the economic impact on the economy, linear regression model is applied assuming total tourists arrivals independent variables and employment and foreign exchange earnings as dependent variables. The contribution of tourism economy on GDP and other economic impact has been examined in descriptive manner. Some descriptive statistics such as table and line graph are also used to explain the data.

Model Specification

The following equations are used to estimate the impact of total tourist arrivals on employment and foreign exchange earnings:

The impact of total tourist arrivals (TTA) on employment of Nepal (E_N) is estimated by:

$$E_N = \alpha_0+\beta_1 TTA+\varepsilon_t \ldots\ldots\ldots\ldots (i)$$

Where, employment is generated due to total tourist arrivals (TTA) in Nepal. The α_0 is constant, β_1 is coefficient parameter.

The impact of total tourist arrivals (TTA) on employment of India (E_I) is estimated by:

$$E_I = \alpha_0+\beta_1 TTA+\varepsilon_t \ldots\ldots\ldots\ldots (ii)$$

The impact of total tourist arrivals (TTA) on foreign exchange earnings of Nepal (FEE_N) is estimated by:

$$FEE_N = \alpha_0+\beta_1 TTA+\varepsilon_t \ldots\ldots\ldots\ldots (iii)$$

The impact of total tourist arrivals (TTA) on foreign exchange earnings of India (FEE_I) is estimated by:

$$FEE_I = \alpha_0+\beta_1 TTA+\varepsilon_t \ldots\ldots\ldots\ldots (iv)$$

Employment and foreign exchange earnings are expected to be increase due to total tourist arrivals in Nepal and India. For analyzing and interpreting the data collected through the different sources in the process of presentation and analysis, both the qualitative and quantitative parameters have been used. Required econometrics, accounting and statistical tools and techniques has been applied. Data are also presented in tables, graphs and diagrams as required.

IV. Results and Discussion

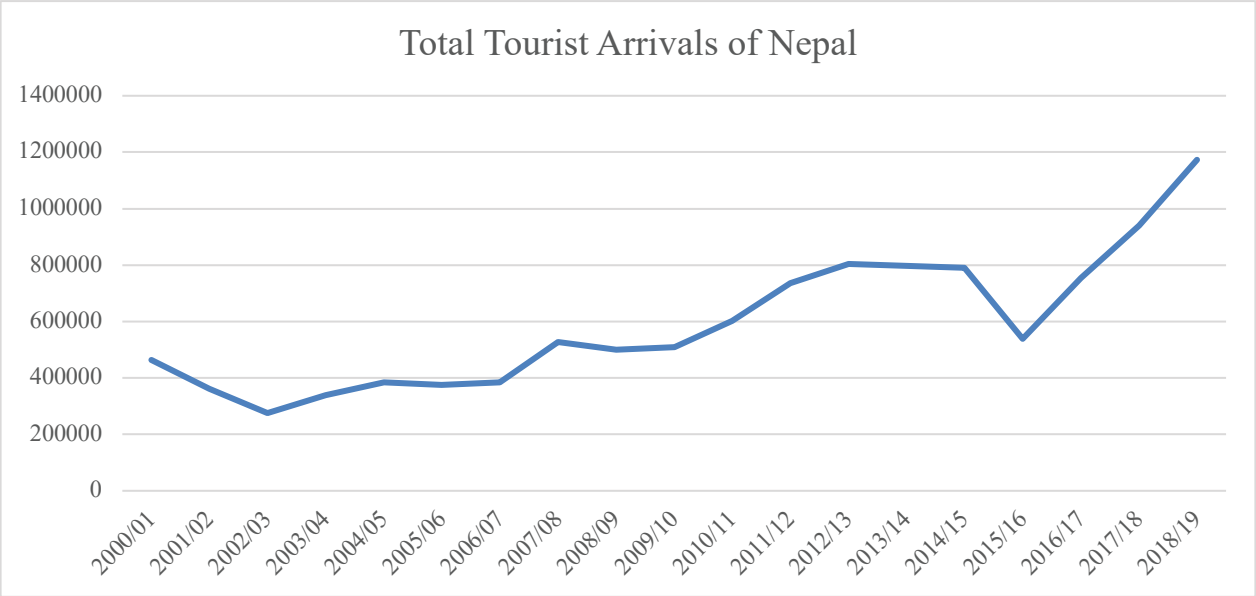
Tourism economy has a significant contribution and impact on the economy of any country and the world. Tourism industry helps in creating the opportunity of employment and foreign

exchange earnings of a country. The increment of employed people helps to generate income and raise the standard of their living. It helps people to create new industry in rural areas and increase their production. These all helps to increase the tax collection which later helps in economy of the country. Tourism industry has been extending these days and number of tourists arrival also increasing these days. Various programs have been operating for the development of tourism industry and tourism policy has also been more liberal. A large number of tourists are visiting Nepal and India since the decades.

Trends of Tourist Arrivals and Average Duration of Stay to Nepal and India

The number of total tourist arrivals and their average duration of stay keep significant meaning of a country. The increasing number of tourist arrivals enhances opportunities in diversified areas. In the context of Nepal, the total tourist arrivals and their average duration of stay is undertaken through Ministry of Finance. There is fluctuation of tourists' arrivals of Nepal due to political factors as well other unnecessary changing environment for tourists in different years.

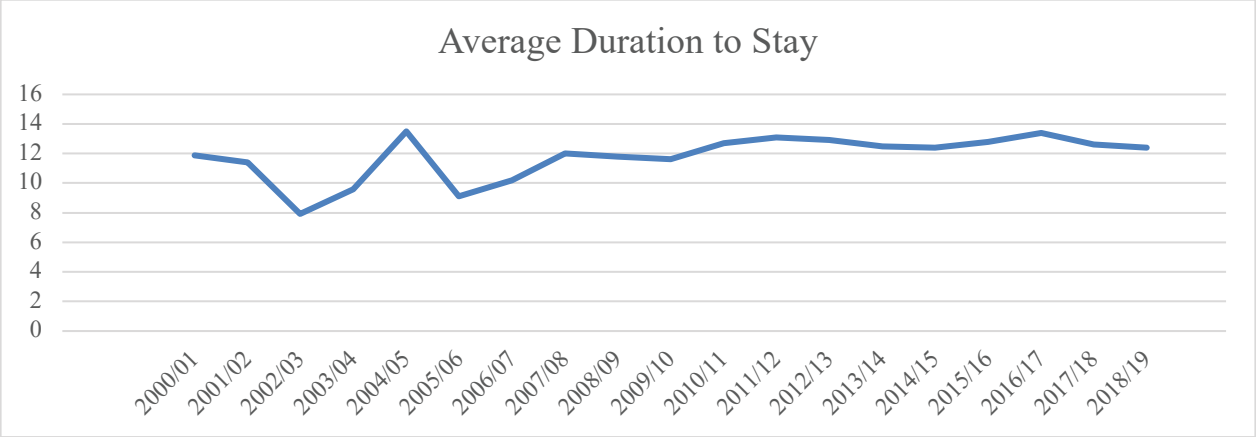
Figure-1: Total Tourist Arrivals of Nepal (2000-2018)



Source: *MOF., Economic Survey (2010/11 & 2019/20).*

Figure-1 depicts the total tourist arrivals of Nepal from 2000/01 to 2018/19. The highest number of tourists was arrived in 2018/19 whereas the lowest number was in 2002/03. Though, the nature of total tourist arrivals signifies the increasing trends in all most years.

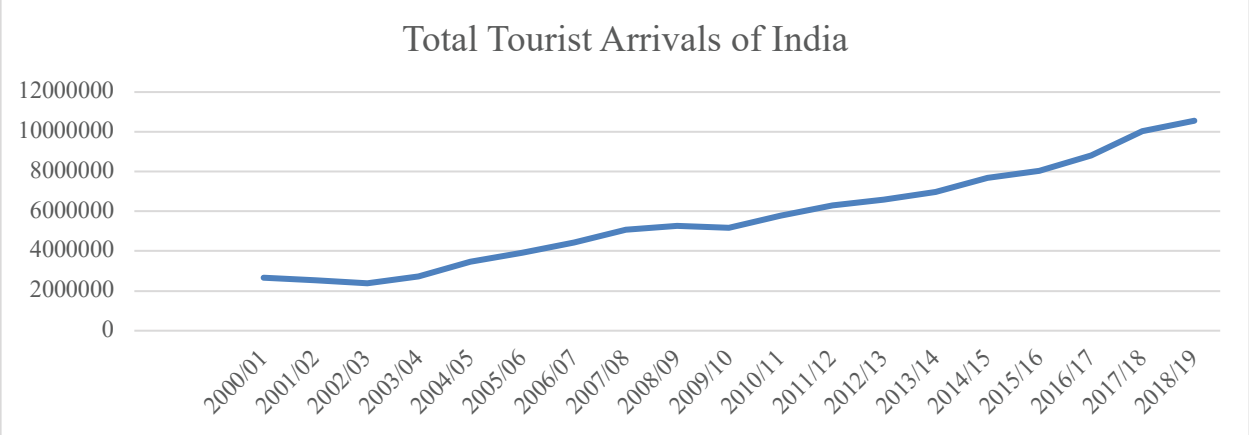
Figure-2: Average Duration of Stay of Tourists of Nepal (2000-2018)



Source: *MOF., Economic Survey (2010/11 & 2019/20).*

Figure-2 depicts the average duration of stay of tourists of Nepal from 2000/01 to 2018/19. The average duration of stay remains between 7.92 days to 13.5 days in Nepal. The increase in average duration of stay of tourists enhances per day expenses of the tourists.

Figure-3: Foreign Tourist Arrivals of India (2000-2018)



Source: *MOT, Indian Tourism Statistics-2019.*

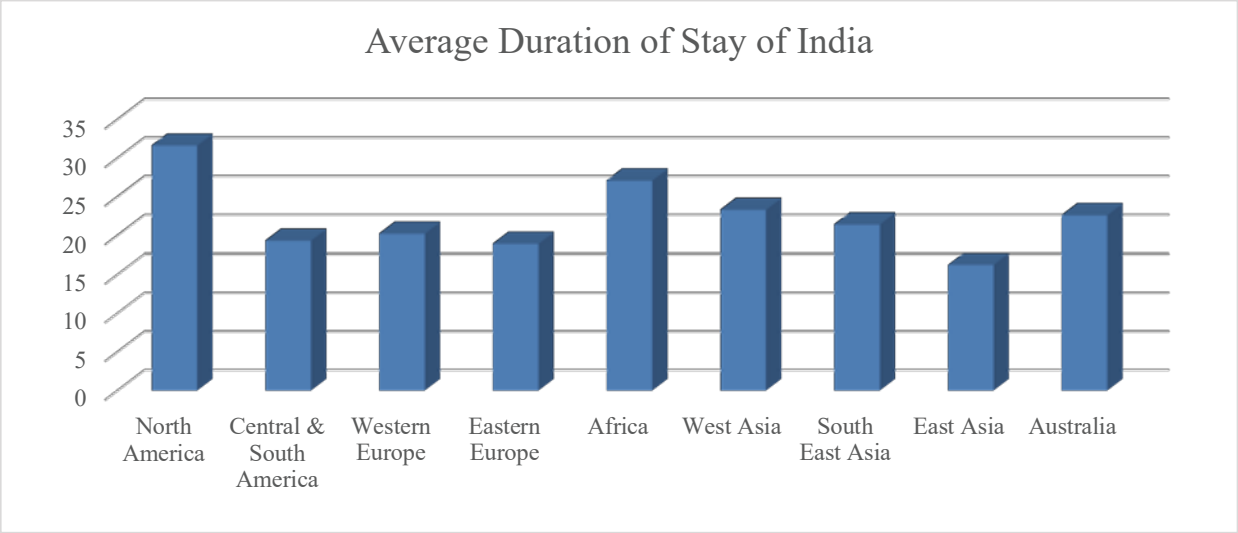
Figure-3 represents the flow of foreign tourist arrivals (FTAs) of India during 2018 increased to 10.56 million as compared to 10.04 million in 2017. The growth rate in FTAs during over 2017 was 5.2 percent as compared to 14 percent during over 2016. The share of India in international tourist arrivals in 2018 was 1.2 percent and 5 percent of international tourist arrivals in Asia Pacific Region in 2018 with the rank of 7th.

Table 1: Nationality-wise Average Duration of Stay of Tourists in India

Nationality	***Average Duration of Stay***
North America	*31.7*
Central & South America	*19.4*
Western Europe	*20.3*
Eastern Europe	*19.0*
Africa	*27.2*
West Asia	*23.4*
South East Asia	*21.5*
East Asia	*16.3*
Australasia	*22.7*

Source: *Ministry of Tourism, India, 2019.*

Figure-4: Average Duration of Stay of Tourists of India



Source: *Table-1.*

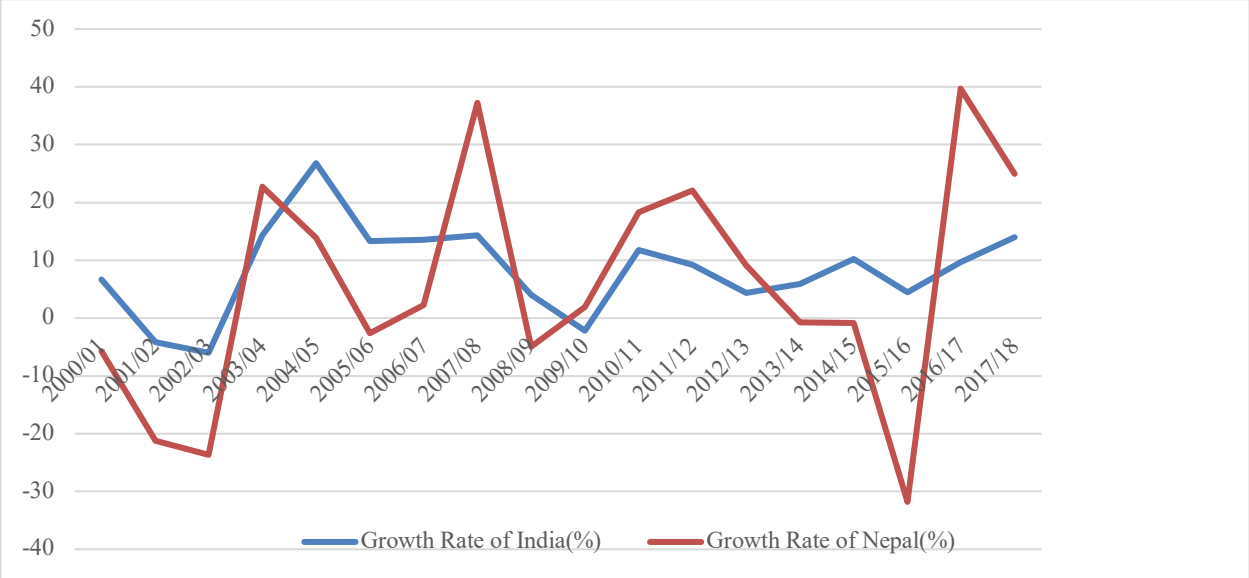
Table-1 and Figure-4 depict the average duration of stay by foreign tourists in India (22.7 days) which is significantly high; there is scope for further increase in view of availability of variety of tourism products, culture, cuisine, etc. to offer the tourists by India. Among the major source regions of countries, the duration of stay was highest from North America (31.7 days) followed by Africa (27.2 days),West Asia(23.4 days), Australasia (22.7days) Western Europe (20.3days), Central& South America (19.4 days), Eastern Europe (19.0 days) and South East Asia (16.3 days).

Growth Trends Rate of Total Tourist Arrivals of Nepal & India

The growth rate of tourist arrivals of Nepal and India seems to be fluctuated. The highest growth rate of total tourist arrivals of Nepal was 39.7 percent in 2016 and the lowest decrease rate was -

31.8 percent in the year 2015. In case of India, the highest growth rate was 26.8 percent in 2004/05 and the lowest decrease rate was -6.0 percent in the year 2002/03.Comparing the change rate of total tourist arrivals between Nepal and India, there is high fluctuation rate of change of total tourist arrivals rate in Nepal than India.

Figure-5: Growth Trends Rate of Total Tourist Arrivals of Nepal & India (2000-2018).



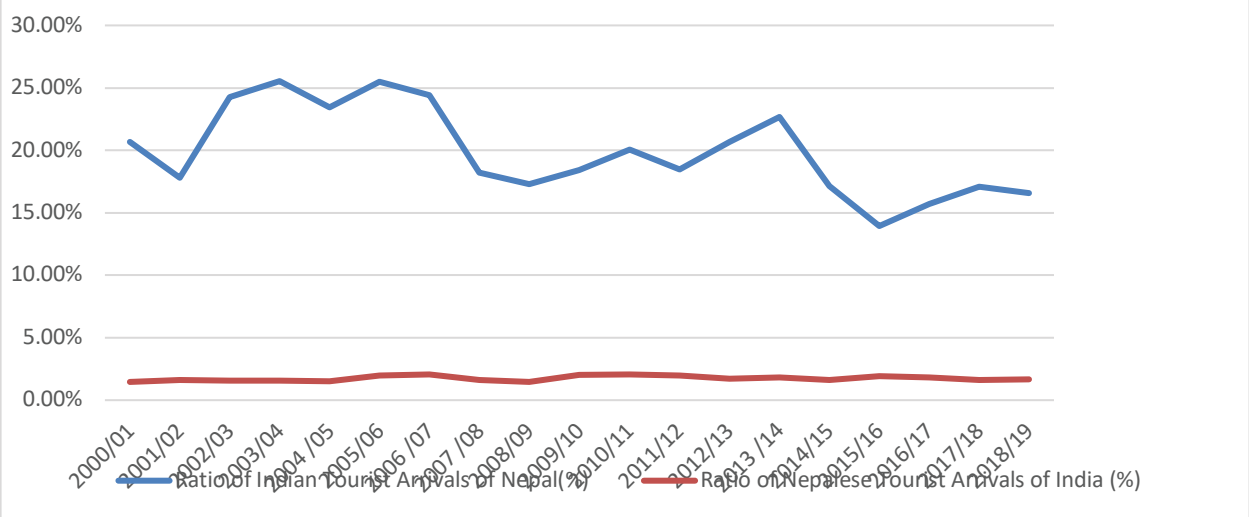
Source: *Ministry of Tourism, Government of India (2019/20 &2020/21) & MOF., Economic Survey (2010/11 & 2019).*

Figure-5 depicts the growth of total tourist arrivals of Nepal and India from 1998/99 to 2018/19. The rate of growth of total tourist arrivals shows the fluctuation during the study period.

Ratio of Total Tourist Arrivals of Nepal from India & Total Tourist Arrivals of India from Nepal

There has been significant ratio of total tourist arrivals of Nepal from India and total tourist arrivals of India from Nepal. Since the decades, Indian tourist arrivals of Nepal holds the first position and Nepalese tourist arrivals of India ranks 14th position in different years. For Nepalese tourism industry, arrivals of Indian tourists play a significant role as Nepalese tourist arrivals of India also contribute greater role during the study period (Annex- III).

Figure-6: Ratio of Total Tourist Arrivals of Nepal from India and Tourist Arrivals of India from Nepal



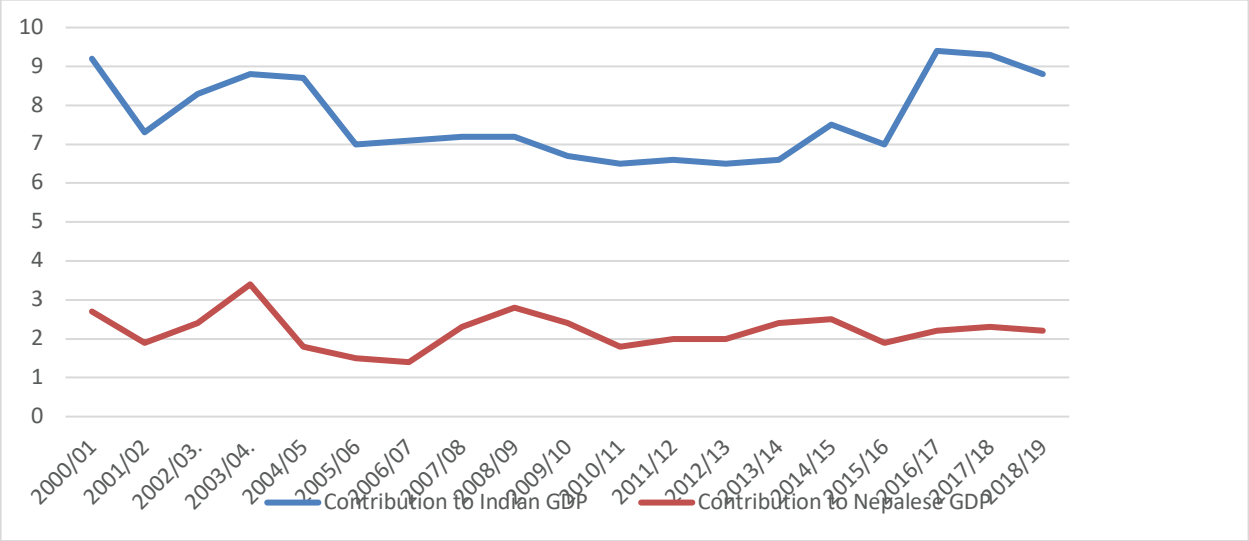
Source: *Annex-III.*

Figure-6 depicts the ratio of Indian tourist arrivals to the total tourist arrivals of Nepal and ratio of Nepalese tourist arrivals to the total tourist arrivals of India from 2000/01 to 2018/19. As per Annex-III, the ratio of tourist arrivals of Nepal from India range between 13-26 percent whereas the ratio of total tourist arrivals of India from Nepal falls between 1-3 percent.

Contribution of Tourism Industry to GDP in Nepal and India

There has been a significant contribution of foreign exchange earnings from tourism industry of Nepal and India. During the study period, foreign exchange earnings contribute to GDP of Nepal between the ranges of 1 to 3 percent whereas foreign exchange earnings contribute to GDP of India between the ranges of 7 to 10 percent. (Annex-IV).

Figure-7: Contribution of Tourism Industry to GDP in Nepal and India from 2000/01-2018/19.



Source: *Annex-IV.*

Figure-7 depicts the contribution of tourism industry in Nepal and India from 2000/01 to 2018/19. Total contribution by travel and tourism sector to India's GDP was expected to increase from Rs.15.24 lakh crore (US$ 234.03 billion) in 2017 to Rs. 32.05 lakh crore (US$ 492.21 billion) in 2018. Total earning from this sector in India was targeted to be US$50 billion by 2022.

Economic Impact of Tourism Industry

There is significant economic impact of tourism industry in different aspects of Nepalese economy and Indian economy. In case of Nepal, the economic impact is measured in terms of foreign exchange earnings, employment generation, government royalty and contribution to GDP. Similarly, in case of Indian economy, the economic impact is measured in terms of foreign exchange earnings, employment and contribution to GDP is descriptively discussed. To show the relationship between dependent variables and independent variables, correlation is applied and measuring the economic impact on Nepalese and Indian economy, simple linear regression model has been applied assuming total tourists arrivals independent variables and other variables dependent variables. For hypothesis testing, regression analysis was done in SPSS v22 with the following regression model.

Impact Tourism Economy on Economy

There has significant contribution of tourism economy in the generation employment opportunities in Nepal and India. During the study period, tourism sector directly generated more than one lakh employment opportunities and this sector indirectly generating more than 3 lakh employment opportunities. In case of Indian tourism industry has been significantly generating large number of employment opportunities. In the year 2000/01, 481313.3 thousand of employment opportunities was generated from this sector. In the year 2015, it 37315 thousand employment opportunities were generated in India. As per 2019, 4.2 crore jobs were generated in

Table-2: Regression between Total Tourists Arrivals & Foreign Exchange Earnings to Nepal

Model Summary[b]						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson	
1	.906[a]	.821	.811	913.47759	.738	
Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1611.193	572.635		-2.814	.012
	Nepal	.008	.001	.906	8.837	.000
a. Dependent Variable: Foreign Exchange Earnings of Nepal b. Predictors : (Constant), Total Tourist Arrivals of Nepal						

Source: *Calculated by Author based on Annex-I.*

The *R* value of 0.883 indicates highly positive relationship between total tourists arrivals and foreign exchange earnings ($p<0.05$). Similarly, *R*-square value of 0.780 states that 78.80% change in direct employment is due to independent variable. Likewise, Standard error of the estimate of 0.001 indicates the variability of the observed value of foreign exchange earnings from regression line is 0.001 units. The result shows that there is a significant impact of total tourist arrivals on foreign exchange earnings. It signifies that a change in total tourist arrivals improved position of foreign exchange earnings. The finding of the regression analysis between total tourists arrivals and foreign exchange earnings indicates that total tourists arrivals is a significant predictor of foreign exchange earnings. The variable of total tourists' arrivals has 88.30 %, contributed towards foreign exchange earnings (Table-2).

Table-3: Regression between Total Tourist Arrivals & Foreign Exchange Earnings to India

Model Summary[b]						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson	
1	.997[a]	.994	.994	654.43565	.610	
Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-4829.139	380.693		-12.685	.000
	India	.003	.000	.997	52.511	.000
a. Dependent Variable: Foreign Exchange Earnings of India b. Predictors: (Constant), Total Tourist Arrivals of India						

Source: *Calculated by Author based on Annex-II.*

The *R* value of 0.997 indicates the highly positive relationship between total tourists arrivals and foreign exchange earnings from tourism economy ($p<0.05$). Similarly, R-square value of 0.995 states that 99.5 % change in foreign exchange earnings due to independent variables. The result shows that there is highly impact of total tourist arrivals on foreign exchange earnings. It signifies that a change in total tourist arrivals highly improved position of foreign exchange earning in India. It shows a significant association between the changes in total tourists' arrivals on foreign exchange earnings (Table-3).

V. Conclusions

Tourism industry has a wonderful economic contribution to today's world economy. Tourism economy is a great way for people to spend their money and for cities to attract other people. Experiencing culture, religion, foods, sports, entertainment shows, and general ways of life in a new place is a great way to live life to the fullest. The presence of modern types of tourist hotels, motels and lodges are extremely essential for developing this industry. Developing a common vision or a cohesive mission to guide itself to meet the emerging market challenges in a proactive manner. There is fluctuation of tourist arrivals due to change in tourism environment in different years. There is significant contribution of tourism industry different sectors of Nepalese and Indian economy. There is significant contribution of tourism economy on employment foreign exchange earning in gross domestic product (GDP) of Nepal and India. The contribution and economic impact is measured in terms of foreign exchange earnings, employment generation and contribution to GDP. There is significant relationship between total tourist arrivals and foreign exchange earnings and very nominal relations total tourist arrivals and employment and contribution to GDP.

The finding of the regression analysis between total tourists arrivals and foreign exchange earnings of both countries indicates that total tourists arrivals is a significant predictor of foreign exchange earnings. There is significant contribution of total tourist arrivals and average duration of stay in employment generation, GDP and government royalties of both countries in the study period. For developing tourism industry, there should be farsighted and focused leadership, stability in political leadership and continuity of government and bureaucracy. The attraction of foreign visitors as well as to sell the product is not an easy task. It certainly requires improvement of tourist facilities; preservation of existing tourism resources; regulation and supervision of tourism industry in desired manner; enhancement of education for the employees; and designation and development of new tourist sites. Tourism industry hinges much also on the competence of guides. Hence there should be special arrangement of security in tourist destinations and extension of facilities to tourists.

References

Anupriya,M. and Rajasekaran,R. (2016). Tourism Industry: The Impact on Indian Gross Domestic P roduct. *Advance in Economics and Business Management, 3(6):* 612-617.

Jenkins,C.& Henr,B.(1982). *Government Involvement in Tourism in Developing Countries*. Annuals of Tourism Research, pp.499-521.

KC,D. & Leelabati,D.S.(2016).Tourism Development and Economic Growth in India. *IOSR Journal of Humanities & Social Science,* 21(11): 43-49.

Knoema (2019). *World Data Atlus.* Knoema Enterprises Data Solutions.

Knoema (2021). *India-contribution of travel and tourism to GDP as a share of GDP*. World Data Atlas, *https://knoema.com*

Mahatara, B.(2019).*Tourism Industry in Nepal: Make it Backbone of Economy*, Himalaya Times, Nepal.

Malhotra, R.K.(1995). *Socio-environmental and Legal Issues in Tourism.* Anmol Publication, New Delhi,p.25.

Malik,M.M. & Nusrath,A.(2012). *A Review of Tourism Development in India*. Golden Research Thoughts, ISSN 2231-5063, Vol.3, Issue 11, May-2014.

MOF.(2020). *Economic Survey 2010/11.* Ministry of Finance, Kathmandu: Government of Nepal.

MOF. (2010). *Economic Survey 2014/15.* Ministry of Finance, Kathmandu: Government of Nepal.

Ministry of Tourism (2003).*Tourism Statistics 2019*. Market Research Division, Government of India,

Delhi.
Ministry of Tourism (2019).*Tourism Statistics 2019*. Market Research Division, Government of India, Delhi.
Ministry of Tourism (2020).Indian *Tourism Statistics 2020 at a Glance*. Market Research Division, Government of India, Delhi.
Shrestha,M.B. & Shrestha,P.(2000). *Nepalese Aviation and Tourism.* Kathmandu, Nepal.
Stynes,D.J.(1997). *Economic Impacts of Tourism.* A Handbook for Tourism Professions. Urbana, IL: University of Illions, Tourism Research Laboratory.
World Tourism & Travel Council (2019). *Travel and Tourism Reports of India, 2019.* Queen Victoria,Terrace,London, UK.
World Tourism and Travel Council (2015). *Travel and Tourism Economic Impact in Nepal.* Queen Victoria,Terrace,London, UK.
Zurub,H.,Ionescu,A.C.and Valentina,D.(2015). *Measuring the Economic Impact of Tourism in European Emerging Markets.* Procedia Economics and Finance 32, 95-102.

Annexure

Annex-I: Total Tourists Arrivals, Growth Rate of Nepal, Average Duration of Stay & Foreign Exchange Earnings from Tourism Industry of Nepal, 2000/01- 2019/20.

Year	Total Tourists Arrivals	Growth Rate (%)	Average Duration of Stay	FEEs (Rs. in Ten Million)	FEEs (USD. in Million)
1995/96	363395	11.28	11.27	952.12	168.43
1996/97	393613	8.30	13.50	852.30	149.45
1997/98	421857	7.20	10.50	988.16	145.47
1998/99	463684	9.90	10.80	1216.78	177.59
1999/00	491504	6.00	12.80	1207.39	170.66
2000/01	463646	-5.7	11.88	1171.70	156.16
2001/02	361237	-21.17	11.93	865.43	110.53
2002/03	275466	-23.7	7.92	1174.77	156.53
2003/04	338132	22.7	9.60	1814.74	243.75
2004/05	385297	13.9	13.50	1046.40	148.11
2005/06	375398	-2.6	9.10	955.60	128.44
2006/07	383926	2.3	10.20	1012.50	155.41
2007/08	526705	37.2	12.00	1865.30	271.12
2008/09	500277	-5.0	11.80	2796.0	356.86
2009/10	509752	1.9	11.60	2813.9	376.49
2010/11	602867	18.3	12.70	2461.1	345.42
2011/12	796215	22.1	13.10	3070.4	345.38
2012/13	803092	9.1	12.90	3421.1	387.35
2013/14	797616	-0.7	12.50	4637.5	472.01
2014/15	790118	-0.9	12.40	5342.9	535.04
2015/16	538970	-31.8	12.80	4176.5	392.20
2016/17	753002	39.7	13.40	5852.7	552.40
2017/18	940218	24.9	12.60	6852.2	655.34
2018/19	1173072	24.8	12.40	7537.4	666.38
2019/20	1197191	2.1	13.0	6088.5	521.14

Source: *Economic Survey (2010/11, 2014/15 & 2019/20).*

Annex-II: Foreign Tourist Arrivals of India, Growth Rate and Foreign Exchange Earning from Tourism Industry of India (2000/01 – 2018/19).

Year	Total Tourists Arrivals of India (Million)	Growth (%)	Foreign Exchange Earnings (US $ Million)
1995/96	2.12	12.6	2583
1996/97	2.29	7.7	2832
1997/98	2.37	3.8	2889
1998/99	2.36	-0.7	2948
1999/00	2.48	5.2	3009
2000/01	2.65	6.7	3460
2001/02	2.54	-4.2	3198
2002/03	2.38	-6.0	3103
2003/04	2.73	14.3	4463
2004/05	3.46	26.8	6170
2005/06	3.92	13.3	7493
2006/07	4.45	13.5	8634
2007/08	5.08	14.3	10729
2008/09	5.28	4.0	11832
2009/10	5.17	-2.2	11136
2010/11	5.78	11.8	14193
2011/12	6.31	9.2	16564
2012/13	6.58	4.3	17737
2013/14	6.97	5.9	18445
2014/15	7.68	10.2	20236
2015/16	8.03	4.5	21071
2016/17	8.80	9.7	22923
2017/18	10.04	14.0	27310
2018/19	10.56	5.2	28585
2019/20	10.93	3.5	30058

Source: *Ministry of Tourism, Government of India (2019/20 &2020/21) and Indian Tourism Statistics, 2020.*

Annex-III: Ratio of Tourists Arrivals of Nepal from India and Tourists Arrivals of India from Nepal (1995-2019).

Year	Tourists Arrivals to Nepal from India	Ratio to Total Tourists (%)	Tourists Arrivals to India from Nepal	Ratio to Total Tourists (%)
1995/96	117260	32.3%	34562	1.63%
1996/97	122512	31.10%	43426	1.88%
1997/98	133438	31.60%	43155	1.82%
1998/99	143229	30.90%	38199	1.62%
1999/00	140661	28.60%	25859	1.04%
2000/01	95915	20.68%	38801	1.46%
2001/02	64320	17.80%	41135	1.62%
2002/03	66777	24.24%	37136	1.56%
200304	86363	25.54%	42771	1.57%
2004 /05	90326	23.44%	51534	1.49%
2005/06	95685	25.50%	77024	1.96%

2006 /07	93722	24.41%	91552	2.06%
2007 /08	96010	18.23%	83037	1.63%
2008/09	91177	17.31%	78133	1.48%
2009/10	93884	18.42%	104374	2.02%
2010/11	120898	20.05%	119131	2.06%
2011/12	147037	18.47%	125375	1.99%
2012/13	165815	20.65%	113790	1.73%
2013 /14	180974	22.69%	126416	1.81%
2014/15	135343	17.13%	126362	1.64%
2015/16	75124	13.94%	154720	1.93%
2016/17	118249	15.70%	161097	1.83%
2017/18	160832	17.11%	164018	1.63%
2018/19	194323	16.56%	174096	1.65%
2019/20	254150	21.23%		

Source: *Economic Survey (2010/11, 2014/15 & 2019/20) of Nepal & Ministry of Tourism of India (2009/10 &2019/20).*

Annex-IV: Contribution of Tourism Industry to GDP of Nepal & India (2000/01- 2018/19).

Year	Contribution to GDP of India (%)	Contribution to GDP of Nepal (%)
1995/96	13.1	3.8
1996/97	13.1	3.0
1997/98	14.2	3.3
1998/99	14.0	3.6
1999/00	14.3	3.2
2000/01	14.0	2.7
2001/02	11.7	1.9
2002/03	13.5	2.4
2003/04	14.3	3.4
2004/05	13.6	1.8
2005/06	10.0	1.5
2006/07	9.6	1.4
2007/08	10.1	2.3
2008/09	10.0	2.8
2009/10	9.6	2.4
2010/11	9.3	1.8
2011/12	9.1	2.0
2012/13	9.1	2.0
2013/14	9.2	2.4
2014/15	9.2	2.5
2015/16	9.3	1.9
2016/17	9.4	2.2
2017/18	9.3	2.3
2018/19	9.2	2.2
2019/20	9.3	1.5

Source: *Ministry of Tourism of India, WTTC and Economic Surveys of Nepal./ Knoema-World Data Atlas,2021.*

CUSTOMER SATISFACTION ON TATA MOTOR'S VEHICLES IN POKHARA VALLEY

- Deepesh Ranabhat, Pradeep Sapkota, Shanti Devi Chhetri and Anish Kumar Bhattarai

Abstract

Customer satisfaction is considered as a fundamental business strategy to acquire and retain customers. The automobile industry in Nepal has been gradually increasing. This study aimed to find out the major factors affecting customer satisfaction towards Tata Motor's vehicles in Pokhara valley, Nepal. The study followed descriptive and cross-sectional research design. Survey method using researcher-administered questionnaire was used for data collection. The target population of the study were the users of Tata vehicle in Pokhara Valley and 150 sample was taken for this study using convenience technique. Different statistical tools such as descriptive statistics, exploratory factor analysis, correlation analysis, and regression analysis were used in this study. This study found that safety things, fuel efficiency, and after sales service of vehicle are major things considered by the buyers of vehicles. This study extracted five important factors- brand value proposition, financial rationalization, networking and relationship marketing, sales promotion and customized product design related to buying decision of vehicle and concluded that brand value proposition, sales promotion, and financial rationalization are the important factors affecting customers' satisfaction. In this regard, further research can be carried out taking different automobile industries and comparative study can be done as in Nepal in this topic.

Keywords: Customer satisfaction, Tata motor, brand value, sales promotion, financial rationale

I. Introduction

Customers are the lifeblood of any business, so they must be treated as the king of the market. Profit, position, reputation, and other factors as well as the customers' behavior all have a role in how well a business does (Lata et al., 2017). Customers are crucial to the success of the business, and when they are happy, they stay with the company for a long time (Rohith, 2016). It is indicated that the study of consumer satisfaction is one of the subsets of human behavior because it holds great interest for researchers as well as marketers to comprehend the factors that influence what is purchased, why it is purchased, how it is purchased, and what are the internal and external influences that led to purchase (Pachuau & Thanzauva, 2021). The demand for automobiles in Nepal is increasing due to rising affordability and disposable income of Nepalese, particularly due to remittances and real estate business (Fresenius, 2019). The automotive industry is one of the most important sectors in the world, as it enables both developed and developing countries to grow steadily, accelerates technological advancements, and aids the growth of many other industries. The automotive industry, which accounts for about 5% of the global economy and has a total value of about $4 trillion, is the world's fourth largest economy. Talking about Nepal, the Nepalese market is modest, as the country's entire territory is small and the market is dispersed. Customer happiness is seen as a fundamental business strategy to acquire and retain customers in such situations, as businesses fight for customers. It is well known that happy customers lead to higher economic returns, which leads to increased customer loyalty. Tata Motors Limited is

India's largest automaker, with operations in more than 40 countries around the world. Sipradi Trading Private Ltd. has been a strong and dedicated partner of Tata Motors in Nepal since 1982. Among the 26 automobile companies in Nepal, Tata has the third highest market share (12.4 percent) in Passenger Vehicles (International Business, 2018). There is a massive increase in the demands of Tata vehicles in Nepal. Despite of high demand of Tata vehicles in Nepal, whether the customers are satisfied or not with the Tata vehicles is yet to be identified. So, this study attempts to identify the factors considered by the customer before buying the vehicle and measure the customer's satisfaction towards the Tata vehicles in Pokhara, Nepal. Enhancing customer satisfaction has become the important factor for organization these days. All organizations have taken this as major part of their business. The main reason for considering it is to enhance and have a long business period. Customer happiness has a number of advantages for businesses. It serves as a point of differentiation, lowers client turnover, boosts customer lifetime value, and lowers negative word of mouth. Furthermore, the cost of acquiring a new customer is five times costlier than that of keeping an existing one (Landis, 2022). Customer happiness is seen as a crucial differentiator and has gradually become a key component of corporate strategy in a competitive market where organizations compete for clients. Therefore, managing customer satisfaction successfully is crucial for businesses (Mehrish et al., 2016). There are significant number of studies that were conducted on this topic in the developing and developed nations (Amineh & Kosach, 2016; Haq, 2012; Selvaraj et al., 2020; Mathankumar & Velmurugan, 2016). But in the context of Nepal, there are very few studies. Thus, this research study is aimed to identify the major factors affecting customer satisfaction towards Tata Motor's vehicles in Pokhara valley, Nepal. This study also provides suggestions to the industry stakeholders on how to get customer satisfaction.

II. Literature Review

Professor Noriaki Kano established the Kano model of customer satisfaction in the 1980s. The model elucidates the nonlinear link between product quality and customer happiness. That model divides product attributes into four categories depending on how customers perceive them and how they affect customer satisfaction (Rotar & Kozar, 2017). The four categories are: threshold, performance, excitement, and indifference. Threshold Attributes are the characteristics that people anticipate from a product or service, making them "musts." More is better when it comes to performance aspects. Better fulfilment results in a linear increase in customer happiness, whereas the absence or poor performance of these criteria reduces customer contentment (Dreessen & Elfers, 2017). Excitement traits are typically unanticipated and customers do not convey openly. The existence of these features thrills customers and leads to high levels of pleasure. However, the lack of these qualities does not result in discontent. Indifferent attributes are the product characteristics that do not fit neatly into any of the three categories mentioned above. Because they are of little or no value to the customer. They have an impact on how people make decisions.

Sharm et al. (2011) identified that customers are delighted with the car's safety features and the discounts offered by the dealers. Further the study found that customers are satisfied with Tata commercial cars, because of their superior quality, brand image, ease of access to service stations, and spare part quality, among other factors. Dua and Savita (2013) conducted a study to measure customer satisfaction and key factor that affects customer satisfaction of Tata vehicles. The study argued that customers are largely satisfied with Tata Motors' cost, design, range, safety, inner space, brand status, comfort, spare parts, and after-sales service, according to the report, with price, mileage, and interior space being the most influencing factors.

Goyal and Singh (2019) found that customer satisfaction is the most critical aspect in purchasing passenger cars and receiving after-sales services. Customer satisfaction is influenced by a variety of elements, including salesperson behaviour, service quality, level of satisfaction, and so on. Opata et al. (2020) revealed that the two antecedents, willingness and ability, both have a positive moderation effect on co-creation; co-creation also has a considerable impact on customer satisfaction; price fairness perception and service convenience both have a positive moderation effect on customer satisfaction. Giri and Thapa (2018) concluded that after-sales service and the behaviour of technicians have a greater influence on customer satisfaction. Customer happiness is heavily influenced by behavioural characteristics. Customer expectations, according to Haq (2012), have a direct beneficial impact on perceived value and an indirect positive impact on customer satisfaction. He also found that customer education plays an essential and positive impact in satisfying customers

III. Methodology

The study was descriptive and cross-sectional. Survey method using researcher-administered questionnaire was used for data collection. The target population of the study were the users of Tata vehicle in Pokhara valley and 150 respondents were taken as sample for this study using convenience sampling technique. To collect the required data, the researchers visited the Tata Vehicles' traders and service centers in Pokhara valley and data were collected from customer who had visited there during the study period. Different statistical tools such as frequency counts and percentages of all socio-cultural characteristics, mean, standard deviation (SD), exploratory factor analysis, correlation analysis, and regression analysis was computed using IBM SPSS Statistics for Windows. In the study, the researchers used 24 different indicators to measure the factors affecting the buying decision of vehicle. All these items consisted of 5-points Likert scale where 1 denotes strongly unimportant and 5 denotes strongly important. Exploratory factor analysis (EFA) was used to extract the important factors. Factor loading (communalities) was computed to determine the each variable's variance. All the items which met the minimum acceptable limit of 0.5 and did not have cross loading on more than one factors were considered for EFA. Then correlation analysis and regression analysis was calculated using the factors extracted from EFA and customer satisfaction.

IV. Results and Discussion

4.1 Socio-Cultural Characteristics

The socio-cultural characteristics of the respondents based on their gender, age, family income, education, marital status, occupation status, purpose of buying vehicle and medium of knowing Tata vehicle is presented in Table 1.

Table 1
Socio-Cultural Characteristics of Respondents

Variables	Freq.	%	Variables	Freq.	%
Gender			**Marital status of respondents**		
Male	137	91.3	Single	25	16.7
Female	13	8.7	Married	125	83.3
Age of respondents			**Occupation status**		
Below 25 years	5	3.3	Business Person	100	66.7
25 to 30 years	32	21.3	Government Employee	13	8.7
Above 30 years	113	75.3	Private Employee	37	24.7

Family income per month			**Purpose of Buying Vehicle**		
Less than 50000	27	18.0	Commercial	107	71.3
50000-100000	76	50.7	Personal	43	28.7
More than 100000	47	31.3			
			Medium of knowing Tata vehicle		
Education level			Friends	34	22.7
Below 10+2	36	24.0	Advertisement	32	21.3
10+2	46	30.7	Activities/Promotion	16	10.7
Bachelor	37	24.7	Family member	18	12.0
Above bachelor	31	20.7	Self Interest	43	28.7
			Others	7	4.7
Total	**150**	**100.0**	**Total**	**150**	**100.0**

Table 1 reveals that majority of the respondents having Tata vehicle are males (91.3%) whereas, only 8.7 percent are females. Age-wise, the majority of respondents above 30 years (75.3 %) and income-wise, majority of respondents having monthly income of Rs.50000 to Rs.100,000 (50.7%) are having Tata vehicle. Similarly, majority of married respondents (83.3%), occupation-wise majority of business person (66.7%), and purpose-wise majority for commercial purpose (71.3%) purchase Tata vehicle. Moreover, education-wise and medium of knowing Tata vehicle, there is no much difference in the percentage of respondents in different classes having Tata vehicle.

4.2 Mean Score of Items

The perception of respondents toward factors affecting the buying decision of vehicle is measured using 5-points Likert Scale in different 24 items such as price, mileage, looks, safety, brand, advertisement, origin, etc. The mean score of respondents on these items are given in Table 2.

Table 2
Mean score of variables

Variables	Mean	SD
Price	3.72	1.11
Mileage	3.91	0.94
Looks	3.67	0.92
Safety	3.94	0.83
After sales service	3.87	0.94
Status symbol	3.64	0.94
Value for money	3.63	1.02
Financing facility	3.66	1.15
Bank interest rate	3.62	1.07
Advertisement and promotion	3.45	1.01
Brand name	3.35	1.08
Family needs	3.41	1.04
Income level	3.56	0.95
Offer and schemes	3.55	1.08
Festive season	3.47	1.08

Special occasions	3.26	1.06
Availability of spare parts and their cost	3.56	1.23
Discounts	3.40	1.09
Suggestion from friends and other	3.59	1.17
Resale value	3.74	1.23
Location / Network of brand	3.82	1.02
Colour	3.53	1.08
Size	3.69	0.91
Country of origin	3.70	1.21

(Where N=150, 1=strongly unimportant, 3=neutral and 5=strongly important)

Table 2 reveals that all these items used to measure factors affecting the buying decision of vehicle by the respondents are important for purchase decision which is denoted by the mean score more than the average value of 3. Among these, most important variable is safety (mean score of 3.94) followed by mileage (mean score of 3.91), and after sales service (mean score of 3.87). Other highly important variables are network of brand, resale value, price, and country of origin.

4.3 Exploratory Factor Analysis

An exploratory factor analysis (EFA) is run using principal component as extraction method and with a varimax rotation using SPSS with the aim of simplifying the large number indicators to a few representative constructs (Ho, 2006). In this study, initially factor loading is calculated using 24 different items that are related to purchase decision of vehicle. The items which have factor loading of more than 0.50 were considered for further analysis. The result of factor loading is presented in Table 3. In this study all items have factor loading >0.50 and hence are accepted for further analysis.

Table 3
Communalities

Variables	Initial	Extraction
Price	1.000	.794
Mileage	1.000	.752
Looks	1.000	.726
Safety	1.000	.684
After sales service	1.000	.694
Status Symbol	1.000	.719
Value for money	1.000	.750
Financing facility	1.000	.754
Bank interest rate	1.000	.726
Advertisement and Promotion	1.000	.668
Brand Name	1.000	.627
Family needs	1.000	.656
Income level	1.000	.630
Offer and Schemes	1.000	.635
Festive season	1.000	.776

Special Occasions	1.000	.656
Availability of spare parts and their cost	1.000	.779
Discounts	1.000	.753
Suggestion from friends and other	1.000	.647
Resale value	1.000	.794
Network of brand	1.000	.682
Color	1.000	.669
Size	1.000	.591
Country of origin	1.000	.539

Appropriateness of factor analysis is confirmed using Kaiser–Meyer–Olkin (KMO) and Bartlett's test of sphericity. Kaiser–Meyer–Olkin (KMO) is used to measure the overall sampling adequacy and the acceptable values are greater than 0.5 (Kaiser, 1974). In this study, the sample adequacy is good as the KMO value is 0.885, which is above than the required limit. Similarly, the value for Bartlett's test of sphericity is 2532.518 and the p-value is significant at 1 percent level. This measurement reveals that there is a highly significant connection among the items used in the study. Table 4 shows the results of the KMO-Bartlett's test.

Table 4
Results of KMO-Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.885
Bartlett's Test of Sphericity	Approx. Chi-Square	2532.518
	Df	276
	Sig.	0.000

Further varimax rotation is used for extraction of factors. From 24 items, one item- income level is removed because of cross-loading on two factors and further 23 items are used for exploratory factor analysis. The results of factor extraction, its items, the total variance explained by different factors are shown in Table 5.

Table 5
Results of Exploratory Factor Analysis

S. N.	Factor Extracted	Components	% of variance	Cumulative variance
1	Brand value proposition	Price, Mileage, Looks, Safety, After sales service, Brand name	18.22	18.22
2	Financial rationalization	Status Symbol, Value for money, Financing facility, Bank Interest rate	16.657	34.877
3	Networking and relationship marketing	Advertisement and Promotion, Family needs, Discounts, Suggestion from friends and others, Resale value, Network of brand	15.257	50.134
4	Sales promotion	Offer and Schemes, Festive season, Special Occasions, Availability of spare parts	13.133	63.267
5	Customized product design	Color, Size, Country of origin	6.326	69.593

The exploratory factor analysis extracted five factors which all together give 69.593 percent of total variance loading. These factors are named as brand value proposition, financial rationalization, networking and relationship marketing, sales promotion and customized product design. The brand value proposition comprises of 6 items- price, mileage, looks, safety, after sales service, brand name explains 18.22 percent of variance. The financial rationalization comprises of 4 items- status symbol, value for money, financing facility, bank interest rate explains 16.66 percent of variance. The networking and relationship marketing comprises of 6 items- advertisement and promotion, family needs, discounts, suggestion from friends and others, resale value, network of brand explains 15.26 percent of variance. The sales promotion comprises of 4 items- offer and schemes, festive season, special occasions, availability of spare parts explains 13.13 percent of variance and the customized product design comprises of 3 items- color, size, country of origin explains 6.33 percent of variance.

4.4 Correlation Analysis

The correlation between customer satisfaction and other variables such as brand value proposition, financial rationalization, networking and relationship marketing, sales promotion, and customized product design is presented in Table 6.

Table 6
Correlation analysis

Variables	CS	BVP	FR	N&RM	SP	CPD
CS	1					
BVP	.602**	1				
FR	.274**	.557**	1			
N&RM	.415**	.658**	.655**	1		
SP	.449**	.533**	.597**	.622**	1	
CPD	.276**	.275**	.367**	.453**	.420**	1

**. Correlation is significant at the 0.01 level (2-tailed).

(Where, CS is customer satisfaction, BVP is brand value proposition, FR is financial rationalization, N&RM is networking and relationship marketing, SP is sales promotion and CPD is customized product design)

Table 6 reveals that there is significant positive correlation between customer satisfaction as dependent variable with all independent variables such as brand value proposition, financial rationalization, networking and relationship marketing, sales promotion, and customized product design. The correlation of customer satisfaction with brand value proposition, networking and relationship marketing, and sales promotion is moderate as the correlation coefficient is between 0.3 to 0.7 whereas, the correlation of customer satisfaction with financial rationalization and customized product design is low as the correlation coefficient is less than 0.3.

4.5 Regression analysis

Multiple regression model is used for identifying the factors that affect the customer satisfaction toward TATA motor's vehicle in Pokhara Valley. Variance inflation factor (VIF) is used to check the multicollinearity. The VIF values are less than 5, which indicates that there is no issue of multicollinearity between the independent variables. In this study customer's satisfaction is considered as dependent variable and five other indicators that are extracted from the exploratory factor analysis- brand value proposition, financial rationalization, networking and relationship

marketing, sale promotion and customized product design are considered as independent variables. The results of regression model are depicted in Table 7.

Table 7
Output of Regression Analysis

Variables	Dependent variable: Customers' Satisfaction		Collinearity Statistics	
	Co-eff.	t-stat	Tolerance	VIF
(Constant)	1.480	5.267***		
Brand Value proposition	.542	6.613***	.523	1.911
Financial Rationalization	-.174	2.411*	.496	2.014
Networking and relationship marketing	-.017	0.200	.387	2.585
Sales Promotion	.187	2.704**	.520	1.924
Customized product design	.098	1.431	.756	1.323
R Square	.418			
Adj. R Square	.398			
F-statistic	20.681***			

Note: *Denotes p<0.05; ** Denotes p<0.01; ***Denotes p<0.001

Table 7 reveals that there is significant positive impact of brand value proposition and sales promotion on customers' satisfaction. The positive beta coefficient along with significant t-statistics justify it. However, the negative beta coefficient and significant t-statistics reveal that there is significant negative impact of financial rationalization on customers' satisfaction. The other two independent variables- networking and relationship marketing, and customized product design have no significant impact on customer's satisfaction. Similarly, the significant F-statistics reveals that the model of regression analysis used is good.

4.6 Discussion

This study was conducted to find out the major factors affecting customer satisfaction towards Tata Motor's vehicles in Pokhara valley, Nepal. First, major five factors that are related to purchase of vehicles were extracted by using EFA. Then, the regression analysis found that brand value proposition, financial rationalization and sales promotion have a significant positive impact on customer satisfaction. The results are similar with the previous studies of (Kaur & Mahajan, 2011; Shahroodi et al., 2015) which states that customer satisfaction is significantly influenced by the three brand equity factors of brand identity, ideal internal consistency, and lifestyle consistency. Likewise, it is in consistent with the study of (Herrmann et al., 2007) that price fairness of automobiles influences customer satisfaction positively and the findings of (Antunes, 2018) which shows that sales promotion techniques of vehicles is positively significant to customer satisfaction.

V. Conclusion

This study finds that safety, mileage, after sales service are the most important things that the customer focus while buying the vehicle in Pokhara valley. So, this study concludes that the seller of vehicle should primarily focus on safety things, fuel efficiency, and after sales service of vehicle. This study also finds that brand value proposition, sales promotion, and financial rationalization are the important factors affecting customers' satisfaction where brand value proposition, and sales promotion are positively related and financial rationalization is negatively related. It is concluded that the automobiles traders should focus on building brand value, sales promotion and offer fair price to increase the customer satisfaction of vehicle buyers. This study has only focused on Tata motors and limited to Pokhara valley. So, further research can be carried out taking different automobile industries as well as comparative study can be done in Nepal in this topic.

References

Amineh, H., & Kosach, N. (2016). Assessment of Consumers' Satisfaction with the Automotive Product Quality. *International journal of environmental and science education*, *11*(16), 8726-8739.

Antunes, I. F. S. (2018). *The effectiveness of sales promotion techniques on consumer buying behavior of generation Y.* (Doctoral dissertation). https://run.unl.pt/bitstream/10362/38603/1/Antunes_2018.pdf

Dreessen, A., & Elfers, J. (2017). Review of the Kano model-practical example tourism industry. 1–14. http://www.diva-portal.se/smash/get/diva2:1080756/FULLTEXT01.pdf

Dua, K., & Savita. (2013). Study of Customer Satisfaction With Reference To Tata Motor. *International Journal of Advanced Research in Management and Social Science*, *2*(4), 68–83.

Fresenius (2019). Annual Report. Extracted from *https://www.annualreports.com/HostedData/AnnualReportArchive/f/fresenius_2019.pdf*

Giri, S., & Thapa, K. (2018). A Study of Customer Satisfaction on After Sales Service of Two Wheelers in Kathmandu Valley. *Journal of Business and Social Sciences Research*, *1*(1), 1. https://doi.org/10.3126/jbssr.v1i1.20946

Goyal, V., & Singh, S. (2019). Customer satisfaction in automobile industry with reference to passenger cars in Delhi and NCR. *International Journal for Research in Engineering Application & Management 5*(2),125-134.

Haq, A. U. (2012). Satisfaction towards Customer Loyalty in Auto-Mobile Industry of Pakistan. *International Journal of Management Business Research*, *2*(4), 363–371. http://ijmbr.srbiau.ac.ir/article_1752_af57aec3f485561d13fad0fdf917306c.pdf

Herrmann, A., Xia, L., Kent, M. B., & Huber, F. (2007). The influence of price fairness on customer satisfaction: An empirical test in the context of automobile purchases. *Journal of Product and Brand Management*, *16*(1), 49–58. https://doi.org/10.1108/10610420710731151

International Business (2018 May 15). *This is how Tata Motors conquered hearts of the mountain kingdom!*. https://www.tatamotors.com/blog/international-business/nepal-this-is-how-tata-motors-conquered-hearts-of-the-mountain-kingdom/

Kaur, G., & Mahajan, N. (2011). Exploring the Impact of Brand Equity and Customer Satisfaction on

Customer Loyalty. *Metamorphosis: A Journal of Management Research*, *10*(2), 27–47. https://doi.org/10.1177/0972622520110204

Landis, T. (2022). Customer Retention Marketing vs. Customer Acquisition Marketing. In *Outbound Engine*. https://www.outboundengine.com/blog/customer-retention-marketing-vs-customer-acquisition-marketing/

Lata, H., Singh, A., & Pradesh, H. (2017). Customer Satisfaction Towards Maruti Suzuki Cars: a Case Study of Solan City, Himachal Pradesh. *International Journal of Advance Research and Innovative Ideas in Education*, *4*, 493–501.

Mathankumar, M. V., & Velmurugan, R. (2016). Factors Influencing Car Owners Satisfaction. *Editorial Board*, *5*(2), 32.

Mehrish, A., Fanaswalla, A., Gore, A., Singh, A., & Jain, A. (2016). Customer Satisfaction in Automobile Industry. *A Research Methodology Report.* Extracted from https://www.academia.edu/23614085/Consumer_Satisfaction_in_Automobile_Industry

Opata, C. N., Xiao, W., Nusenu, A. A., Tetteh, S., & John Narh, T. W. (2020). Customer Value Co-Creation in the Automobile Industry: Antecedents, Satisfaction, and Moderation. *SAGE Open*, *10*(3). https://doi.org/10.1177/2158244020948527

Pachuau, L., & Thanzauva, J. (2021). Customer Satisfaction : A Case Study of Hyundai Motors in Aizawl City. *Journal of Emerging Technologies and Innovative Research. 8*(7), 289–294.

Rohith, K. (2016). A Study on Customer Satisfaction at Ford Motor. *A Report submitted to Visvesvaraya Technological University, Bangalore, India. http://14.99.188.242:8080/jspui/bitstream/123456789/6434/1/1NZ14MBA34.pdf*

Rotar, L. J., & Kozar, M. (2017). The Use of the Kano Model to Enhance Customer Satisfaction. *Organizacija*, *50*(4), 339–351. https://doi.org/10.1515/orga-2017-0025

Selvaraj, N., Alagupandi, V., & Santhanamari, R. A Study on Factors Influencing the Customer Satisfaction of Small Car Owners With Reference to Tamil Nadu Region. *Personnel*, *4*, 1144-1165.

Shahroodi, M. H., Kaviani, H., & Abasian, M. (2015). Evaluating the Effect of Brand Equity on Consumer Satisfaction and Brand Loyalty in Large Retails of the Mazandaran Province (Case Study: Food Products Industry). *European Online Journal of Natural and Social Sciences: Proceedings*, *4*(1(s)), 1–12.

Sharm, S. K., Sharma, K., & Khan, M. (2011). A Study and Analysis of Customer Satisfaction of Tata Motors in Jaipur, Rajasthan. *International Journal of Business Management & Economic Research*, *2*(4).250–257.

STRESS TEST ON NEPALESE FINANCIAL INSTITUTIONS: AN IMPACT ANALYSIS OF COVID-19

-Yashodip Poudel and Sudan Kumar Oli

Abstract

Under the Basel framework banks are required to conduct stress test for their adequacy of capital. Nepal Rastra Bank has adopted and mandated the reduced model of stress testing framework. The study is carried out using reduced model of stress testing by measuring the impact in provision as a result of non-performing loans. This study investigates the changes in capital adequacy during stressed scenarios. The results suggest that the Capital Adequacy Ratio falls substantially when exposed to varied stressed scenarios. The study finds that Nepalese BFIs are heavily exposed to short-term lending facilities like Term Loan, Demand and other working capital loans, and Wholesaler and Retailer exposure. Although the findings are consistent with other similar studies, the Nepalese financial system is uniquely exposed to short-term financing facilities. Increasing margin requirements and credit rationing is recommended to ease the situation if and when the crisis persists. However, it should be known that this sensitivity analysis delves into capital adequacy and not profitability. This study contributes to existing literature and helps policymakers with analysis.

Keywords*: Stress Test, COVID-19, Capital Adequacy, Risk Management*

I. Introduction

Ever since its inception, the financial system has overseen many crises and turbulences. The 1997 Asian financial crisis, the global financial crisis of 2007-2008, the 2010 European sovereign debt crisis and recently Turkish currency and debt crisis since 2018 has all but highlighted the importance of financial system stability. Nepal's financial system has become increasingly unstable particularly after it adopted Financial and Economic liberalization since 1992. Shrestha (2005) found that financial liberalization has brought instability in the Nepalese financial sector and that the financial liberalization is positively associated with growth but negatively associated with financial stability. The instability of financial system brings alongside multitudes of risk and banks as a primary financial intermediary are hit the hardest. According to Kick & Koetter (2007), "Banking failures are different from non-financial corporations' failures, since a unique bank failure can put at risk the clients trust and trigger the collapse of the entire banking system. This is the reason why banks are more supervised and controlled by authorities." Stress Testing is intense but deliberate form of technique to determine the stability of the financial system pertaining particularly towards banks.

According to Blaschke, *et al.* (2001), "Stress testing describes a range of techniques used to assess the vulnerability of a portfolio to major changes in the macroeconomic environment or to exceptional, but plausible events." In the early 2000s authorities of major central banks considered the possibility of a system-wide exercises to analyze the complexities by aggregating results of different methodologies exercised by various banks. A Committee on the Global Financial System established a taskforce in 2001 to learn about the role of stress testing in risk management, which formally paved ways for stress testing tools at a global scale. The central bank of Nepal with assistance from World Bank and State Bank of Pakistan developed a reduced and more simplified version of the guideline of otherwise very complex BCBS guideline to assess

risk exposure of banks in Nepal. BCBS (2018) has outlined a guiding framework that must include objectives, governance, policies, processes, methodology, resources, and documentation that guide stress testing activities and facilitate the use, implementation, and oversight of stress testing frameworks. Following that, a guideline was formally laid down in 2012 by the central bank of Nepal with step by step methodologies to follow on. Capital Adequacy Ratio is the hallmark for Nepalese adaptation of the stress testing methodologies. Capital adequacy is the sufficiency of capital that works as a cushion for relevant risks as per regulatory guidelines.

Stress testing is a new concept in Nepalese financial system. Stress testing as a risk management tool is still in its infancy stage although as a compliance, quarterly tests are done and reported to the central authority. Due to the ongoing pandemic, frequent lockdown is imposed which ultimately has severe impact to the economy and the financial system. Can the banking system withstand the rise in interest rate? Is current CAR enough to withstand fluctuations in stock market? What happens if the certain loan portfolio collapses to non-performing loan? Can current capital withstand restructuring of various loan portfolio as mandated by central bank? These are some pertinent questions that arises during the pandemic. Therefore, this paper deals with the various stressors that impact the financial stability. The major objective of this paper is to test the financial stress on Nepalese financial institutions due to the COVID-19 outbreak. Furthermore, this paper has been extended as follows: Section II will be presented a brief literature review followed by data and methodology in section III, data analysis results and discussion in section IV, and final section V will present a quick summary and conclusion of this paper along with a policy recommendation.

II. Literature reviews

Ghosh (2021) found that the banks with low capital, minimal liquidity ratio, high non-performing loans, low profitability, and portfolio with high exposure to risky sectors were more vulnerable to the pandemic irrespective of their balance sheet size. These banks have considerable profitability ratio but low capital base, high non-performing loans, and low short term liquidity facility that further exacerbates the situation. Thomä (2020) used the scenario analysis concept and toolbox developed for climate stress-test scenarios. The report has placed impact due to covid under three scenario archetypes: health effect; sentiment effect; and policy response. The report found that it was unlikely that COVID-19 will generate dire outcome without combination of 'unlucky' factors, such as higher mortality, panic sentiment at unprecedented scale, and the complete breakdown of basic principles of good governance. Patra & Padhi (2020) used the panel data models to evaluate stressed scenarios under three different categories of shock, vis-à-vis, baseline, medium and severe. The study found that much of the private banks could withstand the assumed crisis scenarios barring the few banks. Likewise, Acharya, et al. (2018) found that the banks significantly reduced their credit supply to the relatively risky borrower even though such high risk borrowers paid high spread rate. The findings did not support the Moral Hazard hypothesis meaning that banks were willing to decrease their credit risk. The empirical study used difference-in-difference (DID) methodology to study the effects on stress tests on the supplies of different types of credit. Equally significant, Hassan et al. (2016) used comparative methods to investigate changes in CAR under different stressed scenarios in Turkey. The stressed results are found to be more sensitive towards changes in exchange rate and increased non-performing loans. Dinabandhu (2012) used the Cholesky decomposition of indicators to evaluate the stressed credit quality and its impact on CAR. The multivariate analysis found that the minimum CAR could fall to 8-9 percent against the 16-17 percent of gross non-performing assets.

Accordingly, Blaschke, et al. (2001) recommends aggregation and re-pricing of portfolio and comparison of it with the present portfolio and adjustment to present portfolio and risk management techniques. The paper has established a decision sequence for the conduct of stress test for individual portfolio. Kick & Koetter (2007) also used an ordered logit approach to find that distress is increasingly less likely for well-capitalized, profitable banks and more likely for banks with low levels of total reserves and high shares of poor quality loans. The approach estimated each set of probabilities with high accuracy and confirms the necessity to account for varied distress events. Oura and Schumacher (2012) defined the necessity of stress testing to measure the vulnerability of financial portfolio. Similarly, Jorion (2006) differentiates between value-at-risk and stress testing in which value-at-risk calculates potential losses at normal market conditions whereas stress testing covers broader crisis scenario.

III. Methods

There are various models for stress testing depending on the nature of shock exposed, availability of data, regulatory mandate, and covariance of macroeconomy and individual portfolio. Blaschke, et al. (2001) places emphasis on dollar gap analysis, repricing model, duration model all based on multiple shock scenarios. Silva, P. (2018) uses a limited dependent variable model of econometrics by Woolridge (2012). Similarly, Jobst et al. (2013) describes three primary approaches for concurrent stress test; balance sheet; market price-based model and macro financial models. Nepal Rastra Bank on its 2012 Stress Testing Guidelines mandated all the commercial banks to conduct quarterly stress test under three categories: Credit Risk Stress Test; Market Risk Stress Test and Liquidity Risk Stress Test. A reduced and simplified model of provisioning was recommended to calculate the capital adequacy ratio to be compared with the pre shock capital adequacy ratio. This paper follows the reduced model on various shock exposures to balance sheet.

The secondary data were obtained from Financial Stability Reports and Annual Reports from 2019 (mid-July) to 2021 (mid-July) which was the period of pandemic. This study uses the reduced model recommended by the central bank of Nepal. The reduced model is geared towards approximation of CAR because of changes in provisioning.

Credit Risk Stress Test evaluates the increase in the level of non-performing loan that have adverse impact in the capital of the bank. When NPL level goes up, additional provision requirements have an adverse impact on the bank's capital adequacy ratio. Likewise, Market Risk Stress Test explains change in the market risk factor and the bank's capital position. Capital position may vary, when there is a change in the interest rate, equity prices and exchange rates. Changes in market variables particularly interest rate of both deposits and loans have direct impact in its profit. In accordance, Liquidity risk stress test assesses the banks' ability to discharge its liabilities during the stressed events. The bank with sufficient liquid assets will have strong liquidity strength. Below Table 1 highlights the procedure of stressing across various categories of shock.

Table 1. Reduced Model of Stress Testing (NRB- 2012)

CREDIT RISK STRESS TEST			
Magnitude of Shock	**(B)BASELINE : 5%**	**(M)MEDIUM : 10%**	**(S)SEVERE : 15%**
Increase in Provision	a X B X 100%	a X M X 100%	a X S X 100%
Revised Capital Fund	Capital Fund - Increase in Provision		
Revised Risk Weightage Exposure	Risk Weighted Exposure - Increase in Provision		

Revised CAR	***(Revised Capital Fund/Revised RWE) * 100%***		
MARKET RISK STRESS TEST			
Magnitude of Shock	**(B)BASELINE : 200bp**	**(M)MEDIUM : 400bp**	**(S)SEVERE : 800bp**
Impact (-) in Profit	(a X B)/12	(a X M)/12	(a X S)/12
Revised Capital Fund	Capital Fund - Impact in Profit		
Revised CAR	***(Revised Capital Fund/Revised RWE) * 100%***		
LIQUIDITY RISK STRESS TEST			
Magnitude of Shock	**(B)BASELINE : 5%**	**(M)MEDIUM : 10%**	**(S)SEVERE : 15%**
Revised Deposits	a - (a X B)	a - (a X M)	a - (a X S)
Revised Liquid Fund	Liquid Fund - (a X B)	Liquid Fund - (a X M)	Liquid Fund - (a X S)
Liquidity Ratio	**(Revised Liquid Fund/ Revised Deposits) * 100%**		
Additional RWE	a X 0.01	a X 0.06	a X 0.11
Revised Risk Weighted Exposure	RWE + Additional RWE		
Revised CAR	***(Revised Capital Fund/Revised RWE) * 100%***		

Here "***a***" is the given portfolio to be exposed.

The credit, market and liquidity portfolio are stressed across three spectra: Baseline, Medium and Severe. Loan portfolios consisted of Demand & other working capital loan (WC), Term loan (TL), Overdraft facility (OD), Home Loan up to 1.5 crore (HL), Real Estate Exposure (RE), Hotel or Restaurant Exposure (H&R) and Wholesaler & Retailer Exposure (W&R); all stressed for 5%, 10% and 15%. Deposit (DEPR) and Lending interest rate (LIR) are exposed to 200 bp, 400 bp and 800 bp, increase and decrease respectively. Equity (FE) is exposed to 50% fall and withdrawal of deposit (WDEP) at 5%, 10% and 15%. The reduced model of sensitivity analysis is used because it is easier to understand and comfortable to replicate. Since it studies the in depth impact of a variable, the predictors are reliable and helps researcher in accurate identification for space of improvements. It is however bound by the limitation of not generating probabilistic distribution of changes.

IV. Data analysis results and discussion

Stress Testing quintessentially is a 'what if' scenario. Various assumptions were laid down to evaluate the overall resilience and standing of Nepalese BFIs' capital adequacy, especially in view of the COVID pandemic. The pre-shock CAR stood at 14.29% in 2019, 14.16% in 2020 and 13.53% in 2021. The recommended minimum CAR as per the New Capital Adequacy Framework of central bank is 10%. Across 3 years stress testing yielded the following results:

Table 2. Stress Test Results

Magnitude of Shock	**BASELINE (5%)**			**MEDIUM (10%)**			**SEVERE (15%)**		
' %CAR	**2019**	**2020**	**2021**	**2019**	**2020**	**2021**	**2019**	**2020**	**2021**
WC	13.44%	13.28%	12.60%	12.57%	12.38%	11.65%	11.68%	11.46%	10.67%
TL	13.51%	13.26%	12.54%	12.72%	12.33%	11.53%	11.91%	11.39%	10.50%
OD	13.66%	13.55%	12.86%	13.02%	12.93%	12.18%	12.37%	12.30%	11.49%
HL	13.96%	13.84%	13.22%	13.63%	13.53%	12.90%	13.30%	13.21%	12.58%
RE	14.09%	13.96%	13.34%	13.88%	13.75%	13.14%	13.68%	13.55%	12.95%
H&R	14.12%	13.97%	13.34%	13.95%	13.79%	13.14%	13.78%	13.60%	12.95%
W&R	13.44%	13.33%	12.64%	12.57%	12.48%	11.74%	11.68%	11.61%	10.82%
DEPR	14.21%	14.08%	13.45%	14.13%	14.00%	13.37%	13.97%	13.84%	13.20%

LIR	14.13%	14.00%	13.36%	13.98%	13.84%	13.19%	13.67%	13.53%	12.86%
WDEP	14.14%	14.00%	13.38%	13.43%	13.25%	12.66%	12.78%	12.58%	12.01%
FE							14.29%	14.16%	13.53%

It is evident from Table 2 that, exposure to hotel or restaurant sector was minimum, so is the exposure to real estate sector. The biggest impact can be witnessed in Demand & Other Working Capital Loan, Term Loan and Wholesaler and Retailer Exposure. Eldomiaty, et al. (2016) suggests that non-performing loan and loan to deposit ratios have positive significance on bank's capital adequacy ratio. As the non-performing loan increased due to exposure, the immediate standing in short term lending portfolio saw a massive hit consistently in all 3 years. Similarly, the findings are consistent with stress test carried out by Hassan et al. (2016). However, much impact was not seen in fall in equity prices. Although, the results are consistent with previous studies, the Nepalese financial system is uniquely exposed to short term lending facilities. However, it should be known that land and houses work as a collateral in Nepal, and this study is not a simultaneous study. Monte Carlo simulation using stochastic approach is more suitable to draw multivariate simultaneous analysis.

Table 3. Descriptive Statistics of Stressed Test Result

Magnitude of Shock	**Baseline Shock**		**Medium Shock**		**Severe Shock**	
Portfolio Exposure	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
WC	13.10%	0.0036	12.20%	0.0040	11.27%	0.0043
TL	13.10%	0.0041	12.19%	0.0049	11.27%	0.0058
OD	13.36%	0.0035	12.71%	0.0038	12.05%	0.0040
HL	13.67%	0.0033	13.35%	0.0032	13.03%	0.0032
RE	13.79%	0.0033	13.59%	0.0032	13.39%	0.0032
H&R	13.81%	0.0034	13.63%	0.0035	13.44%	0.0036
W&R	13.14%	0.0035	12.26%	0.0037	11.37%	0.0039
DEPR	13.91%	0.0033	13.83%	0.0033	13.67%	0.0034
LIR	13.83%	0.0034	13.67%	0.0034	13.35%	0.0035
WDEP	13.84%	0.0033	13.11%	0.0033	12.46%	0.0033
FE					13.99%	0.0033

Table 3 shows the descriptive statistics of variables based on panel data of 11 portfolios exposed on 3 categories of shock. Each portfolio has 3 observations from 2019 (mid-July) to 2021 (mid-July). In each category of shock, the mean average for WC, TL and W&R are the lowest. These three are the most hit sector during the COVID-19 pandemic.

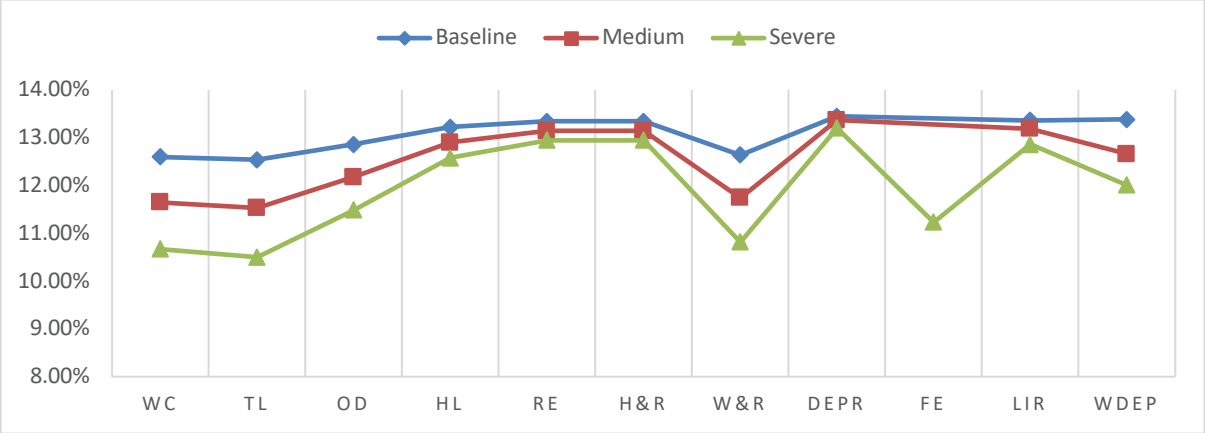


Exhibit 1. Stressed CAR% of 2021

Source: Author's own development based on stress test of 2021 using Excel

Singh, *et al* (2021) found no positive correlation between CAR and non-performing loans in Nepal, which means that individual banks in Nepal will disburse short term loans to fuel their profitability growth irrespective of fall in their CAR. The figure at Exhibit 1 merely discounts the motivation to propel necessary changes, given the higher profit spread earned from such short term lending facilities.

V. Summary and Conclusion.

After economic liberalization throughout the 90s, Nepal has seen manifold rise in its financial institutions. It has created systematic and unsystematic risk supported by integration to global financial system. As a result, adequate capital is necessary to sustain crisis and unfortunate scenarios. The purpose of this study was to identify the risk exposure of Nepalese financial institutions using reduced model of stress testing. The sensitivity analysis is carried out using data sourced from annual financial reports and financial stability report published by the central bank. It was found that Nepalese financial system in uniquely exposed to short term lending facilities like Term Loan, Demand and other working capital loan and Wholesaler and retailer exposure. This may necessitate the central bank to lay down tools for refinancing or restructuring the loans. It may also push BFIs to reschedule their assets or else new problem of excessive non-banking assets may arise and managing such assets may cause difficulties in their banking activities. Liquidity has and will always remain a problem for Nepalese financial system with or without pandemic situation fueled by over financing in short term loans like demand, term, and wholesaler/retailer loan. Managing the over leverage towards working capital financing may ease the liquidity shortage. A strict credit rationing or margin requirement is required to prevent the worst case scenario, which otherwise might necessitate recapitalization of the banking industry.

Reduced model of stress test doesn't account for the probability of occurrence of such categorized events simultaneously. So, VAR model, stochastic simulation, Monte Carlo simulation and reverse stress testing etc. can be more useful. This study prioritizes capital, however individual BFIs should also use profit as an examining parameter and evaluate the impact on distributable profits at the end of every quarter. Baudino, et al. (2018) has identified three pillars for stress test – governance, implementation, and outcome. Internal stress should be built on that for increased transparency and accountability. Governance iteratives, its implementation and outcome must all be measured to ensure the strong foundational basis for comprehensive risk management. Basel Committee on Banking Supervision (2017) found that both banks and regulating authorities have

made significant advances in methodologies and infrastructure for stressed test. It has now become a core tool for supervision and macroprudential policy making.

This study would be useful for studying the readiness of the Nepalese BFIs to withstand varied crisis scenarios such as the COVID pandemic. It can also be useful for regulatory authorities and policy maker to analyze the recapitalization need of the Nepalese financial system. It contributes to the existing literature of Nepal.

References

Acharya, V., Berger, A., Roman, R. (2018). Lending implications of U.S. bank stress tests: Costs or benefits? *Journal of financial Intermediation*. 34(1), 58-90.

Basel Committee on Banking Supervision. (2017). Supervisory and bank stress testing: range of practices. Basel: BIS.

Basel Committee on Banking Supervision. (2018). *Stress Testing Principles.* Basel: BIS.

Baudino, P., Goetschmann, R., Henry, J., Taniguchi, K. & Zhu, W. (2018). Stress-testing banks-a comparative analysis. Basel: Financial Stability Institute Insight.

Blaschke, W., Jones, M., Majnoni, G., & Peria, S. (2001). Stress Testing of Financial Systems: An overview of Issues Methodologies and FSAP Experience. International Monetary Fund, IMF Working Paper. DOI:01.10.5089/9781451851168.00

Committee on the Global Financial System. (2004). Stress testing at major financial institutions; survey results and practice. Basel: BIS.

Dinabandhu, Bag. (2012). Stress Testing of the Banking Sector in Credit Risk Framework, April -June, Prajnan: *Social Science journal, NIBM.* 11(1).

Eldomiaty, T., Eldin, A., & Azzam, I. (2016). Determinants of Capital Adequacy Ratios under Basel III: Stress Testing and Sensitivity Analysis on Egyptian Banks. Available at: https://papers.ssrn. com/sol3/papers.cfm?abstract_id=2788482

Ghosh, R. (2021). Resilience of commercial banks of Bangladesh to the shocks caused by COVID-19 pandemic: An application of MCDM-based approaches. *Asian Journal of Accounting Research, Vol.* 6(3), 281-295.

Hassan, M., Unsal, O. & Tamer, H. (2016). Risk Management and Capital Adequacy in Turkish Participation and Conventional Banks: A Comparative Stress Testing Analysis. *Borsa Istanbul Review,* 16(2), 72-81.

Jobst, R., Rösch, D., Scheule, H. & Schmelzle, M. (2015). A Simple Econometric Approach for Modeling Stress Event Intensities. *Journal of Futures Markets,* 35(1), 300-320.

Jorion, P. (2006).Value at risk: The new benchmark for managing financial risk. McGrawHill.

Kick, T., & Koetter, M. (2007). Slippery slopes of stress: Ordered failure events in German banking. *Journal of Financial Stability,* 3(1), 132-148.

Nepal Rastra Bank (2012). Stress Testing Guidelines. Kathmandu: Author.

Oura, H. & Schumacher, L. (2012). Macrofinancial stress testing-principles and practices. International Monetary Fund Policy Paper.

Patra, B., & Padhi, P. (2020). Resilience of Indian Banks: Macroeconomic Stress Test Modelling for Credit Risk. *Journal of Public Affairs, Vol. e2350*. DOI: 10.1002/pa2350

Shrestha, M. B. (2005). Financial Liberalisation in Nepal, PhD thesis, School of Economics and Information Systems, University of Wollongong. http://ro.uow.edu/theses/308

Silva, P. Stress Tests on European Banks: Determinants of Banking Failure, Dissertation MFIN, Instituto Universitario de Lisboa, 2018.

Singh, S., Basuki, B. & Rahmat, S. (2021). The effect of non-performing loan on profitability: Empirical evidence from Nepalese commercial banks. The Journal of Asian Finance, Economics and Business, *8*(4), 709-716.

Thomä, Jakob. (2020). Stress Testing COVID-19, an exploratory Stress-Test scenario for next 36 months. 2degrees investing. [Online]. https://2degreesinveseting.org/covid19stresstesting

Wooldridge, J. (2012). Introductory Econometrics: A Modern Approach. South-Western Cengage Learning.

MACROECONOMIC DETERMINANTS OF EXCHANGE RATE VOLATILITY: A CASE OF NEPAL

- Suresh Pari

Abstract

The main objectives of this research are to investigate various macroeconomic variables leading to critical variations in the exchange rate of a currency in Nepal, which includes Inflation rate, Interest rate, FDI, current account balance, trade and GDP, its impact on exchange rate against USD by using annual time series data throughout 199/96 to 2019/20. These variables have been taken as independent variables and the exchange rate is taken as dependent variables. This study is primarily quantitative in its approach and it follows a descriptive and analytical approach. The finding of this study is FDI, current account deficit, trade deficit, and GDP have a strong positive correlation with the exchange rate, and the inflation rate (CPI) and interest rate are insignificantly correlated with the exchange rate of Nepal.the exchange rate volatility of Nepal in the run is impacted by the inflation rate, FDI, and GDP. Likewise, FDI and GDP, in the long run, affect the exchange rate of Nepal.

Keywords: Exchange Rate, FDI, GDP, Inflation rate, Interest rate, Exchange Rate Volatility, International trade.

I. Introduction

The exchange rate is the value of a country's currency against other currencies (Krugman & Obstfeld, 2006) and it is important for all countries. Exchange rates provide links between local and international markets for goods, services, and various financial assets. It is an important macroeconomic variable that is used as a parameter to determine global competitiveness, it is considered an indicator to measure the attractiveness of any currency in any country, with a negative relationship between said competitiveness. For this reason, the lower the value of this indicator in any country, the greater the competitiveness of that country's currency. Similarly, Volatility is defined as "instability ", whether it appears in asset prices, option prices, portfolio optimization, or risk management. This fluctuation provides a huge basis for economic decision-making. Exchange rate fluctuations describe the uncertainty of international commodity and financial asset transactions. If a country’s exports exceed imports, the demand for its currency rises and consequently, it has a positive impact on the exchange rate (Verma, 2016).

The exchange rate plays a vital role in international trade. However, the exchange rate is very important in this era of globalization, considering that any country trades internationally, because lower exchange rates make exports cheaper, while higher exchange rates make them more expensive, and vice versa. The appreciation of the currency has a greater impact on foreign trade. The exchange rate also has a greater impact on the profitability of companies with FDI (foreign direct investment). The exchange rate can also considerably increase the risks and uncertainties in the case of foreign investment. Therefore, the exchange rate has a more important factor to discuss. In this research, try use to verify the determinants that can affect the exchange rate of Nepal.

The understanding and addressing exchange rate determinants in this study provides help and clarity. We are considering developing a solid exchange policy to achieve desirable economic growth. Investors in economies with high foreign exchange risk and high-risk avoidance never invest in such economies, allowing investors to invest in economies with stable exchange rates.

To raise the economic exchange rate, we need to focus on the determinants for that purpose.Therefore, the exchange rate is influenced by the inflation rate, interest rates, GDP growth rate, foreign direct investment, trade, and the current account of a particular country. These types of research he to government, macroeconomic policymakers, and other researchers know about how the exchange rate impact on macroeconomics variables of our country Nepal.

II. Literature review

In 1973, the floating exchange rate was applied to most developing countries based on a fixed exchange rate. Through this change in the exchange rate system, most researchers investigated how this factor affects the economy.

Mirchandani (2013), Analysis of Macroeconomic Determinants of Exchange Rate Volatility in India. The objectives of the study are to investigate the impact of various macroeconomic variables on the volatility of the foreign exchange rate. The research is based on secondary data, to compile the report with some variables twenty years of annual data for the period of 1991 to 2010 were collected. The relationship between the Exchange rate and Macroeconomic variables such as interest rate, Balance of trade, Inflation rate, Foreign Direct Investment, GDP, etc. have been analyzed with the help of the statistical tool. he concluded that review the probable reasons for the depreciation of the Rupee and analyze different macroeconomic determinants that have an impact on the volatility of the exchange rate and their extent of correlation. The study found that high inflation leads to an appreciation of the exchange rate of a currency, a high-interest rate results in depreciation in the exchange rate of the currency, and the exchange rate has a positive correlation with GDP growth rate & current account balance.
Hossain (2013) studied exchange rates and economic growth in Bangladesh's econometric analysis. This study examines the impact of exchange rate and export to GDP in Bangladesh using the time series data from 1981-2013. The Ordinary Least Square (OLS) method is used to estimate the model. The results show that there is a positive relationship between exchange rate, export, and GDP. The value of R^2 is 98.8%. This indicates that about 98.8% of the total variation in the GDP is explained by the exchange rate and export in Bangladesh. The results are statistically significant at a 5% level of significance. This study suggests increasing exchange rate and export to increase economic growth in Bangladesh.

Danmola (2013) study the impact of exchange rate volatility on the macroeconomic variables in Nigeria. The study analyses the impact of exchange rate volatility on Macroeconomic variables with the help of the Correlation Matrix, Ordinary Least Square (OLS), and Granger Causality test. He used econometric models are based on simple regression equations. The findings of the study show that exchange rate volatility has a positive influence on Gross Domestic Product, Foreign Direct Investment, and Trade Openness, but with a negative influence on the inflationary rate in the country.

Chowdhury's (2014) study has been conducted to analyze the determinants of exchange rates in Bangladesh's economy from 1990 to 2011 using a simple single equation linear regression model (SELRM). The inflation rate, GDP growth rate, interest rate, and current account balance is used as an explanatory variable. These are the most important determinants of the exchange rate, which have a major impact on the exchange rate. He concluded includes that inflation rate, GDP growth rate, interest rate, and current account balance have a positive impact on the exchange rate and the major role played by GDP.

Paudel (2015) studies Exchange rate policy and export performance in a landlocked developing country: The case of Nepal. The objectives of this are to examine the implications of Nepal's exchange rate policy for its export performance over the period 1980–2010. We first document Nepal's long-standing currency peg against the Indian rupee and that Nepal's real exchange rate appreciated substantially from the late 1990s. We then employ a gravity modeling approach to confirm that this real exchange rate appreciation has adversely affected Nepal's exports, especially to third-country markets. Nepal's exchange rate-related export competitiveness trap motivates to reconsider the current peg.

Ramasamy (2015), the study Influence of Macroeconomic Variables on Exchange Rates. This study investigates nine important macroeconomic variables' relationship and their influence on exchange rates. under this study 15-year data (2001-2015). The regression modeling technique is widely applied to estimate coefficients for independent variables, test hypotheses, and evaluate the importance of each independent variable in the model. He found that interest rate, BOP, and inflation rates are positively related to the exchange rate.
Wadud (2017)examines the macroeconomic determinants of economic growth of the World Bank's newly categorized lower-middle-income countries. In specific, the study tries to find out the relationship between the key macroeconomic indicators namely foreign direct investment, current account balance, exports of goods and services, imports of goods and services, government total investment, inflation, total population, unemployment rate, life expectancy at birth, total remittances received and economic growth among lower-middle-income countries.This study employs the panel data analysis that allows the unobservable heterogeneity for each observation contained in the sample to be removed and multicollinearity among independent variables to be alleviated. The data for this analysis used the cross-sectional and time-series data (strongly balanced panel data) for 45 countries during the period from 1991to 2016. He found that import performance and inflation are found insignificant while FDI, interest rate, and unemployment rate are found highly insignificant.

Barguellil (2018) examines the impact of exchange rate volatility on economic growth. An empirical investigation based on a sample of 45 developing and emerging countries throughout 1985~2015 is conducted using the difference and system generalized method of moments estimators. Findings suggest that the generalized autoregressive conditional heteroskedasticity-based measure of nominal and real exchange rate volatility hurts economic growth. Also, the effect of exchange rate volatility depends on the exchange rate regimes and financial openness, that is, volatility is more harmful when countries adopt flexible exchange rate regimes and financial openness.

Khan's (2019) studies investigate the effect of macroeconomic variables on the exchangerate USD/CYN using yearly time series data for China's economy from 1980 to 2017.ARDLbounds test approach for cointegration is applied to test the long-run relation betweenthe dependent and the independent variables. The results of long-run ARDL indicate thatgross domestic product growth and trade openness have a positive effect onthe exchange rate USD/CNY while interest and inflation rates hurt theexchange rate.

Antwi & Issah (2020) The study examined the effect of macroeconomic variables on the exchange rate in Ghana using a multivariate modeling technique of the Vector Autoregression(VAR) and focusing on the impact of broad money supply (M2), lending rate, inflation, andreal GDP on the exchange rate, for 76 quarterly observations period of 2000–2019, inGhana and to examine their effectiveness in managing the exchange rate in Ghana. Thestudy used only secondary sources of data from the Bank of Ghana, World DevelopmentIndicators,

and the Ghana Statistical Service. He found that the real GDP granger causesan exchange rate in Ghana. However, inflation, money supply, and lending rate do notgranger cause exchange rate in Ghana but they affect exchange rate indirectly.

III. Methodology

This study has used descriptive inferential research designs. The descriptive design helps to describe the phenomenon, Inferential statistics allow using samples to generalize the populations from which samples are drawn. It is used to assess the strengths of the relationship between the independent variables and the dependent variables.This study has used correlation, Unit root test ARDL model is suggested to test the relationship between dependent and independent variables.The sample of this study consistsof 25 years of annual time series data of Nepal as the macroeconomic determinants of the exchange rate in the Nepalese economy covering the period from 1995/96 to 2019/20 AD.This study has been based on secondary data which has beencollected from various sources like the MOF, NRB, and world bank data set. The data is analyzed using Statistical Packages for Social Scientists (SPSS) software, Software for Statistics and Data Science (STATA), and Micro Soft- Excel.

The Model

Autoregressive Distributed Lag (ARDL) bounds testing approach is used to investigate the long and the short-run relationship between dependent and independent variables of the study. Since the nature of our data is based on time series distribution these data suffer from the problem of autocorrelation and trends therefore linear regression model can't produce a valid result. In such a situation the following ARDL model is suggested to test the relationship between dependent and independent variables. Following are the bound test cointegrations models.

$$\Delta EXR\mathrm{t} = \beta 0 + \beta 1 \sum_{t=\mathrm{i}}^{p} \Delta \mathrm{EXR\,t\text{-}1} + \beta 2 \sum_{t=\mathrm{i}}^{p} \Delta \mathrm{Inf\,t} - 1 + \beta 3 \sum_{t=\mathrm{i}}^{p} \Delta INT\mathrm{t} - 1 + \beta 4 \sum_{t=1}^{p} \Delta FDI\mathrm{t} - 1 + \beta 5 \sum_{t=\mathrm{i}}^{p} \Delta CA\mathrm{t} - 1 + \beta 6 \sum_{t=\mathrm{i}}^{p} \Delta TD\mathrm{t} - 1 + \beta 7 \sum_{t=\mathrm{i}}^{p} \Delta GDP\mathrm{t} - 1 + \lambda 1 EX\mathrm{t} - \mathrm{i} + \lambda 2 \mathrm{Inft} - \mathrm{i} + \lambda 3 INT\mathrm{t} - \mathrm{i} + \lambda 4 FDI\mathrm{t} - \mathrm{i} + \lambda 5 CA\mathrm{t} - \mathrm{i} + \lambda 6 TD\mathrm{t} - \mathrm{i} + \lambda 7 GDP\mathrm{t} - \mathrm{i} + e\mathrm{t}$$

IV. Results and discussion

Descriptive analysis

Table 8.1 provides a summary of the sample descriptive statistics. This summary of descriptive analysis is macroeconomic determinants of exchange rate volatility a case Nepal. The exchange rate is the dependent variable of this study and the exchange rate of the Nepalese rupee (NPR) against the US dollar was measured used to calculate the exchange rate. The minimum value of the exchange rate NPR is 54.96 per US dollar and the maximum value of NPR is 116.01 with an average value of NPR is 80.89 per dollar. There is the fluctuation of the exchange rate is measured by the standard deviation over the past 25 years. The standard deviation of the exchange rate is 17.64 per us dollar. This fluctuation is relatively smaller.

Inflation is the independent variable and describes the rate at which the price level continues to rise overall or at which the prices for goods and services rise regularly with low purchasing power. Inflation affects the distribution of income. The increase in price volatilityleadsto high inflation. The inflation rate is measured by the consumer price index (CPI) of Nepal. The minimum value of the inflation rate is 2.27 in CPI per year and the maximum value of inflation is 11.24 in CPI per year with an average value is 6.74 per year. There is the fluctuation of the inflation rate is measured by the standard deviation over the past 25 years. The standard deviation of inflation is 2.89.

Similarly, interest rate another independent that influences the movementof the exchange rate was the differential of interest or difference in interest rates between the main countries. The interest rate is measured by the weighted average interest lending rate of commercial banks in Nepal which is published by the NRB. The minimum value of interest rate is 8. 92 percent per year and the maximum value is 16. 15 percent per year with an average value is 11.29 percent per year. There is the fluctuation of interest rate is measured by the standard deviation over the past 25 years. The standard deviation of the interest rate is 1.76 percent per year.

The FDI is the independent variable in this study. The exchange rate volatility can also influence the level of development of the counties through its effects on direct foreign investment entries. It is measured by in this study ten-million-unit NPR amount data converted into log formula. The minimum value of FDI is 0.00 because the FDI is 199/00 and 2002/03 AD, FDI inflow in Nepal is zero, and the maximum value is 3.29 with an average value is 2.05. The fluctuation of FDI is measured by a standard deviation the value of standard deviation is 0.95, which is the smaller fluctuation of FDI in Nepal.

Likewise, the current account balance deficit is the independent variable in this study. The current account formula of the Balance of Payment measures the import and export of goods and services and is calculated as the sum of the trade balance, net income, and current transfers. It is measured by in this study ten-million-unit NPR amount data converted into log formula. The minimum value of the current account balance deficit is 1.37 and the maximum value is 4.42 per year with an average value of the current account balance is 3.34 per year. The fluctuation of the current account balance is measured by standard deviation and the value of standard deviation is 0.66 over the past 25-years, which is a very small fluctuation in the current account deficit in Nepal.

The trade deficit is another independent variable in this study. The import and export directly as well as indirectly influence the country's exchange rate. The relationship shows that the trade deficit of Nepal is determined by the price level of Nepal and the exchange rate of NPR with US dollars. The trade deficit is measured by the export more import of country trade. The minimum value of the trade deficit is 1.53 and the maximum value is 4.45 with an average value of trade deficit is 3.37. The trade fluctuation is measured by the standard deviation and the value of the standard deviation is 0.63 over the past 25-years.

Similarly, GDP is the independent variable in this research, Changes in the GDP reveal changes in economic growth and can directly impact the relative value of a country's currency. It is measured by in this study ten-million-unit NPR amount data converted into log formula. The minimum value of GDP is 4.40 and the maximum value of GDP is 5.58 with an average value is 4.96. the GDP fluctuation is measured by standard deviation, the value of standard deviation value is 0.37. This fluctuation is relatively smaller

Table 8.1
Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Exchange rate (USD/Rs)	25	54.96	116.01	80.89	17.64
Inflation (CPI by Year %)	25	2.27	11.24	6.74	2.89
Interest rate (Lending Rate per Annum)	25	8.92	16.15	11.29	1.76
Foreign direct investment	25	.00	3.29	2.05	.95
Current account balance deficit	25	1.37	4.42	3.34	.66
Trade deficit	25	1.53	4.45	3.37	.63
GDP	25	4.40	5.58	4.96	.37

Correlation Analysis

Table 8.2 shows that the exchange rate has been a positive significant correlation with foreign direct investment (+.653). The current account balance deficit has been a is the significant relationship with the exchange rate (+.567) and the trade deficit has been a positive significant correlation with the exchange rate by.0648. The exchange rate also has positive significance with the GDP of Nepal, the remaining other variables have been no correlation between the exchange rate of Nepalese rupees i.e., inflation (CPI), and interest rate. This result shows that the exchange rate significant positive correlation with foreign direct investment (FDI), Current account balance (CAB)/deficit, trade deficit, and GDP. It means that all mentioned variable is a strong positive correlation with the exchange rate. The inflation rate (CPI) and interest rate are insignificantly correlated with the exchange rate of Nepal.

The result data show that the inflation rate is an insignificant correlation with the exchange rate, lending interest rate, foreign direct investment, current account balance deficit, trade deficit, and GDP of Nepal. It means that the inflation rate has is no significant correlation with the macroeconomic variables of Nepal.

The lending interest of the commercial bank of Nepal is an insignificant correlation with the exchange rate, foreign direct investment, current account balance deficit, and the trade deficit. This result shows that the interest rate is a negatively significant correlation with GDP (. -500). The correlation found that the interest rate is an only negative significant correlation with GDP and another remaining study variable is an insignificant correlation.

Foreign direct investment has been a positive significant correlation with the exchange rate by (+.652), the current account balance deficit has been a positive significant correlation with FDI by (+.474). FDI also has been a positive significant correlation with trade deficit by (+.542) and GDP has been also a positive significant correlation with FDI by (+.763). Foreign direct investment is an insignificant correlation with inflation and interest rate.

The current account balance deficit has been a positive significant correlation with the exchange rate by (+.567). similarly, FID is significant with the current account balance deficit by (+.474)

and the trade deficit has a highly positive significant correlation with the current account balance (+.989). The GDP has also a positive significance with the current account balance by (. +606). In another hand, the inflation rate and interest rate are insignificantly correlated with the current account balance. This relationship found that the current account balance deficit has been a significant correlation with the exchange rate, FDI, CAB deficit, trade deficit, GDP, and the insignificant correlation with inflation and interest rate.

Likewise, the trade deficit has been a positive significant correlation with the exchange rate by (+.648) and trade deficit and FDI is a significant correlation by (+.542). similarly, the current account balance deficit is a highly significant correlation with the trade deficit by (+.989) and GDP has also a positive correlation with the trade deficit by (+.689). The result shows that the exchange rate, FDI, CAB deficit, and GDP have been significantly correlated with the trade deficit and the interest and inflation rates of Nepal insignificant correlation with the trade deficit.

The GDP has been positive and highly significantly correlated with the exchange rate by (+.911) and the lending interest rate is positively significant with the GDP of Nepal. Similarly, the FDI has positive significance with GDP by (+.763). likewise, the GDP of Nepal has positive a significant correlation with the current account balance deficit by (+.606), and the GDP has also a positive and significant correlation with the trade deficit by (+.689). This correlation shows that the exchange rate, lending interest rate, FDI, current account balance deficit, and the trade deficit has been positive and significantly correlated with the GDP growth. The inflation rate is no significant correlation with the GDP of Nepal.

Table 8.2 Pearson Correlation Coefficient between macroeconomic determinants variable and the exchange rate

	Exchange rate	**Inflation rate**	**Interest rate**	**FDI**	**CAB deficit**	**Trade deficit**	**GDP**
Exchange rate	1	-.017	-.395	.652**	.567**	.648**	.911**
Inflation rate	-.017	1	-.018	.316	-.152	-.128	-.126
Interest rate	-.395	-.018	1	-.105	-.075	-.100	-.500*
FDI	.652**	.316	-.105	1	.474*	.542**	.763**
CAB deficit	.567**	-.152	-.075	.474*	1	.989**	.606**
Trade deficit	.648**	-.128	-.100	.542**	.989**	1	.689**
GDP	.911**	.128	-.500*	.763**	.606**	.689**	1

***. Correlation is significant at the 0.01 level (2-tailed).*

**. Correlation is significant at the 0.05 level (2-tailed).*

Unit root test

Table 8.3 Indicates the results of the Unit Root test for checking the stochastic properties of the data are assessed based on the series of each variable through Augmented Dickey-Fuller and Phillips-Perron tests. Results indicate that inflation and interest rate are stationary at level with ADF unit root test, also the interest rate is stationary at level with PP while the remaining

variables are non-stationary at the level. All the time series variables stationarity is again checked at the first difference with both ADF and PP. The result of the first difference indicates that all variables are stationary. Thus, it indicates that the order of integration is a mixture of I (0) and I (1), making it valid to use the Autoregressive distributed lag (ARDL) bound test approach.

Table 8.3. Unit root test

Variables	ADF		PP	
	Intercept	Trend &intercept	Intercept	Trend & intercept
Level				
EX	0.097	-1.18	0.129	-1.25
Inflation	-3.32	-3.29	-3.30	-3.26
Interest	-3.21	-2.85[a]	-3.37[a]	2.85
FDI	-1.65	-3.12	-1.48	-3.00
Current balance	-3.30[c]	-5.03	-3.29	-5.15
Trade	-2.81	-4.88	-2.76	-5.02
GDP	0.88a	-1.72	-4.67	-1.81
First difference				
EXR	-4.67[c]	-4.66[c]	-7.99[c]	-4.66[c]
Inflation	-7.10[c]	-6.92[c]	-3.75[c]	-7.75[c]
Interest	-3.49[c]	-3.48[c]	-6.19[c]	-3.23[c]
FDI	-5.81[c]	-5.80[c]	-8.19[c]	-6.34[c]
Current balance	-6.98[c]	-6.80[c]	-8.30[c]	-8.085[c]
Trade	6.90[c]	-6.74[c]	-8.05[c]	-7.86[c]
GDP	-3.76[c]	-3.84[a]	-3.75[b]	3.82[b]

[a,b] and [c] shows 1, 5, and 10% level of significance respectively

ARDL Bounding Test

While conducting a bounding test for the long-run cointegration of the exchange rate and another independent variable. The result found that based on table 4.2.5 the long-run relationship of the study variable since the lower value (I-O) at 5% level is less than for F- statistics value and f-statistics value is greater than the upper bound critical value, so the long-run cointegration of variable is accepted, it is shown in the table.

Table 8.4 ARDL Bounding Test

	Lower bound	Upper bound
F-test	Critical value (5%)	Critical value (5%)
6.624	2.45	3.61
t-test	-2.86	-4.38
-2.91		
H0: no level relationship *Accept if f< critical value I (0)* *Reject if f> critical value I (1)*		

ARDL Short Run Approach

Table 8.5 indicates the results of the short-run ARDL approach. Exchange rate NPR/ USD is used as the dependent variable. The past exchange has a positive effect on the current period exchange rate, in the short-run, the increase in the past exchange rate increases by .963 times of the year and the result is significant at 5%. Inflation is the independent variable in this study. The inflation rate has a positive impact on the exchange rate as per our prior hypothesis. In our short-run model, the inflation rate coefficient is 0.46 at the level and it is significant at 5 %. So, the hypothesis is accepted.

The interest rate hurts the exchange rate as per our prior hypothesis. The Short-run ARDL results of interest rate coefficient is - 0.094 at the level and it is insignificant at 5 %. So, the hypothesis is accepted. Similarly, FDI is a positive impact on the exchange rate as per our prior hypothesis. The result shows the FDI coefficient is 0.019 at the level and significant at 5%. So, the hypothesis is accepted. The current account balance is a positive impact on exchange as per our prior hypothesis. As per the ARDL short-run approach results shows the current account coefficient is -1.274 at the level and insignificant at 5%. So, the hypothesis is not accepted.

Likewise, the trade deficit has a positive impact on the exchange rate as per our prior hypothesis. The result ARDL short run approach shows the trade deficit coefficient is 1.530 at the level and insignificant. So, the hypothesis is not accepted. The GDP is a positive impact on the exchange rate in our prior hypothesis.

In our short-run model, the coefficient is 4.226 at the level and significant. So, the hypothesis is accepted. As our ARDL short-run model R-square indicates 97.47% variation in exchange rates is explained by the independent variables of the study. AIC and SIC values show that the model fits for analysis.

Table 8.5 ARDL Short Run Approach

Variables	Coefficient	Std. Error	t-statistics	Prob.
Exchange rate	.963	.215	4.48	.046
Inflation	.0462	.009	4.81	.041
Interest	-.094	.002	3.47	.065
FDI	.019	.037	-3.22	.004
Current account	-1.274	.396	-3.23	.084
Trade	1.530	.464	3.29	.081
GDP	4.226	1.62	2.62	.048

R-squared	.9747
Adjusted R-squared	.9747
F-statistics	43.40
Prob (F-statistics)	.0028

ARDL Long Run Approach

Table 8.6 indicates the results of the long-run ARDL approach. Exchange rate NPR/ USD is used as the dependent variable and inflation rate, interest rate, FDI, current account deficit, the trade deficit is used as independent variables in this study. The past exchange has a positive effect on the current period exchange rate, in the short-run, the increase in past exchange rate increases by

.922 times of the year and the result is significant at 5%. Inflation is the independent variable in this study. The inflation rate has a positive impact on the exchange rate as per our prior hypothesis. In our short-run model, the inflation rate coefficient is 0.615 at the level and it is insignificant at 5 %. So, the hypothesis is not accepted. A high rate of inflation minimalizes the effectiveness of a country in the international market.

The interest rate hurts the exchange rate as per our prior hypothesis. The Short-run ARDL results of interest rate coefficient are - 0.094 at the level and it is insignificant at 5 %. So, the hypothesis is accepted. Interest rate results indicated that the decrease in the NPR value is caused by the high-interest rate in the economy. Results of the interest rate are in line with the results of previous researchers. Khan and Qayyum (2011) stated that the interest rate has negatively and statistically non-significant affect exchange rates in Pakistan. Iqbal et al. (2012) revealed that GDP and interest rates hurt exchange rates in Pakistan. Similarly, FDI is a positive impact on the exchange rate as per our prior hypothesis. The result shows the FDI coefficient is 0.062 at the level and significant at 5%. So, the hypothesis is accepted.

The current account balance is a positive impact on exchange as per our prior hypothesis. As per the ARDL short-run approach results shows the current account coefficient is 1.094 at the level and insignificant at 5%. So, the hypothesis is not accepted. Likewise, the trade deficit has a positive impact on exchange rate as per our prior hypothesis. The result ARDL short-run approach shows the trade deficit coefficient is (-1.530) at the level and insignificant. So, the hypothesis is not accepted. Long run coefficient of trade openness indicates negative and statistically non-significant to determine exchange rates. Raza and Afshan (2017) investigated elements of the exchange rate in Pakistan by using time series data from 1972 to 2013. They used the autoregressive distributed lag bound testing cointegration approach, the Johansen and Juselius cointegration approach for checking the long-run relationship among the study variables.

The result of long-run cointegration shows that terms of trade and trade openness have a significant and negative effect on exchange. The GDP is a positive impact on the exchange rate in our prior hypothesis. In our short-run model, the coefficient is -8.603 at the level and significant. So, hypothesis is accepted. Our results of gross domestic product growth are consistent with Azid et al. (2005) and Mirchandani (2013) while contradicting with results of Harberger (2003). Mirchandani (2013) investigated the association between GDP and exchange rates in India and pointed out a significant positive relationship between India's economic growth with the exchange rate. Azid et al. (2005) stated that volatility in economic growth affects the exchange rate positively and significantly; the government applies non-consistent exchange rate policies in the economy. Harberger (2003) stated that economic growth and exchange rate have no relationship and economic growth non-significantly affects exchange rates. As our ARDL long-run model R-square indicates 97.80% variation in exchange rates is explained by the independent variables of the study. AIC and BSIC values show that the model fits for analysis.

Table 8.6 ARDL long Run Approach

Variables	Coefficient	Std. Error	t-statistics	Prob.
Exchange rate	.922	.28	2.81	.0490
Inflation	.615	.07	2.01	.067
Interest	-.016	.012	-1.32	.018
FDI	.062	.0422	1.49	.004
Current account	1.0911	.39	2.77	.073

Trade GDP	-1.034 -8.603	.433 1.382	-2.38 -4.24	.081 .000
R-squared Adjusted R-squared	.9780 .7581			

V. Finding

The following are the major finding from the statistical analysis:

I. The FDI, current account deficit, trade deficit, and GDP have a strong positive correlation with the exchange rate. Similarly, the inflation rate (CPI) and interest rate are insignificantly correlated with the exchange rate of Nepal.

II. The ARDL short-run model indicates that the inflation rate, FDI, and GDP are significant at 5% and the interest rate, current account, and the trade deficit are insignificant at 5% as per our prior hypothesis. The R-square indicates 97.47% variation in exchange rates is explained by the independent variables of the study.

III. ARDL long-run model indicate that the FDI and GDP are significant at 5% with the exchange rate and current account balance, trade deficit, and interest rate is in insignificant at 5% with dependent variables, 97.80% variation in exchange rates is explained by the independent variables of the study.

VI. Conclusion

The study concludes that the FDI, current account deficit, trade deficit, and GDP have a strong positive correlation with the exchange rate, and the inflation rate (CPI) and interest rate are insignificantly correlated with the exchange rate of Nepal. FDI and GDP, in the long run, affect the exchange rate of Nepal. The policymakers of the Nepal government should motivate its government to assign such monetary and fiscal policies that cause the less volatile and productive exchange rate for Nepal to manage sustainable economic growth for a long time with its trading partners.

References

Adhikari. (2018). Impact of exchange rate on trade deficit and foreign exchange reserve in Nepal: an empirical analysis. NRB Working Paper No. 43.

Ahmad, S., Ali, M., & Hussain, I. U. (2021). The exchange rate and its impact on Pakistani exports: An ARDL approach. Journal of Management, Economics, and Industrial Organization, 62-69. https://doi.org/10.31039/jomeino.2021.5.3.5

Aizenman, J. (1992). Exchange rate flexibility, volatility and the patterns of domestic and foreign direct investment. SSRN Electronic Journal.
https://doi.org/10.2139/ssrn.884640

Alshubiri, F. (2019). The impact of financial macroeconomic indicators on mobile money: Empirical evidence of GCC countries. 2019 International Conference on Digitization (ICD). https://doi.org/10.1109/icd47981.2019.9105782.

Chipili, J. M. (2013). Exchange rate volatility and trade flows in Zambia. African Development Review, 25(1), 55-66. https://doi.org/10.1111/j.1467-8268.2013.12013.x

Chowdhury. (2014). Determinants of Exchange Rate in Bangladesh: A Case Study. Journal of Economics and Sustainable Development,

Damane, M. (2020). Investigating the determinants of commercial bank interest rate spreads in Lesotho: Evidence from autoregressive distributed lag (ARDL) and non-linear ARDL approaches. International Journal of Finance & Economics. https://doi.org/10.1002/ijfe.2370

Henry, R., Andriamboavonjy, H., Paulin, J., Drahy, S., &Gourichon, R. (2015). Macroeconomic reevaluation of CNY/USD exchange rate: Quantitative impact of EUR/USD exchange rate. Advances in Intelligent Systems and Computing, 369-375. https://doi.org/10.1007/978-3-319-18167-7_32

Jabeen, M., & Khan, S. A. (2014). Modelling exchange rate volatility by macroeconomic fundamentals in Pakistan. International Econometric Review, 6(2), 58-76. https://doi.org/10.33818/ier.278035

Mirchandani. (2013). Analysis of Macroeconomic Determinants of Exchange Rate Volatility in India. International Journal of Economics and Financial Issues, 3. www.econjournals.com

Moraghen, W., Seetanah, B., &Sookia, N. U. (2020). The impact of exchange rate and exchange rate volatility on Mauritius foreign direct investment: A sector-wise analysis. International Journal of Finance & Economics. https://doi.org/10.1002/ijfe.2416

Capital Adequacy, Operating Efficiency and Credit Risk of Nepalese Commercial Banks: A Simultaneous Equation Framework

- Usha Kumari Sedhai[2] and Kapil Deb Subedi[3]

Abstract

This study tests the hypothesis on interrelationship of bank capital, credit risk and operating efficiency of Nepalese Commercial Banks. Simultaneous equations framework was used to avoid endogenity and simultaneous bias errors in estimated coefficients in separate equations of capital, risk and efficiency. Following the past literatures, a Two-Stage Least Squares (2SLS) regression method was employed to estimate the endogenous effect of bank capital on its relationship with efficiency and risk. Simultaneous equation strategy is chosen to alleviate the endogeneity effect among efficiency, banking risk, and capital adequacy. As per the moral hazard principles, a negative effect of efficiency on risk-taking was found. The weak performers are more vulnerable to risk-taking than high performing commercial banks. In contrast, capital and bank size are positively related to efficiency, and it indicates the increase in capital base and bank size reduces the credit risk. There is a negative relationship between risk and off-balance sheet items. Moreover, the larger off-balance sheet activities tend to decrease the bank efficiency and induce bank risk. On the risk equation, it was found that capital and size are negatively related with risk and positively related with efficiency which means large banks have lower risk than smaller ones. Banks that own more loans and advances have positive relation with risk, however the banks can offset such risks through expansion of their capital base and improving its cost efficiency. More capital tends to absorb adverse shocks and reduces the likelihood of failure; hence the major implication of this study is; the regulatory agencies should be aware enough to mitigate the banking risks first, through capital adequacy framework, and then improving their cost efficiency through the flexible interest rate corridors during the countercyclical economic shocks.

Keywords: *Capital Adequacy, Capital Risk, Endogeneity, Efficiency, Simultaneous Bias, 2SLS*

I. Introduction

Banking is highly regulated industry in the world. Apart from the products and its services, banking regulation covers its institution. The aim of the bank regulation is to increase prudential practices that will reduce the level of risk that bank are exposed to (Suhartono, 2012). Capital regulation is one of the key instruments of modern banking regulation. The regulation aims to increase a cushion during economic shocks and a mechanism to restrain bank to take excessive risk taking. The theoretical foundation on the relationship between bank capital and risk mainly stems from the principles of moral hazard that arise due to the agency problem. These moral hazards in banking industry are tested in strands of empirical works to show whether the increase in capital regulation forces bank to increase their risk or vice versa

[2] Graduate Student at MBA Program, Boston International College, Chitwan, Nepal
[3] Associate Professor, Boston International College, Chitwan, Nepal

(Altunbus, Santiago, Edward. & Gardener, 2007). Bank capital and risk positioning are simultaneously determined and are affected by both exogenous and endogenous factors.

In their study of interrelationship between capital and efficiency, Altunbus et.al., (2007) do not find a positive relationship between inefficiency and bank risk-taking. Inefficient European banks appear to hold more capital and take on less risk. Empirical evidence is found showing the positive relationship between risk on the level of capital (and liquidity), possibly indicating regulators' preference for capital as a mean of restricting risk-taking activities. The financial strength of the corporate sector has a positive influence in reducing bank risk-taking and capital levels. There are no major differences in the relationships between capital, risk and efficiency for commercial and savings banks although there are for co-operative banks. In the case of co-operative banks, capital levels are inversely related to risks and inefficient banks hold lower levels of capital. Some of these relationships also vary depending on whether banks are among the most or least efficient operators.

The regulatory agencies have focus on bank capital adequacy to cushion against the distress risk of banks so a number of measures have been framed to implement the countercyclical convergence of risk with capital. After 2017 AD, the paid-up capital of Nepalese commercial banks has been increased through regularity framework prescribed by NRB, as commercial banks should have minimum eight billion paid up capital. (NRB Unified Directives,2076). With implementation of these new provision, it is very important to assess the impact of bank capital on interrelation between risk and efficiency. As the level of capital might have positive effect on such relationship. For example, banks might increase the incentives of lowering capitalization and undertake more higher non-performing loans in future since the moral hazard problems are rampant in banking industry. However, in the case of healthier capitalized banks moral hazard problems may be lower and they can be both more efficient and less risky than low capitalized ones. In the frame of capital costs, which are higher in the case of highly capitalized banks, maximization of revenues through increase of risk-taking level has to be taken in consideration.

In recent years, Nepalese banking systems have become increasingly integrated and liberalized on the road to greater product and service deregulation. This progressive process of financial integration is enhancing competition and emphasizing the importance of improved efficiency of financial institutions. Regulators have tried to counterbalance these incentives by given capital adequacy a more prominent role in the banking regulatory process. In this sense, due to both regulatory and market pressures, most Nepalese banks have been under pressure to boost their efficiency. Hence, studying the relationship between risk-taking, capital levels and efficiency in the case of Nepalese banking system is very important. While there are few studies on the relationship between capital and risk for the Nepalese banking system, there is still a gap in the studies of operating efficiency as an endogenous covariate in relationship of bank capital and risk. This study aims to fill up this by on analyzing the possible variables to be used for the estimation of interrelationship among operating efficiency, bank capital and risk-taking.

1.2 Literature Review and Study Framework

Capital is the financial shock absorber of any commercial organization. It comprises of the mix of debt, preferred stock and common equity. Amount of capital held and how these assets are structured is vital in preventing severe financial distress and failure of the organization. So the underlying mix of capital comprises various degree of risk. The risk generated in the organization creates the financial instability in the organization. To maintain stability and to maximize the profit objective of the firm, shareholders appoint managers, who work on the best interest of the

management. So to sustain in the competitive market, managers involve in various types of risk management activities mainly portfolio management of the firm. Such type of activities may create the incentive for the managers. So the incentive and the risk taking activity may create agency problem in the firms. In order to maintain financial stability in the organization as well as in the economy; various studies have been conducted on the capital requirement, risk taking behavior of the firms and agency problem management. Major contributing theories to the capital structure and risk management are Modigliani and Miller (MM) Theory and Markowitz Portfolio theory.

1.2.1 The Modigliani-Miller Theorem

Under a certain market price process, in the absence of taxes, bankruptcy costs, agency costs, and asymmetric information, and in an efficient market, the value of a firm is unaffected by how that firm is financed. It does not matter if the firm's capital is raised by issuing stock or selling debt, Modigliani and Miller (1958). If financial markets are assumed to be complete and depositors are perfectly informed about the failure risk of banks, the Modigliani and Miller indeterminacy principle applies. This, however, requires that shareholders do not have a possibility to exploit depositors.

Some studies state that the Modigliani-Miller theorem is not applicable to banks. In a world with complete markets and in the absence of any frictions, there would not be a need for financial intermediaries. Information theories suggest that a primary rationale for the existence of banks is that they have an information advantage in monitoring firms. Hence, depositors lack information in order to fully assess the riskiness of bank portfolios. Thus, they are not able to efficiently monitor and sanction banks. This information advantage of banks gives rise to moral hazard, (Sealey, 1985 & altensperger & Milde, 1987).

In a banking context, this means that if depositors cannot interfere into the bank’s activity and/or cannot observe the bank’s actions, interest rates fail to fully reflect the risk of bankruptcy. Moral hazard arises, i.e., banks will have an incentive to increase leverage and risk (Galai & Masulis: 1976) and (Green, 1984) who describes the hidden action phenomenon for firms which are financed both with equity and debt.

1.2.2 Portfolio Models Markowitz

Portfolio theory asserts that the riskiness of a single asset is entirely different from that of a portfolio of assets. According to this theory, a single asset may be very risky when held in isolation, but not much risky when held in combination with other assets in a portfolio. Portfolio models assume that the bank’s objective function is to maximize the expectation of a utility function that describes the preferences of the risk- averse owner-manager. To break it down to a mean-variance framework, one has to either assume a quadratic utility function or a probability distribution which can be described by its first two moments, Markowitz (1952). Most work done in this field assumes a single period framework. Equity and deposits are modeled as securities with fixed returns. Banks thus face the well- known Markowitz portfolio selection problem with additional restrictions on the sign of the shares invested in equity (negative), deposits (negative), and assets (positive). For banks with low risk aversion, insolvency will become more probable if stricter capital regulation is imposed. Thus, the result of higher capital-asset ratios in terms of the average probability of failure is ambiguous, while the intra-industry dispersion of the probability of failure unambiguously increases. Koehn and Santomero (1980) found that capital regulation

alone fails to reduce the probability of failure. To be effective, capital requirements have to be combined with asset regulation.

Rochet (1992) showed that risk-sensitive capital regulation can reduce the probability of default if the risk-weights are chosen proportional to the systematic risks of the assets (market-based risk-weights). According to his model, all banks will continue to choose a portfolio on the efficient line with capital-restricted banks choosing a less risky portfolio. As a consequence, their default risk decreases. Rochet also considered limited liability of banks. With bankruptcy, the relationship between utility of shareholders and asset returns is no longer uniformly convex or concave. For low values of capital requirements, banks will tend to choose risky investments for the same reasons as described in the complete market setup. For higher values of capital requirements, this strategy will, however, be deterred due to risk aversion. To avoid risk-loving behavior, capital requirements should thus be set at sufficiently high levels.

1.2.3 Bank Capital and Risk

Risk can be understood as the possibility of loss or danger. Rahman et al. (2018) analyzed the relationship between risk taking capital regulation, and performance in the banking sector. The empirical results show a significant negative relationship between risk-taking and capital regulation. Results also reveal that there is a significant positive relation between capital regulation and performance, and a significant negative relationship between risk and performance. This study provides various suggestions about risk management and capital adequacy for the regulators, stakeholders, and government. It is assumed that the higher capital requirements will have a positive impact on banking sector risk (Lee & Chih, 2013), but empirical results are mixed. Several studies have shown that there is a positive relationship between risk and capital.

Abbas et. al. (2020) investigated containing large commercial banks, according to the information of FDIC on 31 December 2019. The study includes only 937 active banks whose continuous data is available in ranging from 2003 to 2019. Moreover, it drop the banks with a common equity ratio of less than 4.5% of risk-weighted assets on 31 December 2019. The regulators impose a restriction on the activities (for example, restrictions on lending, level of liquidity, and dividend payments) of those facing difficulties in meeting the regulatory requirements. A two-step GMM had been used to control the endogeneity, simultaneity, heteroscedasticity, and auto-correlations issue. The findings conclude that the impact of risk-based capital is higher and more significant to decrease risks of large commercial banks. The outcomes confirm that the impact of non-risk based capital ratios on risk-taking is positive and in line with the regulatory hypothesis that is in line with regulators' recommendations. Similarly, the relationship between risk-based capital ratios, capital buffer ratios, and banks' risk-taking is negative. The findings justified the regulators' efforts because when banks increase their capital against their risky assets, their risk goes down. The findings remain robust throughout the analysis. The study revealed that capital ratios' impact on influencing risk-taking is more significant for under-capitalized banks than well-capitalized commercial banks. The findings are heterogeneous for pre, pro, and post-crisis periods.

1.2.4 Bank Efficiency and Risk

Rozzani and Rahman, (2013) reviewd the determinants of conventional and Islamic bank efficiency in Malaysia.This study was performed on 19 conventional banks and 16 Islamic banks that operated in Malaysia from the years 2008 to 2011. An overall view of the results indicated that the levels of profit efficiency for both conventional and Islamic banks in Malaysia were highly similar. Further, it observed that efficiency would be better for conventional banks with the increment of bank size and also the decrement of both operational cost and credit risk, while the efficiency for Islamic banks would be better with only the decrement of operational cost. The major conclusion of this study from evidence from both conventional and Islamic models was there was significantly negative relationship between operational cost and efficiency and also negative relationship between credit risk and efficiency.

1.2.5 Relationship between risk, capital and efficiency

Zeb and Sattar (2017) investigated the impact of financial regulations on financial soundness and profit efficiency of banks for a sample of 21 commercial banks in Pakistan for the period 2008-2014. They calculated profit efficiency using Data Envelopment Analysis, and financial soundness using Z-score for each bank. They found that profit efficiency was positively related to reserve ratio and non-performing loan to assets ratio of banks. They further proved that loan to deposit ratio and liquidity ratio were positively and significantly related to profit efficiency. Further, they identified that different size of banks had different impact on financial soundness and profit efficiency of banks.

Saeed et.al (2020) investigated the relationship between risk, capital and efficiency for Islamic and conventional banks using a dataset covering 14 countries. The z-score as a proxy for insolvency risk, and cost efficiency was estimated via a stochastic frontier approach and capitalization was reflected on the equity to assets ratio. An array of bank-specific, macroeconomic and market structure variables were used in a system of three equations, estimated using the seemingly unrelated regression (SUR) technique. They find the capitalization response to increases in insolvency risk is more pronounced for Islamic banks but has an approximately five-times smaller effect on risk mitigation compared to conventional banks. Higher cost efficiency is related to lower risk for conventional banks, but the opposite is true for Islamic banks. The link between cost efficiency and capitalization attests to a substitutional effect for the case of conventional banks, but a complementary effect for Islamic banks. Their findings give new insights on the use of efficiency to gauge capital requirements for financial institutions and are particularly relevant for regulators and policy makers in countries where both bank types operate.

1.2.6 Study framework

In theory, bank capital plays the role cushions for degree of loss faced by a bank in the event of a bankruptcy. Hence, a bank has a higher capital base will suffer lower risks and vice versa. However, when all deposits are insured with a flat premium rate, there occurs a negative relationship between risk and capital. Thus, the marginal cost of increasing bank risk and/or lowering the level of capital is zero as the insurance premium remains constant with risk or capital. After introduction of capital adequacy requirement in banking sector, it is argued that risk-taking activities are reduced significantly (Altunbas, Carbo, Garde & Molyneux, 2007). In contrast, it may further be argued that higher capital requirements lead to excessive risk-taking

by banks as this would lower the bank's charter value, thereby restricting bank's drive to behave cautiously (Hellman, Murdock and Stiglitz, 2000). Moreover, if capital cost of bank is taken as more expensive, banks will induce to more risks to generate a higher return on equity to cope with higher level of capital. Similarly, the moral hazard arguments also support the bank's tendency to take more risk when its intention is to exploit the deposits insurance schemes. Moral hazard occurs when central banks, and governments, assures economic agents to believe that they will get involved to protect an institution and its creditors in case of any failure. Moral hazards can further be hypothesized along the line of agency problems between managers and shareholders. In an unhealthy banking industry, managers will be less inclined to take on more risk. Added to that, well informed managers may employ an expansionary strategy which may end up being very risky. In banking industry, the ''too-big-to fail'' argument is also prudent in relationship of bank risk and capital. Large banks may rely too much on a public bailout in case of financial difficulties as they are conscious of their importance in the financial system.

In line with the capital buffer theory, banks aim at holding more capital than required since it plays the role of insurance against breach of the regulatory minimum capital requirement. More equity capital tends to absorb adverse shocks and thus protects the bank from being failure due to increase in loan default. Consequently, portfolio risk and regulatory capital are assumed to be positively related. Banks raise capital when portfolio risk goes up in order to keep up their capital buffer. Hence, the capital, efficiency and risk are more pronounced in banking industry to explore their relationship so as to develop plausible hypothesis and testing it for policy implications. Indeed, this study aims to work in line with this theoretical framework in case of Nepalese banking industry.

II. Research Approach

This research is based on the descriptive, correlational and casual comparative research design. Descriptive research design is used to describe the nature of variables used in this study. Correlational research design is used to determine if there is a relationship (or co-variation) between the study variables. Casual comparative research design is used to examine the casual relationship between risk, capital and efficiency in Nepalese commercial banks

2.1. Data and Sample

There were 27 commercial banks in Nepal till June 2021, so population of this study constitutes 27 commercial Nepalese banks. The 18 commercial banks were chosen as sample for this study and data were taken from 2011 AD to 2020 AD. hence, this study is based on 180 observations of 18 commercial banks for 10-year period. The sample banks were chosen on the basis of their ownership strata i.e. the joint venture banks, public sectors and the private sector banks having the largest and smallest capital base in their strata. capital. To obtain maximum number of observation data from 2011 to 2020 for 18 banks is collected, which includes 2/3 of total population. This study, thus is based on balanced panel data of 10 years period from 18 individual banks.

2.2. Model Specification

Two-Stage least squares (2SLS) regression analysis is a statistical technique that is used in the analysis of structural equations. This technique is the extension of the OLS method. It is used when the dependent variable's error terms are correlated with the independent variables. This situation is known as endogeneity, if we use the ordinary least square method (OLS) to run the estimation, in such case one may face simultaneous bias and inconsistent problem in the estimated results.

This study adopts the approach suggested by Shrieves and Dahl (1992), Altunbas, Carbo, Garde & Molyneux (2007), Zeb & Ali (2019).) to estimate the relationship between risk, capital and efficiency. They underline that capital and risk decisions are made simultaneously and are interrelated. This endogeneity can make OLS estimators inconsistent and thus calls for the use of a simultaneous equation specification and estimation methodology. To allow for simultaneity between banks' risk, capital and efficiency, a system of equations is being used and estimated using two-stage least squares (2SLS) approach through panel data techniques.

$$EFF_{it} = \alpha_0 + \alpha_1 CAP_{it} + \alpha_2 RISK_{it} + \alpha_3 SIZE_{it} + \alpha_4 OBSTA_{it} + \varepsilon_i \quad \text{.....(1)}$$

$$RISK_{it} = \beta_0 + \beta_1 CAP_{it} + \beta_2 EFF_{it} + \beta_3 SIZE_{it} + \beta_4 NLTA_{it} + \varepsilon_i \text{..... (2)}$$

$$CAP_{it} = \gamma_0 + \gamma_1 RISK_{it} + \gamma_2 EFF_{it} + \gamma_3 SIZE_{it} + \gamma_4 ROA_{it} + \gamma_5 IRTA_{it} + \varepsilon \text{…….}_i \text{(3)}$$

In the given specifications, the each of the variables have been approximated with following measurements;

EFF_{it}= Interest revenue to interest expenses of bank $_i$ in period $_t$;

CAP_{it}= Total equity to total assets of bank $_i$ in period $_t$;

$RISK_{it}$= Loan loss provision to total assets of bank $_i$ in period $_t$;

$SIZE_{it}$= Logarithm of total assets of bank $_i$ in period $_t$; as indicator of bank Size;

$OBSTA_{it}$= Off-balance sheet items to total assets of bank $_i$ in period $_t$

ROA_{it}= Profit before tax to total assets of bank $_i$ in period $_t$ as indicator of profitability

$IRTA_{it}$= Total interest revenue to total assets of bank $_i$ in period $_t$

$NLTA_{it}$ = Net loan & advances to total assets of bank I in period t.

α, β, γ = Coefficients to be estimated; and

ε_i= error term.

Following the simultaneous equation framework, to estimate capital equation, risk is used as instrumental variables and vice versa. As the two-stage least square (2SLS) has been programmed in STATA, this study has employed this software to estimate the required regression equations. as explained earlier, the use of 2SLS equations are expected to avoid simultaneous bias for estimated coefficients.

III. Results and Discussions

This section presents results derived from the simultaneous model described above where risk, capital and cost inefficiency are the endogenous variables. Two stage least squares with fixed effects estimation has been used and the results for each equation are disclosed separately for ease of explanation. This study has adopted the 'balanced panel' approach, whereby each bank is represented in each time period. A panel data with long-time dimension might suffer through non-stationary problems of variables. Unit root test was conducted to investigate the nature of stationarity in data. The test statistics rejected the null confirming the non-stationary variables in the given data set.

3.1 Descriptive statistics

The table 1 depicts the descriptive and statistical summary of all dependent and independent variables used in this study. Efficiency as measured in ratio of interest income to interest expenses shows the average value of 2.01 indicating the substantial gaps in interest rate spreads. However, its minimum value is as less as 0.17 times and maximum value up to 4.66 times of interest expenses. The next important variable banking risk as measured in loan loss provision scaled by total assets has mean value of 0.53 % of total assets. Its maximum values are 4.23 % showing higher lending risks in some banks. Average bank capital measured as equity to total assets were 8.28% slightly above the minimum core capital ratio as prescribed by regulatory agency. However, some banks have as minimum as 0.3% capital base showing higher capital deficiency of the banks. All other control variables including bank size, loan & advances ratio, profitability and off-balance sheet assets are presented in the summary statistics.

Table 1

Summary statistics of study variables

Variables	N	Minimum	Maximum	Mean	Std. Deviation
EFFICIENCY	180	0.17	4.66	2.01	0.70
RISK	180	0.00	4.23	0.53	0.58
CAPITAL	180	0.30	22.26	8.28	2.84
SIZE	180	9.49	12.52	11.17	0.66
NLTA	180	6.47	97.00	63.73	12.04
ROA	180	0.03	3.99	1.62	0.62
IRTA	180	1.72	10.50	5.06	2.34
OBSTA	180	2.14	69.76	26.04	14.42

Notes: The figure of size is in log Rupees and other figures are in percentage.

3.2 Correlation among variables

Table 2 portrays the Pearson's correlation coefficients among eight variables. If the p-value is less than level of significance, the null hypothesis shall be rejected, else accepted. In the table 2, fourteen coefficients are significant at 5 percent level of significance. Twelve coefficients have negative sign and remaining coefficient have positive sign.

Table 2

Correlation among variables

Variables	Efficiency	Risk	Capital	Size	NLTA	ROA	IRTA	OBTA
Efficiency	1.00							
Risk	0.104	1.00						
Capital	-0.018	0.460**	1.00					
Size	0.274**	-0.226	-0.445	1.00				
NLTA	-0.298	-0.11	0.167	-0.047	1.00			
ROA	0.426*	0.016**	0.150**	0.233	-0.036	1.00		
IRTA	-0.133	-0.194	-0.099	0.641**	0.216	0.217**	1.00	
OBTA	-0.169	-0.229	0.057	0.102	0.144	0.124**	0.316	1.00

**. ** denotes correlation are significant at the 0.05 and 0.001 percent level respectively.*

The p-value of risk in relation to efficiency is 0.166 which is higher than the level of significance at 5%, hence null hypothesis shall be accepted. However, Pearson's correlation coefficient is 0.104 that shows low degree of positive correlation between the risk and efficiency. In the case of capital in relation to risk, the p-value is 0.000, hence null hypothesis is rejected. This means that there is a significant relationship between risk and capital. Also, Pearson's coefficient is 0.460 which denotes that there is low degree of positive relationship between risk and capital. Moreover, the p-value of capital in relation to efficiency is 0.812, which is higher than level of significance at 5%, hence there is no significant relationship between capital and efficiency. Pearson's correlation coefficient is -0.018 which denotes that there is low degree of negative relationship between capital and efficiency.

The p-value of size in relation to efficiency is 0.000 which is less than level of significance at 1% level of significance, hence null hypothesis is rejected. This indicates that there is a significant relationship between size and efficiency. Also, Pearson's coefficient is 0.274 which means that there is low degree of positive relationship between size and efficiency. On other hand, the p- value of size in relation with risk and capital are -0.002 and 0.000 respectively, which are lesser than level of significance at 5%, hence, there are significant relationship of size with risk and capital. Pearson's correlation coefficients are -0.0226 and -0.047 which denote that there are low degree of negative relationship of size with risk and capital.

Similarly, the p-value of risk with NLTA is 0.141which is higher than the level of significance; hence null hypothesis shall be accepted reflecting no significant relationship between risk and NLTA. However, the Pearson's correlation coefficient is -0.11, which denotes low negative

correlation between the risk and NLTA. Moreover, capital has 0.044 p-value with ROA and 0.188 p-value with IRTA which are lesser than level of significance at 5% level of significance, hence null hypothesis is rejected in relation with ROA and accepted with IRTA. This means that there is a significant relationship of capital with ROA and no relation with IRTA. Also, Pearson's coefficients are 0.150 and -0.099 which describe that there is low degree of positive relationship of capital with ROA and low degree of negative relationship with IRTA. And p-value of efficiency with OBTA is 0.023 which is lesser than the level of significance; hence null hypothesis shall be rejected reflecting there is significant relationship between efficiency and OBTA. However, Pearson's correlation coefficient is -0.169, which shows low degree of negative relationship between efficiency and OBTA.

3.3. Determinants of efficiency

To account for a possible interdependence between the efficiency, risk and capital, the two- stage least squares (2SLS) regression model has been programmed in "STATA". In a first step, however, to make sure that 2SLS is an appropriate methodology, a test for the endogeneities of the efficiency, risk and capital is conducted using a Hausman test. Similarly, Sargan- over-identification test is used to know about the over identification. Applied to the efficiency equation, the value of Chi-square is 20.23 with probability of 0.004. It means Hausman test is significant and Hausman test rejects the null hypothesis of exogenous at the 5% level. Thus, it is concluded that OLS may lead to biased and inconsistent estimates in our sample.

In second stage, using two- stage least square, here efficiency (interest revenue to interest expenses) is used as the dependent variable. Exogenous variables used in this study are size (logarithm of total assets), off balance sheet item to total assets, capital and risk. The coefficients for these variables are estimated in table 3:

Table 3

Determinants of Bank Efficiency

Efficiency	**Coefficient**	**Std. Err.**	**Z**	**P>z**
Constant	-3.31	1.56	-2.12	0.034
Capital	0.104	0.042	2.48	0.013
Risk	-0.33	0.213	-1.56	0.118
Size	0.567	0.141	4.02	0
OBTA	-0.064	0.019	-3.28	0.001
Notes:				

RMSE = 0.996, Chi-square = 20.23 (0.004)
, and *** denotes Significant at10%, 5%and 1% level of significance*

The table 3 shows that bank Capital has a positive and significant coefficient implying that better capitalised firms operate more efficiently than undercapitalised ones. Regression result revealed that each 1% increase in Capital will increase efficiency by 0.104%. This finding is consistent with previous research which concludes that more capitalized bank operates efficiently than banks with less capital (Shrieves & Dahl, 1992; Berger & Young, 1997; Altunbas *et. al*., 2007). According to Berger and Young (1997), well capitalized banks are better run.

As regard to the effects of risk on efficiency, the results are in line with those in the risk equation. The equation is significantly related to efficiency where negative coefficient of risk is found with 0.33 values which means 1% change in risk leads 0.33% change in Efficiency in negative direction (which is positive when the same equation is estimated through ordinary least squares). It suggests that less efficiency may be the result of managing a larger amount of loans. Banks with higher risk profile tend to operate less efficiently than less risky banks. It is rational because higher risk banks tend to get higher chance of unrecovered loans. Size, measured by log of total assets has positive and significant coefficient of 0.567 with efficiency which means 1 point increment on size leads to 0.567 point increment on efficiency. In other words, larger banks are more efficient. The relationship is theoretically strong and can be explained by both economies of scale as well as economic of scope. Banks can enjoy higher efficiency when they can manage a larger amount of loan.

An off-balance sheet item to total assets (OBTA) appears to be negatively related to efficiency. Coefficient for OBTA is statistically significant at 5% level, which is also significant when the same equation is estimated through ordinary least squares, suggesting that banks that are more actively involved in OBS activities operate more efficiently or 1% change in OBTA leads to 0.064% change in Efficiency in negative direction.

3.4 Determinants of Risk

In this model, an accounting measure of bank risk (loan to total assets, RISK) is used as the dependent variable and capital, efficiency, size and NLTA as exogenous variables. Coefficient for capital and NLTA are statistically significant at 5% level. The coefficient for the NLTA was insignificant when the same equation is estimated through ordinary least squares. In the table 3.4, capital has positive and significant relationship with risk as predicted before. It means stronger capital is associated with higher risk taking behaviour. The coefficient of capital is 0.23; it is significant at 5% level of significance which means each 1% change in capital would lead to 0.239% changes in risk. Similarly, 1% change in efficiency lead to 0.801% change in risk in negative direction. In the case of the efficiency variable, the negative effect of efficiency on risk-taking supports the view that inefficient banks are more vulnerable to risk-taking than efficient ones.

Table 4
Determinants of banking risk

Risk	**Coefficient**	**Std. Err.**	**Z**	**P>z**
Constant	6.321	6.45	0.98	0.328
Capital	0.239	0.15	1.55	0.012
Efficiency	-0.801	0.899	-0.89	0.003
Size	0.35	0.463	0.77	0.444
NLTA	0.158	0.153	1.04	0.03
Notes:				

RMSE = 1.760, Chi- square =5.54(0.0236)
,,*** denotes Significant at 10%,5% & 1% level of significance*

Size found with positive coefficient means 1% change in size lead to 0.350% change in risk at positive direction. However, size coefficient is not significant in this equation. The coefficient of NLTA found 0.158 meaning that 1% change in NLTA leads to 0.158% change in NLTA.

The coefficient for NLTA is positive and significant meaning the existence of linear relationship between net loan and risk taking. Higher net loan to total asset is prone to higher credit risk. When the portion of loan to asset is bigger, it means bank asset is dominated by loan. In Nepalese commercial banking system, where the most important role of the banking industry is to perform intermediation, the higher portion of NLTA leads to a positive contribution to the credit risk.

3.5 Determinants of Capital

Commercial banks with higher risk hold a higher amount of capital as reflected by the positive and significant sign of Risk. Risk is found significant at 5%, level with coefficient of 1.770 meaning that 1% increase in Risk lead to 1.770% increase in Capital. This may suggest that there is sufficient level of intervention by regulators in forcing riskier commercial banks to hold more capital. The coefficient of efficiency is found significant at 5% level with coefficient value of 1.770 meaning that 1% change in efficiency leads to 1.770% change in capital in positive direction, the coefficient is insignificant when the same equation is estimated through ordinary least squares.

Table 5

Determinants of Capital

Capital	Coefficient	Std. Err.	Z	P>z
Constant	55.28	9.28	5.96	0.000
Risk	1.77	0.65	5.2	0.000
Efficiency	1.77	0.314	2.7	0.007
Size	-5.24	1.056	-4.96	0.000
ROA	0.036	1.056	0.07	0.942
IRTA	1.4	0.405	3.47	0.001

RMSE = 2.549, Chi- square = 99.30 (0.000)

, **, * denotes Significant at 10%, 5% & 1% level of significance*

Size has negative coefficient and not significant. The coefficient of Size is -5.240; it implies that 1% change in size lead to 5.240% change in Capital at negative direction. ROA has positive relationship with capital because ROA has coefficient of 0.036 means that 1% change in ROA leads 0.036% change in Capital. This relationship is significant at 5% level of significance, such that banks with higher earnings also tend to operate with high capital. Banks usually require considerable investment in retail infrastructure and human resources, and these in turn allow them to achieve high returns on assets. The coefficient for IRTA, ratio of interest revenue to total asset, an indicator how bank can generate revenue from its asset is positive and significant (which is also significant when the same equation is estimated through ordinary least squares) with the value of -1.217 meaning that 1% change in IRTA leads to 1.217% change in Capital. It

means even the bank can generate higher interest revenue, if the profit is less, the impact is not plausible. Referring to ROA which has positive coefficient, it may conclude that higher interest may come from higher risk.

IV. Conclusion and Implications

The study has focused upon the relationship between capital, risk and efficiency of commercial banks of Nepal and conclusively answered the objectives of the study. The major conclusion of the study is that capital, risk and efficiency affects the banking activities as these variables possess significant relationship in Nepalese commercial banks.

In efficiency equation, it was found that capital and size are positive and significant. It indicates a bigger capital ratio as well as bank size increases efficiency of Nepalese commercial banks. In terms of bank size, large banks enjoy better efficiency than smaller banks. Off-balance sheet to total assets has a negative and significant relationship with efficiency. It means bigger Off-Balance-Sheet activities decrease operating efficiency. In this equation, it can be concluded that efficiency is determined by capital and size meaning more capital and large sized banks can improve the operating efficiency of Nepalese commercial banks.

In risk equation, the results show that highly capitalized banks tend to have higher risk taking and efficient banks also have higher risk. Furthermore, large banks tend to have higher risk than smaller ones because the larger ones have diversified their investment which is investment in hydro projects and other businesses such as hotels and restaurants and other activities as there is higher credit risk. In this risk equation, we can conclude that in general capital, size and net loan to total assets are positively related while efficiency is negatively related.

In capital equation, banks that have higher risk tend to have higher capital and this relationship is significant also. Efficient banks have a positive but insignificant relationship with capital. Bank size has negative relationship with capital meaning larger banks tend to own less capital. This finding is not surprising because for large banks, they can attract more capital at faster and lower cost than smaller banks. The ratio of interest revenue to total assets, an indicator how bank can generate revenue from its assets is positive and significant and same with ROA.

Most studies concentrate on US and European banks, while empirical evidence has remained scarce for Asian banks. Added to that, to our knowledge, there are very few papers on this subject for commercial banks in Nepal. Thus, this study contributes to the literatures to shed light on the determinants of bank risk-taking and analyze its relationship with capital and efficiency in Nepalese Commercial banks.

It has revealed positive impact of capital on risk. Therefore, it is observed from the study that capital of bank is much sensitive towards risk. Nepal Rastra Bank makes plans and policies regarding the control of risk. Therefore, policy makers such as NRB in Nepal should seek to minimize risk when formulating monetary policy. As the growth of the commercial banks and the improvement in their efficiencies influence economic growth, understanding the determinants of the commercial bank efficiencies is helpful not only for the design of better management strategies but also general subject of interest for the investors, depositors and for the public concern (Jha, Hui & Sun, 2013).

References

Abbas, F. Ali S.,Yousaf ,I., Rizwan, S., (2020). How commercial bank adjust capital ratio?: Empiricial evidence from the USA . *Contingent Business and Management*, 7 (1),1–18.

Acharya, M. (2003). Development of financial system and its impact on poverty alleviation in Nepal. *Economic Review*, 15, 134-165.

Acharya, V. (2001). A theory of systemic risk and design of prudential bank regulation, January,. *Working Paper*, 1-49.

Ahmed, S., & Liza, F. (2013). Efficiency of Commercial Banks in Bangladesh-a Data Envelopment Analysis . *European Journal of Economics, Finance and Administrative Sciences*, 1(1), 11-99.

Altunbas, Y., Carbo, S., Garde, E., & Molyneux, P. (2007). Examining the relationships between capital, risk and efficiency in European banking. *European Financial Management*, 13(1), 49-70.

Basel Committee on Banking Supervision (BCBS). (2006). International Convergence of capital 1Measurement and Capital Standards: A Revised Framework*;* Comprehensive Version*. Bank for International Settlement, Basel*. Retrieved from http://www.bis.org/.

Berger, A., & DeYoung, R. (1997). Problem loans and cost efficiency in commercial banks. *Journal of Banking and Finance*, 21(6) , 849–870.

Ghosh, S. (2016). Capital buffer, credit, risk and liquidity behaviour: Evidence for GCC banks. *Comparative Economic Studies*, 1(1), 1-31.

Mester, L., & Moon, C. (2001). Are scale economies in banking elusive or illusive. Evidence obtained by incorporating capital structure and risk-taking into models of bank production. *Journal of Banking and Finance*, 25 (12), 2169–2208.

Koehn, M., & Santomero, A. (1980). Regulation of bank capital and portfolio risk. *Journal of Finance*, 35(5), 1235–45.

Miller, S., & Noulas, A. (1997). Portfolio mix and large-bank profitability in the USA. *Applied Economics, 29* (7), 505-512.

Mills, D. E., & Schumann, L. (1985). Industry structure with fluctuating demand. *The American Economic Review*, 75(4), 758-767.

Modigiliani, F., & Miller, M. (1958). The Cost of Capital, Corporate Finance,and the theory of investment. *American Economic Review, 48*, 261-297.

Nepal Rastra Bank. (2020). *Banking and Financial Statistics.* Bank and Financial Institution Regulation Department, Statistics Division.

Neupane, B. (2013). Efficiency and productivity of commercial banks in Nepal: A malmquist index approach. *Asian Journal of Finance & Accounting*, 5(2), 220-243.

Poudel, R. (2012). The impact of credit risk managment on financial performance of commercial banks in Nepal. *International Journal of Arts and Commerce*, 1(5), 9-15.

Pradhan, R. S., & Gajurel, D. P. (2011). Structure-performance relation in Nepalese banking industry. *International Conference on Economics, Business and Management*, 1(2), 25-31.

Pradhan, R. (2012). The impact of credit risk management on financial performance of commercial banks in Nepal. *International Journal of Arts and Commerce, 1* (5), 9-15.

Rahman,M,M,.,Chowdhary,A,A.,&Dey,M.,(2018).Relationship between risk-taking,capital , and bank performance: Empirical evidence from Bangladesh . *Eurasion Jounal of Business and Economics, 11(22).29-57*. https://doi. org/10.17015/ejbe.2018.022.02

Rozzani, N., & Rahman, R. A. (2013). Determinants of bank efficiency: Conventional versus Islamic. *International Journal of Business and Management*, 8(14), 98-106.

S.Jha, Hui, X., & B.Sun. (2013). Commercial banking efficiency in Nepal : Application of DEA and Tobit model. *Information Technology Journal*, 12 (2), 306-314.

Sedhain, W., & Moussawi, E. (2009). Evaluating the productive efficiency of Lebanese commercial banks: Parametric and no- parametic approaches. *Journal of International Management Review*, 5(1); 5-19.

Shrieves, R., & Dahl, D. (1992). The relationship between risk and capital in commercial banks. *Journal of Banking & Financ*, 16(2),24-88.

Altunbas, Y., Santiago, C., Gardener, E. P.M. & Molyneux, P. (2007). Examining the Relationships between Capital, Risk and Efficiency in European Banking. *European Financial Management*, 13, (1). 49–70

Zeb.S,&Sattar,A.(2017).Financial regulations,profitefficiency,and financial soundness:Empirical evidence from commercial banks of Pakistan. *The Pakistan Development Review*, 56(2), 85 – 103.

Zeb.S,&Z Ali.(2019). Credit risk,capital and inefficiency:An Empirical analysiss of SAARC banking sectors . *South Asian Journal of Management*, 13(1), 41 – 55.

BANK-SPECIFIC VARIABLES AND FINANCIAL PERFORMANCE: A CASE OF NEPALESE DEVELOPMENT BANKS

- Ranjana Sibakoti and Post Raj Pokharel

Abstract

The paper is motivated to present the impact of bank-specific variables on the financial performance of Nepalese development banks. The study period is confined to 9 years, starting from the years 2069/2070 to 2077/78. The performance variables under investigation were return on assets (ROA) and return on equity (ROE). The bank-specific variables were capital adequacy, asset quality, management efficiency, and liquidity. The findings of the study showed that management efficiency and liquidity have a positive impact on bank performance whereas capital adequacy and assets quality management has a negative impact on bank performance.

Key Words: Bank-specific variables, performance, capital adequacy

I. Introduction

It is well known evidence that financial institutions help to achieve sustainable economic growth by providing efficient monetary intermediation. Research shows that financial performance determines the success and failure of the bank and also presents the financial stability of the nation, it helps to measure how well a bank is performing its activities so; the management of the bank and regulatory authority must identify the factors affecting the financial performance of the bank. To make a correct investment decision, it is very important for resource providers to analyze how well a financial institution is performing. If financial performance is good then it will encourage additional investment as shareholders will get rewards for their investment, which will ultimately bring economic growth. On the other hand, if banking performance is poor then it leads to banking failure and crisis which will hamper economic growth (Gautam, 2018).

Similar to the line of concept on performance analysis, it is a way to evaluate the financial statement having key financial variables of a firm through the accepted tools & techniques to identify the financial strengths and weaknesses of a firm. Financial performance analysis is just like the financial health check-up of any organization and it is necessary to regularly check the financial health of the organization to maintain and protect the interest of depositors, lenders, shareholders as well as other stakeholders (Gautam, 2020). The performance evaluation of a development bank is usually related to how well the bank can use its assets, shareholder's equities and liabilities, revenues and expenses i.e. basically about how well a bank can mobilize its deposits. Various factors can affect the financial health of a bank in which political stability and real sector growth are major macro factors and capital adequacy, quality of assets, liquidity, and management quality are micro factors (Saunders & Cornett, 2004).

McKinnon (1973) mentioned that there is a strong and positive correlation between financial system development and the economic growth of a nation. This means a well-developed financial system and strong financial position of financial institution help to boost the economy of the nation.

According to Venkatesh and Suresh (2014), financial institutions like banks provide various financial products and services which enable the corporate sector as well as a household sector to cope with economic uncertainties by hedging, pooling, sharing, and pricing risks. Development bank performs both banking function as well as development function. Development bank promotes development sectors by providing them with technical and economic assistance. Financial performance analysis focuses on financial statements and the significant relationship that exists among the variables contained. In this regard, Metcalf and Titard (1975) said that analyzing financial performance is a process of evaluating financial statements to obtain a better understanding of a firm's position and performance (Hampton, 1998). The performance of development banks depends on how well the bank can manage and maintain its internal factors such as capital adequacy ratio, assets quality management, management efficiency, and liquidity.

The public's faith and trust in the bank's soundness are boosted by its high level of capital. Stronger banks can direct available cash into profitable commercial activity (Pasaribu & Sari, 2011). Capraru and Ihnatov (2014) elucidated that the return on assets and return on equity are heavily influenced by management efficiency and capital adequacy. ROE is negatively correlated with CAR (Tamang, 2021). Assets quality has a negative but significant relation with ROA (Ekinci & Poyraz, 2019). Ngwili (2014) examined a significant positive relationship between liquidity and ROA. There is a negative relationship between ROA and liquidity (Al-Qudah, 2020).

Prior studies have found a relationship between firm-specific variables namely capital adequacy, asset quality, management efficiency, earnings ability, and liquidity on the performance of the bank. For instance, the bank-specific factors included in the study conducted by Ariyibi et al. (2020) in Nigeria were loan-to-deposit ratio, capital adequacy, and assets quality, and found that there is a significant positive relationship between loan-to-deposit ratio, capital adequacy, and return on assets.

In addition, Kamande et al. (2016) investigate the impact of bank-specific factors on the financial performance of Kenyan commercial banks. They concluded that the asset quality of the bank has the highest influence on the ROA of banks so, asset quality affects profitability and the financial performance of the bank. In the Nepalese context, Kandel (2019) found that liquidity moderately influences the performance of banks, and management efficiency has minimal impact on both ROA and ROE. Earning and liquidity positions have a high influence on ROA while asset quality, liquidity, and earning have more influence on ROE. By the same token, Gautam (2020) found that ROA has a significant positive relationship with capital adequacy and ROE but ROA has a significant negative relationship with assets quality. Likewise, Gautam (2020) study also mentions that there was a significant positive relationship of ROE with assets quality and ROA but a significant negative relationship between ROE with capital adequacy. Furthermore, Hamal's (2020) research found a negative and statistically significant association between size and long-term investment and financial performance.

II. Literature review

Several kinds of research have been conducted on the impact of different factors on the financial soundness and performance of the banking sector throughout the world by using a variety of approaches. A study conducted by Nsambu (2014) on the factors affecting the performance of commercial banks in Uganda by using multiple regression analysis findings of the study indicated

that management efficiency; asset quality; interest income; capital adequacy and inflation are factors affecting the performance of domestic commercial banks in Uganda.

Management efficiency of the bank has the highest influence on the ROA of banks and had recommended that to prevent banks from being insolvent, bank managers should practice efficient and effective management. Mbaya (2016) initiated a study and found that efficiency and capital sufficiency have a considerable positive impact on bank profitability; however, liquidity has a negative impact. The result of Aziz et al. (2018) showed that capital adequacy, asset quality, liquidity, and inflation have a strong but indirect correlation with banks' performance. Management efficiency has a very strong and positive relationship with bank performance in Nepal (Pradhan and Shrestha, 2016).

Return on assets has a positive link with capital adequacy ratio, management efficiency, and gross domestic product, but it has a negative relationship with asset quality and liquidity management (Gautam, 2018). Dhakal (2020) established a positive relationship between the current ratio, capital adequacy ratio, and liquidity ratio with ROA and negative relation between capital adequacy ratio, liquidity ratio, and loan-to-deposit ratio with ROA.

III. Methods

The study uses descriptive as well as casual-comparative research design. The population of the study is all development banks in Nepal i.e. 18 development banks of Nepal. Among 18 development banks, there is a total of 8 national-level development banks and out of them 5 (Muktinath Bikas Bank Ltd, Kamana Sewa Bikas Bank Ltd, Jyoti Bikas Bank Ltd, Lumbini Bikas Bank Ltd, and Garima Bikas Bank Ltd) are selected which has positive net profit as well as listed as top development bank on NEPSE 2021. The study only covers the study period from FY 2069/70to 2077/78 because of the unavailability of the annual report of Garima Bikas Bank Ltd. for FY 2068/69.

The nature data is the secondary source of data, which was collected through the annual report from the website of the concerned bank and different published articles and journals related to this study and even published as well as unpublished previous studies regarding a similar topic. Descriptive statistics, regression, and correlation analysis as a part of the inferential analysis were used to examine the relationship between dependent and independent variables through SPSS and MS excel.

The Model

The basic model used in this study (Pradhan & Shrestha, 2016; Pokharel, 2018) is;

Firm performance= f (capital adequacy, assets quality, management efficiency, and liquidity).

More specifically, the given model has been subdivided into the following models:

Model 1

$$ROA_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 AQ_{it} + \beta_3 ME_{it} + \beta_4 LDR_{it} + e_{it}$$

Model 2

$$ROE_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 AQ_{it} + \beta_3 ME_{it} + \beta_4 LDR_{it} + e_{it}$$

Where,
ROA_{it} = Return on assets

ROE_{it} = Return on equity
CAR_{it} = Capital adequacy ratio

AQ_{it} =Assets quality

ME_{it} = management efficiency

β_0 = Consent term

LDR_{it} = liquidity ratio

e_{it} = Error term

IV. Results and Discussion

Descriptive Analysis

To explain the phenomenon, several descriptive statistics like mean, minimum, maximum, and standard deviation are used. Table 4.2 shows the descriptive statistics for the dependent and independent variables of sample banks included in this study.

Table 1 Descriptive statistics of dependent and independent variables of sample banks
This table shows the descriptive statistics of dependent and independent variables of development banks for the study period of 2069/70 to 2077/78 .The independent variables in the study are CAR)capital adequacy ratio defined as tier 1 capital plus tier 2 capital divided by total risk-weighted assets(, ME)management efficiency defined as dividing operating profit by income(, AQ)assets quality defined as dividing nonperforming loan by total loan (and LDR)Liquidity Ratio defined as total loan divided by total deposit (whereas the dependent variables are ROE)Return on Equity defined as dividing net profit by shareholder equity (and ROA)return on assets defined as dividing net profit by total assets .(The descriptive statistics are based on the data from 5 sample banks with 45 observations for the period 2069/70 to 2077/78.

Variables	***Minimum***	***Maximum***	***Mean***	***Std. Deviation***
Capital Adequacy (%)	*11.19*	*30.60*	*15.3604*	*3.78440*
Assets Quality (%)	*.004*	*17.270*	*1.52298*	*2.879253*
Management Efficiency	*-103.03*	*78.94*	*19.1533*	*29.83614*
Liquidity Ratio (%)	*51.89*	*94.67*	*82.5509*	*6.82082*
Return on Assets (%)	*-2.93*	*2.89*	*1.4142*	*1.06005*
Return on Equity (%)	*-12.42*	*29.94*	*14.1722*	*8.03620*

Table 1 shows that the minimum and maximum values of CAR are 11.19 and 30.60 respectively with an average of 15.36 and standard deviation of 3.78. All banks had maintained the minimum requirement of CAR set by NRB which was 10%. Similarly, assets quality the ratio of nonperforming loan to total loan ranges from 0.004 to 17.27 with an average of 1.522 and standard deviation of 2.87. However, NRB had set the percentage nonperforming loan should not more than 5%.

Furthermore, management efficiency varies from -103.03 to 78.94 along with an average of 19.15 and standard deviation of 29.83. Liquidity ratio ranges from 51.89 to 94.67 with an average of 82.55 and standard deviation of 6.82.

Likewise, ROA ranges from -2.93 to 2.79 with an average of 1.4142 and standard deviation of 1.06005. In addition, ROE ranges from -12.42 to 29.94 with an average of 16.12 and standard deviation of 14.09. The standard deviation is smaller than mean which means that the performance is somewhat consistent. Moreover, management efficiency is highest variation of selected development banks which noticed to be 29.83 during the study period.

Table 2: Pearson correlation matrix for selected development banks

This table shows the Pearson correlation between the variables. The correlation coefficients are based on the data from 5 development banks of Nepal for the period of 2069/70 through 2077/78. The independent variables in the study is CAR (capital adequacy ratio defined as tier 1 capital plus tier 2 capital divided by total risk weighted assets), ME (management efficiency defined as dividing operating profit by income), AQ (assets quality defined as dividing nonperforming loan by total loan) and LDR(Liquidity Ratio defined as total loan divided by total deposit) whereas the dependent variable is ROE (Return on Equity defined as dividing net profit by shareholder equity) and ROA(return on assets defined as dividing net profit by total assets) as depicted in the table below:

Variables	***CAR***	***AQ***	***ME***	***LDR***	***ROA***	***ROE***
AQ	*-0.053*	*1*				
ME	*0.115*	*-0.863***	*1*			
LDR	*-0.002*	*-0.686***	*0.636***	*1*		
ROA	*0.054*	*-0.837***	*0.820***	*0.509***	*1*	
ROE	*-0.236*	*-0.764***	*0.782***	*0.463***	*0.827***	*1*

**. Correlation is significant at the 0.01 level (2-tailed).

Table 2 shows that CAR has a positive correlation with ME and ROA but negative correlation with AQ, LDR and ROE. This indicates that the increase in capital adequacy ratio leads to increase management efficiency and return on assets but decreases assets quality, liquidity ratio and return on equity.

Similarly, AQ have a negative association with all variables. It negatively affects ROA and ROE. Increase in assets quality leads to decrease ROA and ROE. AQ has negative but significant relation with ROA and ROE.

Furthermore, ME has significant and positive relation with LDR, ROA and ROE. Increase in ME leads to increases LDR, ROA and ROE. This means higher the management efficiency better will be the performance of development banks.

Return on Equity is positively and significantly correlated with Liquidity Ratio of the development bank. This indicates that the increase in liquidity ratio increases the Return on Equity of banks. Likewise LDR has a positive and significant relation with ROA. Increase in liquidity improves the performance of bank as it increases the profit by increasing ROA and ROE.

Regression Analysis

Regression analysis is a statistical tools or method for examining the relation between dependent and independent variables so that researcher can know how change in independent variables

affects the dependent variables. Regression analysis has been calculated and presented in the table below:

Table 3.a: Regression analysis of ROA on independent variables

The results are based on regression analysis data of 5 development banks for the period of 2069/70 to 2077/78 by using a linear regression model. The model is ROA= β0 + β1 CAR + β2 AQ + β3 ME + β4 LDR + e, where ROA is return on assets defined as net income divided by total assets, in percentage is the dependent variables and CAR is capital adequacy ratio defined as tier 1 capital plus tier2 capital divided by risk weighted assets, in percentage, AQ is assets quality defined as nonperforming loan divided by total loan ,ME is management efficiency defined as operating profit divided by income and LDR is *liquidity ratio defined as total loan divided by total deposit are independent variables.*

Model	***Constant***	***CAR***	***ME***	***AQ***	***LDR***	***F***	***R^2***
1	*1.182*** (1.753)*	*0.015 (0.0355)*				*0.126*	*0.003*
2	*0.856** (7.85)*		*0.029** (9.395)*			*88.275*	*0.672*
3	*1.833** (18.982)*			*-0.038** (-10.026)*		*100.52*	*0.7*
4	*-5.122* (-3.032)*				*0.079** 3.883*	*15.074*	*0.26*
5	*1.03 (2.639)*	*-0.012 (-0.465)*	*0.029** (9.301)*			*43.44*	*0.674*
6	*1.507** (3.915)*	*-0.005 (-0.214)*	*0.14 (2.429)*	*-0.185* (-3.167)*		*38.53*	*0.735*
7	*3.604* (2.41)*	*-0.007 (-0.318)*	*0.015* (2.628)*	*-0.216** (-3.513)*	*-0.025 (-1.45)*	*30.201*	*0.751*

Notes:
Figures in parenthesis are t values.
(**)sign indicates that result is significant at 1 %level.
(*)sign indicates that result is significant at 5 %level.
(***)sign indicates that result is significant at 10 %level .

The above table 3.a shows that beta coefficient is negative and insignificant for capital adequacy ratio. It indicates that an increase in capital adequacy leads to decrease ROA. This finding is contradicting with the findings of Gautam (2020). In addition, beta coefficient is positive and significant for management efficiency. IT implies that increase in management efficiency leads to increase return on assets. This finding is similar with the findings of Pradhan and Shrestha (2016). ME is significant at 1% level.

Furthermore, beta coefficient is negative but statistically significant for assets quality and is significant at 1% level with ROA. It denotes that increase in assets quality leads to decrease return on assets. This finding is similar with the findings of Gautam (2018).

In the same way beta coefficient is weak but positive for liquidity and significant at 1% level with ROA. It signifies that increase in liquidity leads to increase return on assets. This finding is similar with the findings of Ngwili (2014).

Table 3.b Regression analysis of ROE on independent variables

The results are based on regression analysis data of 5 development banks for the period of 2069/70 to 2077/78 by using a linear regression model. The model is ROE= β0 + β1 CAR + β2 AQ + β3 ME + β4 LDR + e, where CAR, AQ, ME and LDR stands for capital adequacy, assets quality, management efficiency and liquidity ratio. where ROE is return on equity defined as net income divided by total shareholder equity, in percentage is the dependent variables and CAR is capital adequacy ratio defined as tier 1 capital plus tier2 capital divided by risk weighted assets, in percentage, AQ is assets quality defined as nonperforming loan divided by total loan, ME is management efficiency defined as operating profit divided by income and LDR is *liquidity ratio defined as total loan divided by total deposit are independent variables.*

Model	***Constant***	***CAR***	***ME***	***AQ***	***LDR***	***F***	***R^2***
1	*21.862** (4.394)*	*-0.501 (-1.159)*				*2.531*	*0.56*
2	*10.138** (11.257)*		*0.211** (8.225)*			*67.657*	*0.672*
3	*17.419** (19.639)*			*-2.132** (-7.761)*		*60.232*	*0.574*
4	*-30.828* (-2.337)*				*0.079** (3.883)*	*11.712*	*0.214*
5	*20.72** (7.541)*	*-0.702** -4.014*	*0.221** (9.962)*			*53.774*	*0.719*
6	*22.806** (7.853)*	*-0.672** (-3.936)*	*0.153** (3.571)*	*-0.811 -1.838*		*39.004*	*0.741*
7	*41.794** (3.747)*	*-0.693** (-4.149)*	*0.162** (3.857)*	*-1.09* (-2.376)*	*-0.223*** (-1.76)*	*31.524*	*0.759*

Notes:
Figures in parenthesis are t values.
(**) sign indicates that result is significant at 1% level.
(***) sign indicates that result is significant at 10% level.
(*) sign indicates that result is significant at 5% level.

The above table 3.b shows that beta coefficient is strong and positive for management efficiency and significant at 1% level with ROE. It shows that increase in management efficiency leads to increase return on equity. This finding is similar with the findings of Ngalawa (2014). In addition beta coefficient is weak but positive for liquidity and significant at 1% level with ROE. It signifies that increase in liquidity leads to increase return on equity. This finding is similar with the findings of Kandel (2019).

On the other hand beta coefficient is negative but statistically significant for capital adequacy ratio and significant at 1%. This finding is similar with the finding of Tamanag (2021) and contradicts with the findings of Ariyibi et al. (2020). It indicates that an increase in capital adequacy leads to decrease ROE. Further, beta coefficient is negative and significant for assets quality and is significant at 1% level with ROE. It denotes that increase in assets quality leads to decrease return on equity. This finding is similar with the findings of Nyabaga and Wepukhulu (2020).

V. Conclusion

The major conclusion of this study is that management efficiency and liquidity has the positive impact on return on assets which indicates that higher the management efficiency and liquidity,

higher would be return on assets. Similarly, assets quality has negative but statistically significant relation with return on assets. Thus, higher the assets quality, lower would be the return on assets. On the other hand, management efficiency has strong and positive impact on return on equity and liquidity ratio has weak but positive relation with return on equity. Thus, higher the management efficiency and liquidity ratio higher would be the return on equity. Furthermore, capital adequacy ratio and assets quality has negative but statistically significant impact on return on equity which indicates that higher the capital adequacy and assets quality, lower would be the return on equity.

References

AL-QUDAH, A. M. (2020). Macroeconomic and bank-specific variables and the liquidity of Jordanian commercial banks. *The Journal of Asian Finance, Economics and Business*, *7*(12), 85-93. https://doi.org/10.13106/jafeb.2020.vol7.no12.085

Ariyibi, E. M., Yunusa, L. A., & Williams, T. O. (2020). Bank specific factors and bank performance: Evidence from Nigeria. *Signifikan: Jurnal Ilmu Ekonomi*, *9*(2), 167-176. doi:10.15408/sjie.v9i2.14658

Aziz, K., Khan,V. J., Kumar, B. & P K, B. K. (2018). Impact of internal and external factors on bank performance in Pakistan. *Journal of Public and International Affairs, 2*(4), 66-77. 10.11648/j.ipa.20180204.11

Capraru, B. & Ihnatov, I. (2014). Banks' profitability in selected central and Eastern European countries. *Procedia Economics and Finance, 16*, 587-591, 4-5.

Ekinci, R., & Poyraz, G. (2019). The effect of credit risk on financial performance of deposit banks in Turkey. *Procedia Computer Science*, *158*, 979-987.

Gautam, R. (2018). Determinants of financial performance: Evidence from Nepalese commercial banks. *Amity Journal of Strategic Management*, *1*(2), 7-12.

Gautam, K. R. (2020). Financial Performance Analysis of Nepalese Financial Institutions in the Framework of CAMEL. *Janapriya Journal of Interdisciplinary Studies*, 57-74, 13-15. https://www.nepjol.info/index.php/JJIS/article/view/35277/27612

Hamal, J. B. (2020). Impact of firm specific factors on financial performance of life insurance companies in Nepal. *Interdisciplinary Journal of Management and Social Sciences*, 7-11.

Hampton, J. J. (1998). *Financial Decision Making*. New Delhi: Prentice Hall of India Private Ltd.

Kandel, S. (2019). Analysis of financial performance of commercial banks of NEPAL using CAMEL approach. *IEEE-SEM, 10*(6), 2320-9151.

Kamandea, E .G., Zablonb, E., & Ariembac, J. (2016). Effect of bank specific factors on financial performance of commercial bank in Kenya. *International journals of science: Basic and Applied Research (IJSBAR), 30*(5), 165-180.

McKinnon, R. (1973). *Money and capital in economic development*. The Brookings Institution, Washington *DC, USA*, 177.

Mumbe, K. J. (2015). The effect of selected internal factors on the financial performance of commercial banks listed in the Nairobi securities exchange. *Research paper*, University of Nairobi.

Ngwili, K. P. (2014). The relationship between liquidity and profitability of insurance companies in Kenya. *Research Project, School of Business*, University of Nairobi.

NRB (2078). *NRB Unified Directives*. Khanda KHA, 15-44.

Nsambu, K. F. (2014). Factors affecting performance of commercial banks in Uganda. A case for domestic commercial banks. *Proceedings of 25th International Business Research Conference* 13-14 Jan, 2014. 10.21102/irbrp.2015.03.111.07

Pasaribu, H., & Sari, R. L. (2011). Analisis Tingkatkecukupan modal and loan to deposit ratio terhadap profitabilitas. *Jurnal Telaahdan Riset Akuntansi*, *4*(2), 114-125.

Pokharel, P. R. (2018). A review: Model used for analyzing pharmaceuticals profitability http://dx.doi.org/10.2139/ssrn.3634476

Pradhan, R. S., & Shrestha, R. (2016). Impact of bank specific and macroeconomic variables on the performance of commercial banks of Nepal. *SSRN Electronic Journal* 10.2139/ssrn.2793530

Saunders, M. M., & Cornett, A. (2004). *Financial markets and institutions*. Tata McGraw-hill Publishing Company Limited.

Tamanag, B. (2021). The influential Factors of capital adequacy ratio in Nepalese banks. *Unpublished GRP, Pokhara University*, Chitwan, Nepal

Venkatesh, J., & Suresh, C. (2014). Comparative performance evaluation of selected commercial banks in Kingdom of Bahrain using CAMELS method. doi:10.2139/ssrn.2418144

BOSTON
INTERNATIONAL COLLEGE

Bharatpur-10, Hakimchowk, Chitwan I PoBox: 118 I Tel: 056-598992/598892
info@bostoncollege.edu.np I www.bostoncollege.edu.np