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The journal is constantly struggling to achieve distinction by promoting the quality of research. The team of the Journal is also committed to accelerating with professional ethics to set standards of quality and academic integrity.

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Influence of Demographic Factors on Entrepreneurial Intentions among Business Students in Nepal

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Abstract
Entrepreneurship is becoming increasingly popular in educational institutions worldwide. The aim is to familiarize students with the topic and potentially strengthen their desire to become entrepreneurs. Research has shown that a person's behavior is influenced by their intention, which makes it essential for researchers to examine the factors that contribute to the development of intention. This research is focusing on how certain demographic factors can affect the desire of Nepali business students to become entrepreneurs. The study involved 343 MBA students from 13 business schools in Kathmandu City who were given a self-administered questionnaire. The data collected was analyzed using Independent Sample T-test and One-way ANOVA. The demographic factors that were considered in the study include gender, age, marital status, working experience, and prior exposure to entrepreneurship courses. The findings suggest that male students have a slightly greater inclination toward entrepreneurship. Age, marital status, and prior work experience show practically no impact. We also found no relationship between entrepreneurial intention and prior exposure to entrepreneurship courses. The findings clearly contradict the currently available literature demonstrating the significance of all these influencing factors. The study provides possibilities for future studies and practical applications for policymakers and professionals in the field.

Keywords: *Entrepreneurial Intention, Age, Gender, Education*

JEL Classification: L22, L26

1. Introduction

Entrepreneurship has been considered an important factor and a driving force for the economy in all countries, as it plays a vital role in generating employment opportunities (Barba-Sánchez et al.,2022). Entrepreneurs contribute to the growth of a nation's economy by fulfilling various roles such as paying taxes, generating employment opportunities, introducing innovative ideas, and taking risks to attract investments (Nakara et al.,2020). These efforts eventually lead to enhanced competitiveness, productivity, technological advancements, increased exports, and overall economic development. It is a widely discussed subject in Nepal, and the government is placing greater emphasis on the role of private business and entrepreneurship due to its potential to drive socio-economic change. Promoting entrepreneurship in Nepal requires a multi-faceted approach, with government policies playing a crucial role in enabling the development of a thriving entrepreneurial ecosystem (Karki & Panta, 2021).

The aim is not only to encourage young individuals to adopt an entrepreneurial mindset through business start-up programs, but also to establish a comprehensive business start-up support program that includes various innovative and efficient initiatives. The push for entrepreneurship in Nepal follows a global trend that focuses on the expansion of new enterprises as a vehicle for promoting economic growth and

generating employment opportunities. This trend has emerged due to the recognition that large established businesses are no longer able to address the rising demand for jobs, and that entrepreneurship can help to alleviate issues related to unemployment and stimulate economic progress (Davidsson, Lindmark & Olofsson, 1995). Nepali graduates face difficulties in finding employment opportunities, and starting businesses or becoming self-employed is viewed as an effective approach to not only generate job opportunities but also make significant contributions to the nation's socio-economic progress. Numerous studies demonstrate that entrepreneurship plays a vital role in the economic success of countries (Katz, 2007; Bowen & Clercq, 2008; Kogut et al., 2010). There are various personal factors that drive someone to choose entrepreneurship as a career path. Typically, these elements can be categorized as either demographic factors or psychological factors such as attitudes and values, according to Ashley-Cotleur et al. (2009).

The paper aims to analyze the entrepreneurial intentions of business students, who are likely to be future entrepreneurs of the country. Measuring entrepreneurial intentions is crucial for understanding the entrepreneurial landscape, predicting business creation, and identifying barriers and enablers. Gaining knowledge about the variables that influence entrepreneurship can help advance the theory in this area, and can also provide valuable insights to policymakers, researchers, consultants, educators, and other relevant stakeholders to gain a better perspective of the elements that affect the development of entrepreneurial intentions as a stepping stone towards starting a business.

2. Review of Literature

2.1 Entrepreneurial intention (EI)

EI is the combination of thinking about entrepreneurial activities and having a favorable attitude or a strong desire to become an entrepreneur. Meanwhile, Huq, Huque & Rana (2017) describe it as a personal inclination that has the potential to result in the creation of a new enterprise. It refers to an individual's internal recognition and determination to initiate a new business venture, along with actively strategizing and working towards achieving this goal in the future. Personal beliefs and norms are the basis of entrepreneurial intent. Ajzen's (1991) theory of planned behavior (TPB) suggests that an entrepreneur's intention is determined by their attitude, subjective norms, and controllable behavior. Among many approaches to study entrepreneurial intention, Shapero's entrepreneurial event model (Shapero, 1975), and the theory of planned behaviour Model (Ajzen, 1991) are the two most popular models.

Shapero's entrepreneurial event model suggests that the establishment of a new firm arises from the interplay of environmental circumstances that shape an individual's perceptions. Shapero (1975) outlines three factors that determine an individual's intention to become an entrepreneur: their perceived sense of desirability, feasibility, and inclination to take action. Perceived desirability refers to the level of attraction someone feels toward a particular behavior, such as becoming an entrepreneur. Perceived feasibility is the degree to which people consider themselves capable of carrying out a certain behavior. Shapero highlights how perception plays a vital role in anticipating how people will act in certain situations, where they perceive certain behaviors as both achievable and desirable. This perception of having the ability to act is a significant factor. The theory of planned behavior proposes that three distinct elements impact an individual's inclination to pursue entrepreneurship: their attitude towards entrepreneurship, the subjective norms related to entrepreneurship, and their perception of behavior control (Ajzen, 1991).

2.2 Gender

Age and gender are among the many demographic factors that are suggested to have an influence on EI (Kristiansen & Indarti, 2004). Overall, men have displayed a stronger inclination towards entrepreneurship and a more optimistic outlook towards it compared to women (Moa-Liberty, Tunde, Tinuola 2016). Men are also more likely to be involved in starting a business than women (Minniti & Nardone, 2007). Largely, women are reported to have lower EI. According to Lee & Lim (2005), women may experience a decrease in their desire to become entrepreneurs due to the conventional belief that they are responsible for supporting the family and raising children. On the other hand, several studies have indicated that there is no significant distinction between males and females with regards to their desire to initiate their own business (Chaudhary, 2017; Smith et al, 2016). Several other studies have demonstrated that women are comparatively less inclined than men to initiate their own business (Global Entrepreneurship Monitor, 2020; Nguyen, 2018). Women entrepreneurs in underdeveloped nations face the most significant obstacles when it comes to access to finance (Maden, 2015). The intention to engage in entrepreneurship is influenced by gender, and it depends on the country of origin of the students being studied (Daim et al, 2016). With this background, following hypothesis has been formulated.

H1: Male students have higher EI than females.

2.3 Age

Age is a fundamental demographic variable that has been found to be related to various aspects of entrepreneurial intention, such as risk-taking propensity, experience, and motivation. Age is an important factor in forming entrepreneurial intentions (Reynolds, 1997). Tanveer et al. (2013) suggest that the role of age in entrepreneurship is a topic of debate. They argue that as age increases, the likelihood of becoming an entrepreneur decrease, but they also note a positive correlation between age and the success of a business. According to Hatak et al. (2015), there is evidence to suggest that as individuals get older, they are less likely to have a desire to become an entrepreneur. However, in contrast to this, other research does not support the idea that age is a factor in predicting entrepreneurial inclination (Chaudhary, 2017; Ferri et al, 2018). By summarizing the above literature, the following -mentioned hypothesis has been developed.

H2: As age increases, the level of EI decreases among students.

2.4 Prior Work Experience

According to Fatoki (2014), there is a strong correlation between past work experience and the desire to become an entrepreneur. Prior work experience has an impact on future business decisions and performance, and factors such as involvement in business, having business role models, and gaining access to relevant business contacts are important for individuals considering starting their own business. Additionally, an individual's experience in business planning and their attitude towards it are influenced by their entrepreneurial intentions because effective strategic planning can lead to better performance. Despite this, there is currently insufficient evidence to establish a strong correlation between work experience and entrepreneurship (Miralles et al., 2016). With above context, below-mentioned hypothesis has been proposed:

H3: Prior work experience has a positive effect on EI

2.5 Prior exposure to Entrepreneurship courses

Ethics education is known to play a significant role in shaping individuals' values, beliefs, and attitudes. In the context of entrepreneurial intention, prior exposure to ethics courses may influence an individual's perception of the moral and ethical implications of entrepreneurship, affecting their propensity to engage in entrepreneurial activities. Growing importance in entrepreneurship have made entrepreneurship related courses popular. These courses can provide important insights for new entrepreneurs. Students

who took entrepreneurship courses had a greater inclination towards entrepreneurship compared to those who didn't (Webb & Wathers, 1982). Similarly, education plays a crucial role in differentiating entrepreneurs from non-entrepreneurs (Lee & Lim, 2005). Individuals who receive education related to entrepreneurship tend to have a stronger desire to become entrepreneurs (Sulcek, 2009).

H4: Past exposure to Entrepreneurship courses has a positive effect on EI.

2.6 Marital Status

Some scholars have argued that having support from a spouse or partner is crucial for achieving success (Hisrich & Brush, 1983; Nelson, 1991). Such support may manifest in various ways, including instrumental, informational, or emotional support (Brockhaus, 1980; Parasuraman et al, 1996). Consequently, it is reasonable to suggest that entrepreneurs who have the support of their spouses may be more optimistic about their prospects of success and thus have a greater drive to expand their business. On the other hand, Jaiswal and Patel (2012) conducted research that identified a connection between marital status and entrepreneurial conduct. According to their findings, unmarried individuals display a greater inclination towards exhibiting entrepreneurial behavior than their married counterparts. Unmarried individuals are more enthusiastic and driven towards entrepreneurship, while married individuals are more careful and restrained in their pursuit of entrepreneurship.

Getting married can impact people's attitudes, beliefs, and priorities, and it involves committing to a particular lifestyle. Furthermore, marriage can also bring about changes in responsibilities and choices, particularly regarding financial matters. Because of the potential dangers associated with starting a business, such as the risk of losing one's savings, a married individual may hesitate to invest in risky ventures due to concerns about their family's future. Unmarried individuals have the liberty to choose any job according to their preferences, but when it comes to married individuals, their spouse may influence their decisions to some extent (Verbakel & de Graaf, 2009). A study conducted by Katundu and Gabagambi (2014), male and married graduates exhibit stronger desire to pursue entrepreneurship, in contrast to their female and single counterparts.

H5: Unmarried individuals have higher EI than married.

3. Data and Methodology

3.1 Data collection process

For the selection of the students' respondents, a purposive sampling method was implemented. A total of 10 colleges located at Kathmandu valley were selected who have included entrepreneurship-related courses in the curriculum. Most of the MBA colleges, around 90%, are located inside Kathmandu valley. Information pertaining to gender, age, marital status, and educational qualifications was gathered from those students. To obtain the necessary data, a research questionnaire was distributed among graduate students. The responses of 343 students were collected in total. Among them, 51.9 % male, and 48.1% female, most of the participants were from the age group 24-30 years, i.e., 70.3%, regarding the students' marital status, 18.7% married, and 81.3% single. Concerning working experience, students had, 20.1% no working experience, 34.1% working experience of at least two years, 30.6% working experience between 2-5 years. In contrast, only 15.2% working experience for more than five years. To the question, whether you have taken entrepreneurship-related courses or not, 79.0% said yes, whereas 21.0% no.

3.2 Research Instruments

The study used Linan & Chen (2009) four items to measure EI on a 7-point scale; 1= strongly disagree to 7=strongly agree. It had been a widely used and validated tool to measure entrepreneurial intention among students for example, Engle et al., (2010), Krueger (2007), Linan (2004), and Linan, Urbano &

Guerrero (2011). A 7-point Likert scale is employed due to the perception of intention as a "Complex cognitive trait".

Cronbach's alpha was used to measure reliability. All the Cronbach's alpha in this study were greater than 0.7. Any value of Cronbach above 0.6 confirms that the scale is reliable (Cortina, 1993). Data for normality should be examined prior to performing inferential statistical analysis (Ahsan et al., 2009). As per the "Normality Test," all variables in this study were significant at the 0.05 level. Consequently, the assumption of normality is deemed valid. Data analysis was done using descriptive statistics, one way ANOVA and Independent sample T test to compare the results based on gender, age, work experience, prior exposure to entrepreneurship education, and marital status.

Table1: Demographic profile of students

Category	**Students**	
	Frequency	Percentage
Male	165	51.9
Female	178	48.1
Less than 24 Years	59	17.2
24- 30 Years.	241	70.3
31-45 Years.	40	11.7
Above 45 Years.	3	.9
Single	279	81.3
Married	64	18.7
No work experiences	69	20.1
WE < 2 years	117	34.1
WE 2- 5 years	105	30.6
WE > 5 years	52	15.2
Yes	271	79.0
No	72	21.0

4. Results and Discussions

Gender-based difference in EI: To analyze the relationship between the gender and intention, a T test has been conducted. As per the table 2, the perception of entrepreneurial intention was rated higher by males (mean of 5.8652) than the female (mean of 5.3371), which was statistically significant (sig- 0.00). It supports our hypothesis H1. The results of this research on the influence of gender on EI were consistent with the conclusions drawn by Molino and Dolce (2018) who found that there is gender-based differences in entrepreneurial role and intention.

The reasons for the results obtained can be attributed to the cultural values and traditions of Nepal, where entrepreneurship is still perceived as a career choice that is predominantly male. This suggests that, in addition to educational initiatives aimed at promoting entrepreneurship, it is crucial to explore ways to motivate female students to pursue their entrepreneurial aspirations and view entrepreneurship as a valuable avenue for advancing their careers.

Age based difference in EI: Table 3 shows the results of one-way ANOVA between age group and EI. The ANOVA's sig value is 0.376, which is greater than 0.05, resulting in the rejection of hypothesis H2. In other words, there is no significant differences among age groups in terms of entrepreneurial intention. As per the result, the younger generation aged between 24- 30 had high entrepreneurial intentions (Mean- 5.64). The younger generation is presumably more aspirational and like to take risks, while the older

category is having a clear career path, settled and doesn't want to take risks. Generation Z, those born after 1995, are born to be leaders (Wells et al; 2018). This generation is progressive, socially conscious and more concerned about job prospects than earlier generations. Nonetheless, this result is consistent with Chaudhary's (2017) findings that there is inadequate statistical proof to back up the idea that age has a negative correlation with IE.

Table 2: Gender vs Intention

	Gender	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Intention	Female	178	5.3371	1.24027	.09296
	Male	165	5.8652	1.10999	.08641

		Levene's Test for Equality of Variances		**t-test for Equality of Means**						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Intention	Equal variances assumed	.751	.387	.583	341	.560	.093	.160	-.221	.408
	Equal variances not assumed			.600	116.258	.550	.093	.155	-.214	.401

Table 3: Age range and EI

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	4.529	3	1.510	1.037	.376
Within Groups	493.686	339	1.456		
Total	498.215	342			

Age	**N**	**Mean**	**Std. Deviation**	**Std. Error**	**95% Confidence Interval for Mean**		**Minimum**	**Maximum**
					Lower Bound	Upper Bound		
Below 24	59	5.3771	1.30761	.17024	5.0364	5.7179	1.75	7.00
Age Between 24- 30	241	5.6473	1.19638	.07707	5.4955	5.7991	1.25	7.00
Age between 31-45	40	5.6125	1.07410	.16983	5.2690	5.9560	2.25	7.00
Above 45	3	5.0000	1.73205	1.00000	.6973	9.3027	4.00	7.00
Total	343	5.5911	1.20697	.06517	5.4629	5.7193	1.25	7.00

EI based on prior work experience among students: Most of the students had some working experience. The results (Table 4) showed that students who are currently working displayed high entrepreneurial intentions than non-working students. Students who had working experience between 2- 5 years showed a high EI (Mean- 5.72) but it was not statistically significant (Sig: 0.494). This finding contradicts past study by Basu & Virick (2008) which shows a positive relationship between work experience and EI. Despite efforts to establish a connection between work experience and entrepreneurial intention, the evidence has been surprisingly weak. According to Kautonen et al. (2011), work experience, regardless of its nature, cannot predict one's inclination towards starting their own business. This lack of a direct

correlation may be due to the challenges associated with measuring and comparing work experiences. Baron (2009) suggests that relying solely on quantifying prior experience through factors such as the number of years worked or the context in which work occurred can limit our understanding of how prior experience affects a person's entrepreneurial intentions.

Table 4: Work experience and EI

Groups	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	3.510	3	1.170	.802	.494
Within Groups	494.705	339	1.459		
Total	498.215	342			

Experience	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
No work experiences	69	5.4457	1.32070	.15899	5.1284	5.7629	1.75	7.00
Work experience < 2 years	117	5.5427	1.14625	.10597	5.3328	5.7526	1.25	7.00
Work experience between 2- 5 years	105	5.7167	1.24570	.12157	5.4756	5.9577	1.75	7.00
Work experience > 5 years	52	5.6394	1.10526	.15327	5.3317	5.9471	2.25	7.00
Total	343	5.5911	1.20697	.06517	5.4629	5.7193	1.25	7.00

Table 5: Entrepreneurship education and EI

	Statement	N	Mean	Std. Deviation	Std. Error Mean
Intention	Yes	271	5.6107	1.22047	.07414
	No	72	5.5174	1.16002	.13671

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Intention	Equal variances assumed	.751	.387	.583	341	.560	.09334	.16018	-.22173	.40841
	Equal variances not assumed			.600	116.258	.550	.09334	.15552	-.21468	.40136

EI based on prior exposure to entrepreneurship education: A student who had taken the course showed high EI (Mean-5.61) than other students (Mean-5.51), but it was not statistically significant (sig: 0.562) as shown in Table 5. The results of this study on the influence of entrepreneurial education on EI were not consistent with the study of Anwar and Saleem (2019), which indicated that teaching entrepreneurship in education plays a significant role in developing students' entrepreneurial intentions. Kaya et al.'s (2019) empirical research indicates that providing entrepreneurial support and teaching self-management skills can enhance the likelihood of students engaging in entrepreneurship in the future. But at the same time, this finding is consistent with the results of previous studies conducted by Sanyal and Al Mashani (2018), Izedonmi (2010), and Yildirim et al. (2016). These studies demonstrated that entrepreneurial education has an indirect impact on students' intention to pursue entrepreneurship, as it

exposes them to the world of entrepreneurship, increases their knowledge and interest in it, and encourages them to exhibit entrepreneurial attitudes such as taking risks and being proactive. However, it does not directly influence their decision to embark on an entrepreneurial career.

Marital status and EI: Table 6 shows the analysis of the marital status-based difference in intention among students. There are no significant differences among students based on their marital status in terms of entrepreneurial intention (sig-0.782). The results of this study on the influence of marital status on EI were not consistant with the findings of Salem and Mobarak (2019), which found unmarried respondents show higher EI than married.

Table 6: Marital status and EI

	Marital status	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Intention	Single	279	5.5824	1.23440	.07390
	Marrried	64	5.6289	1.08744	.13593

		Levene's Test for Equality of Variances		**t-test for Equality of Means**						
									95% Confidence Interval of the Difference	
		F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**	**Mean Difference**	**Std. Error Difference**	**Lower**	**Upper**
Intention	Equal variances assumed	2.461	.118	-.277	341	.782	-.04647	.16751	-.37595	.28301
	Equal variances not assumed			-.300	103.695	.765	-.04647	.15472	-.35330	.26036

5. Conclusions and Policy Implications

Entrepreneurship is one of the most important factors in moving Nepal to the path of economic progress. Therefore, it is crucial to understand the precursor of entrepreneurship to help people start their own business. The aim of this study is to examine how demographic factors influence the EI of Business students.

The results show that male business students are more likely to get into start-up business than females. Nepali women mostly spend time for their family than having a business of their own. In Nepal, women tend to opt for salaried jobs rather than choosing to be an entrepreneur (Acharya & Pandey, 2018). Matters related to property, finances, and education are often considered to be the responsibility of men, with the belief that women need not concern themselves with these issues. Female entrepreneurship is a vital instrument for societal transformation as it improves women's overall standing within their communities. Given the distinct obstacles encountered by female business owners in Nepal, it is crucial that policy changes are sensitive to gender and tailored to their specific requirements. Economic empowerment cannot exclude half the population, and empowering only specific socio-economic groups of women is inadequate. Consequently, an intersectional approach is essential for such policy amendments, particularly in the context of Nepal's diversity.

We did not observe any significant relationship in our findings between age groups and entrepreneurial intention of MBA students. There could be various factors that may explain the lack of relationship like cultural dimensions (Hofstede, 1980), regional entrepreneurial ecosystems (Isenberg, 2010), social support (Aldrich & Cliff, 2003), risk taking propensity (Steward and Roth, 2001) and many more.

The results also demonstrate that there is no relationship between prior entrepreneurship education and entrepreneurial intentions of business students. A recent study by Islam, Islam, and Alam (2021) found

that exposure to entrepreneurship education had no significant impact on entrepreneurial intention among university students in Bangladesh. The study suggests that the impact of entrepreneurship education may be limited in contexts where there are significant socio-economic constraints and lack of resources. The impact of entrepreneurship education may depend on a variety of factors such as cultural norms, social support, individual characteristics, and structural barriers to entrepreneurship. Further research is needed to better understand the conditions under which entrepreneurship education can be effective in promoting EI.

We did not observe any significant relationship in our findings between marital status and EI of MBA students. The relationship between marital status and EI is complex and depends on a variety of factors. While some studies have found that single individuals are more likely to have entrepreneurial intentions, others have found that married individuals are more likely to have such intentions. Ultimately, the impact of marital status on EI is likely to be mediated by factors such as financial resources, social support, and personal characteristics such as autonomy and risk-taking propensity. This information helps policymakers, educators, and support organizations create targeted programs and resources to foster a conducive environment for entrepreneurship. Assessing intentions can also inform educational curricula and contribute to fostering diversity and inclusion in the entrepreneurial ecosystem. Ultimately, understanding entrepreneurial intentions leads to stronger support for new businesses, driving innovation, economic growth, and job creation.

The more Nepal government and other agencies understand how students perceive the entrepreneurship ecosystem; there is more chance that they consider it while developing guidelines, which will likely promote and facilitate entrepreneurial activity and can help transform these "prospective entrepreneurs" into actual entrepreneurs. Faculties must support and encourage students, who are future contributors to economic development, in their entrepreneurial intentions during their studies. This research suggests that scientific and research organizations can develop study programs that focus on increasing students' entrepreneurial intentions. This will enhance the connection between these organizations and the economy, and equip students with the necessary skills to start their own businesses. In addition, there are existing courses aimed at improving entrepreneurial skills that can also apply the main findings of this research in their teachings.

6. Limitations and Future Research

Though this research contributes to the body of empirical evidence in the field, it is limited in its scope and therefore requires additional research. Specifically, the study only examined business students from few colleges in Kathmandu, so in order to enhance its applicability, subsequent investigation should involve a bigger sample of colleges to increase the study's generalizability. This research did not investigate the effect of other demographic variables influence on entrepreneurial intention like parental occupation, economic background, entrepreneurial relatives, nationality which can be focused further. In the future, a greater emphasis may be placed on conducting qualitative studies to enhance a deeper understanding of EI. Additionally, more longitudinal studies will be necessary to investigate students' attitudes and behaviors.

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Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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China-Pakistan Economic Corridor: A Comprehensive Guide to Enhancing Economic and National Security, Stability, and Sustainability

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Abstract

A strong economy is the backbone of a strong nation. Pakistan has experienced security challenges since the beginning that has shifted its attention to defense, which diverted its focus from economic stability. And from the standpoint of independence, Pakistan has territorial disputes with neighboring countries such as Afghanistan and India. This has made it difficult for the country to maintain strong trade relations with them and has hindered diplomatic relations with Pakistan. Programs like China Pakistan Economic Corridor (CPEC) have provided the country with an opportunity to improve its economic conditions. The CPEC can be a game changer for Pakistan. It is a project of regional connectivity, a part of China's Belt and Road initiative (BRI) This would assist not just Pakistan but also Iran, Afghanistan, and Central Asian countries and in some way Middle Eastern states. Under this program, these countries will have improved roads, railways, air transportation, and the frequent and free exchange of goods so that they will have open borders like European countries as a result of which Pakistan will have less security issues and more economic opportunities. Pakistan's current budget (2022-23) allocates 58 percent of its budget to loan repayment and defense, the remaining 42%(News, 2022) is very less for making the country stable or sustainable. The CPEC is a long-term program that will help Pakistan achieve economic and national stability and sustainability. The CPEC model is a win scenario that will result in a linked and integrated area that shares harmony and growth.

Keywords: China-Pakistan Economic Corridor, Security, Economic Stability, Economic Sustainability, SWOT Analysis

JEL Classification: I18, H51

1. Introduction

In this era of hybrid warfare, economic stability is the backbone of any country. For countries like Pakistan, where domestic unrest is perpetually at its worst, national security is not possible with military or border security, but there is a dire need for economic security (Muhammadi et al., 2022). In the initial not many long stretches of its introduction to the world, post-freedom Pakistan confronted various difficulties. Pakistan has faced many confrontations from neighboring countries that's why national defense remained a point of focus for Pakistan. Pakistan had many security issues but now the definition of the term security has been changed from border security to economic security. Pakistan has also to change its strategy from armed forces to economic forces that can bring prosperity to our country.

The world is undergoing a transition from unipolarity to multipolarity. This transition poses challenges but also offers opportunities for regional countries. The CPEC is one such opportunity for Pakistan to improve its economic conditions and enhance its relations with countries in the region. China-Pakistan economic Corridor (CPEC) is often called a "game changer" for Pakistan or a "debt trap" by China, but these are unrealistic claims. CPEC can be fruitful and stabilize the economic conditions of Pakistan if it is utilized in the right way (Shahzad, 2021). The CPEC is a billion-dollar project which cannot just enhance Pakistan's infrastructure but also give Pakistan the chance to get connectivity and improve trade relations with its neighbors. In this way, Pakistan will be having two

benefits from the CPEC, which can stabilize its economy. It can have good trade relations with neighbors and while having open borders and good trade relations there will be a major decrease in security issues hence Pakistan can focus on economic security rather than border security. To get benefit from the long-term effects of the CPEC Pakistan needs policies that can result in the economic sustainability of Pakistan. This study addresses the "positive impact of CPEC on national and economic security, stability and sustainability of Pakistan" and it elaborates how stability, sustainability, and security work together to provide us with a deep understanding of the CPEC.

Pakistan has a very important geostrategic location in South Asia which brings a lot of challenges to its security with opportunities and thus border security has always been Pakistan's first preference (Iqbal, 2014) but "A country that does not have a stable economic growth cannot be regarded as secure no matter how strong its defense system is" (Dagia, 2022). The defense budget always occupies a major percentage of the GDP of the country. The graph in Figure 1 shows the defense budget of the country from 1990 to 2020. There is no doubt CPEC has lot of opportunities for both China and Pakistan and it will be win-win game for both countries (Padda, 2018).

The defense budget occupies a major part of the national budget despite its weak performance in other sectors. The budget for the financial year 2020-2023 is 9.5 Trillion rupees where the largest portion of the budget is occupied by loan repayment which is 3.95 Trillion Rupees and the second largest is defense is 1.5 Trillion Rupees. These both collectively contain 58% of the total budget while 42% remains for the development, health, and education sectors as shown in Figure 2. Pakistan should now focus on economic recovery (Ahmar, 2022) because the security and prosperity of the 220 million people of Pakistan depend on the economic conditions of the country. For strengthening the economy Pakistan has to improve its diplomatic ties with neighbors and superpowers and reduce border security threats(Syed, 2022). The former Prime minister of Pakistan focused on economic security as economic security is the main pillar of national security.

The national interest of Pakistan is seeming to shift from geopolitics to geo-economics(LTC Taewon Choi, 2021) after the US withdraws from the region and inauguration programs like CPEC. The CPEC not only has benefits for Pakistan and China but it is a corridor of regional connectivity(Husain). Various projects under CPEC improve socio-economic and socio-cultural relations of Pakistan through academic and cultural, trade and business and cooperation by a win seeming model(Authority). The CPEC is a journey toward regionalization in a globalization era with dreams for a prosperous future, development, and growth of the economy(Ali, 2020).

The literature "Will the China-Pakistan Economic Corridor sustain itself?" tries to quantify and explain the viability of the China-Pakistan Economic Corridor. It explains how Pakistan can overcome those challenges for sustainable development through a systematic explanation of the internal and external challenges. Because of the CPEC's long-term sustainability, Pakistan needs to assist with all the challenges that come in the way of economic development. Furthermore, Jalil Abbas Jilan, Pakistan's ambassador to the US, in his speech in Washington about regional security and trade in 2015 emphasized that CPEC is the only method to open the way to fortune in Pakistan(Relations, 2015) and the entire region. This also shows how important CPEC is for the sustainable development of Pakistan, and it demonstrates in what manner the sustainability of CPEC is important.

The primary focus of this research revolves around the questions such as 1) Real threat to Pakistan, invasion, or economic instability? 2) Does CPEC have impacts on economic and national stability? 3) What obstacles must Pakistan overcome to ensure economic sustainability? This study will examine the fundamental stability, sustainability, and security aspects of The CPEC, the challenges The CPEC is facing and talk about how Pakistan can work to achieve the vital goals of stability, security, and sustainable development through the CPEC.

The research gap discussed in this paper is that there are three dimensions of Pakistan's economy which include economic Security, stability, and sustainability, combined. This study analyzes how these three factors are related to Pakistan's economy and how the CPEC positively impacts the national and economic security, stability, and sustainability of Pakistan. On top, it covers how Pakistan can be economically secured under CPEC. Secondly, it discusses how CPEC projects can stabilize the economy of Pakistan. It does not only cover the economic and trade relations between Pakistan and China under CPEC but it covers the importance of regional connectivity on

the economic progress of the country. This paper also discusses the factors that can contribute to the economic sustainability of the country.

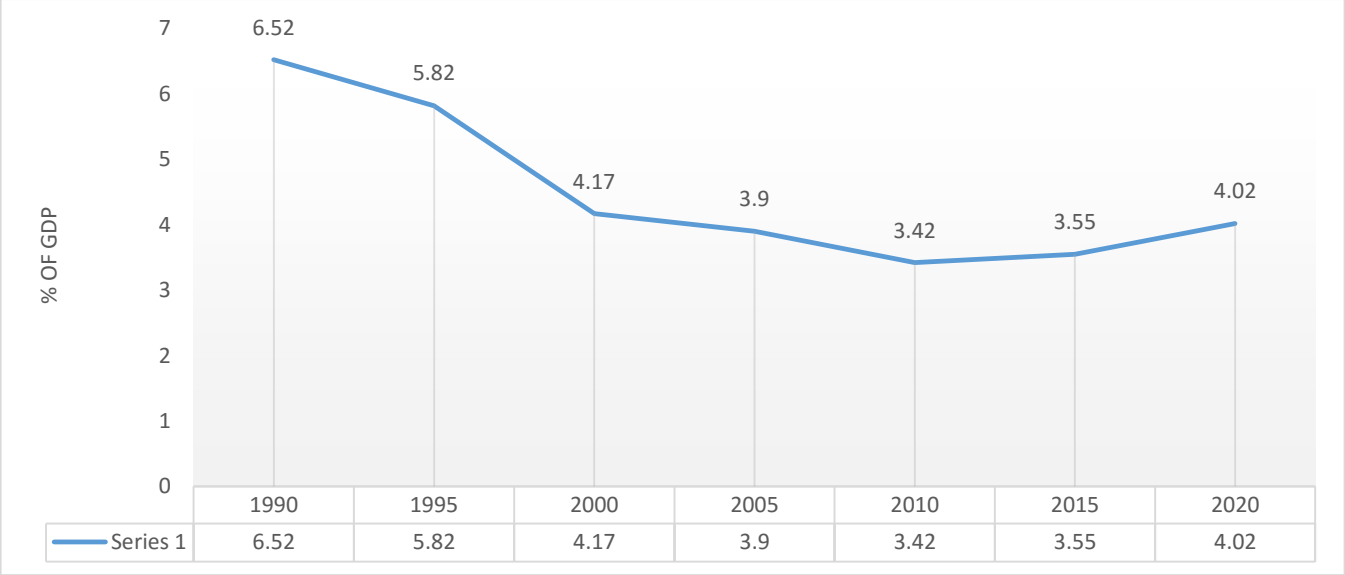

Figure 1: Pakistan's Defense Budget 1990-2020 (Trends, 2023)

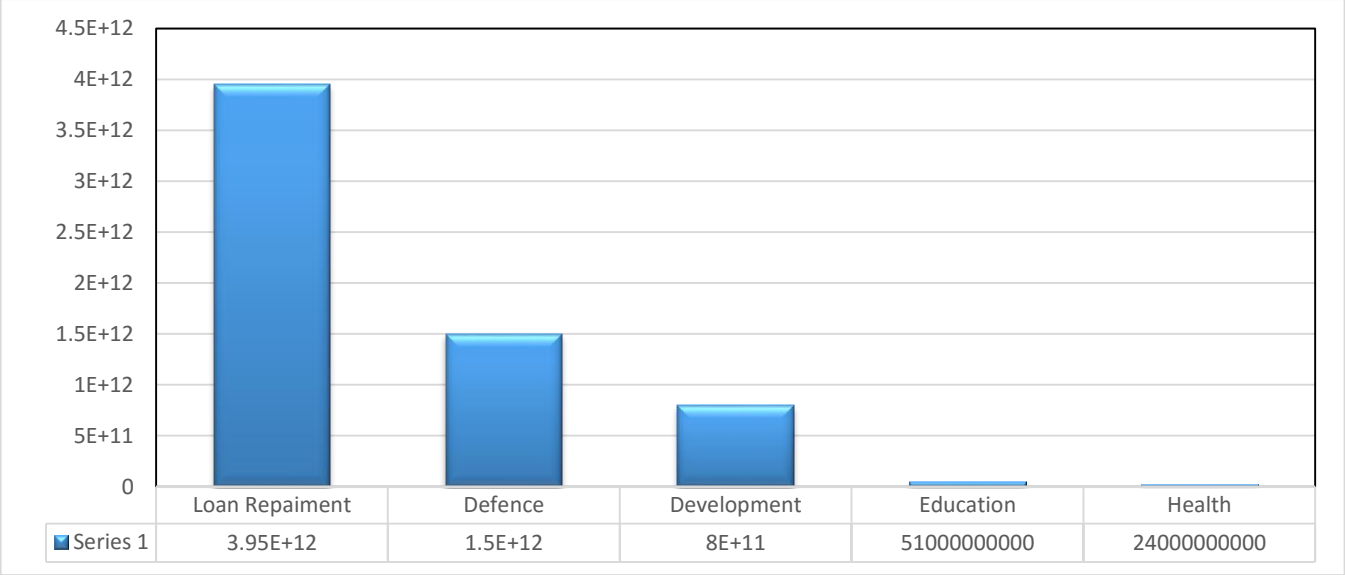

Figure 2: Pakistan's Budget 2022 (News, 2022)

2. Data and Methodology

2.1 Study Area

The study area of this paper is political economy. As this paper attempted to cover the economy, it covered how we can secure, stabilize, and sustain the economy of Pakistan through CPEC. Pakistan's economy with relevance to CPEC is the focus of this paper as a whole, as is its applicability to economic security, stability, and sustainability.

2.2 Research Techniques

This research is qualitative and is done based on both analysis and observation. In this analytical study data is used from secondary sources listed in the references. The qualitative approach characterizes the impacts of CPEC on national and economic stability, sustainability, and security. This paper discusses security challenges to Pakistan, CPEC is a source to counter these challenges and ensure economic stability and sustainability for the betterment of Pakistan.

2.3 Data Collection

The literature on CPEC and Pakistan's economic and security issues has been thoroughly reviewed to gather the data for this study. The information has been collected from a variety of sources, such as news articles, government reports, and academic journals. To find the significant data connected to the study, we evaluated these sources.

2.4 Data Analysis

A content analysis strategy has been used to examine the data gathered for this research. Finding patterns in the data using content analysis has helped address the research questions (Thorne, 2000). To uncover central concepts about the effects of CPEC on Pakistan's economy and security, data have been collected and analyzed. The analysis's observations have identified several themes concerning how the CPEC will affect Pakistan's economy and security, including increased investment, infrastructure growth, and geopolitical repercussions. These findings offer insightful information about the potential advantages and challenges of the CPEC for Pakistan.

2.5 SWOT Analysis

Another research technique used in the research is SWOT analysis. This strategic planning tool helped us to evaluate the potential advantages and disadvantages of CPEC for Pakistan's economy and security. The data from the official website of the government and authentic news around the globe are used to state the employment and growth opportunities created by CPEC and their strength for Pakistan's economy. While data from some Websites enlisted in references show the weaknesses of this project and potential threats it may cause for the economy and security of the country.

3. Results and Discussions

3.1 Real Challenge Border Security or Economic Security

Mark Esper said “Clearly we need a secure economy to build a strong military”. Since its beginning in 1947, Pakistan has seen serious dangers to its national sovereignty and regional integrity from the adjoining nations. Subsequently, Pakistan embraced a state-driven public safety way to counter nearby and provincial dangers to its security during the Cold War time frame. Insecurity on a domestic, political, and physical level directly affects the flow of money, contemporary development, and the trust of financial backers. Combined with growing anxiety. The primary concerns of economic security, like other pillars of comprehensive security, have a significant impact on the current situation and outlook of the state(Iqbal, 2014). Similar to other related security topics. On the one hand, sound and stable economic principles go a long way toward ensuring long-term growth and progress for the state, but again, it is clear that none of these requirements can be met without a prudent security plan and adequate steps toward a sustainable economy due to energy deficiency. A country like Pakistan, which has an agrarian economy, constrained income, and a duty base, has limited options for meeting these standards. Yet a steadily expanding populace will have a larger number of difficulties than arrangements in the next few decades.

There was a time when security was defined in terms of defense but now security has changed its meaning to economic security. So now the world has changed its war from a weapon war to an economic war. During this time a country with a stable economy is more powerful and can exploit a rival country. Like China, and the USA. But in the case of Pakistan, the country is still stuck in matters of defense. A large part of the country's annual budget is allocated for defense. And just the peanut amount is allocated for new projects, education, and other things that can add revenue to the economy.

To develop the country, they have to focus on economic growth. The need of the hour is the country's secure economy. In their recent "National security policy of Pakistan" (2022-2026). Former Prime Minister of Pakistan Imran Khan stated "No state flourishes without economic development and prosperity"

3.2 The National Security Policy of Pakistan Analysis

Under Prime Minister Imran Khan's direction, Pakistan's national security strategy places a strong emphasis on the value of economic security as a vital facet of security. The strategy aims to encourage economic growth, job creation, and poverty alleviation because it recognizes that economic stability is crucial for the well-being and security of the nation as a whole.

The policy places a strong emphasis on several crucial areas to achieving economic security, including encouraging foreign investment, fostering trade relations with other nations, raising exports, lowering imports, and enhancing the business climate. The necessity of utilizing the nation's natural resources, such as water and minerals, to assist economic growth is also emphasized by the strategy. Furthermore, the policy acknowledges that regional stability and security and Pakistan's economic security are intertwined. As a result, it highlights the need for regional cooperation and connectivity to facilitate trade and economic growth in the region. This includes initiatives such as the CPEC, which seeks to promote economic cooperation and development between Pakistan and China.

Overall, the national security policy of Pakistan under Prime Minister Imran Khan's leadership recognizes that economic security is essential for national security and seeks to promote policies and initiatives that support sustainable economic growth and development (Ali et al., 2022).

3.3 FTA between China and Pakistan

Having been ratified in July 2007, the China-Pakistan Free Trade Agreement (FTA) is a bilateral trade deal that was signed in November 2006. By lowering tariffs and non-tariff trade barriers, the pact aimed to improve economic cooperation between the two nations(Chaudhry et al., 2017). The FTA significantly contributed to the growth of Pakistani and Chinese economic cooperation. The Pakistan-China Institute said that the amount of trade between the two nations climbed from $2.2 billion in 2006 to $19.08 billion in 2019. The CPEC, one of the key initiatives under this initiative, is one of the major projects under this agreement. The pact has also increased Chinese investment in Pakistan.

Pakistan has benefited from the FTA in terms of economic security. It has assisted Pakistan in diversifying its export markets and reducing its dependency on established markets like the US and the EU. Due to the FTA, Pakistan now has access to a sizable consumer base in China, one of the world's largest marketplaces, which has led to a rise in exports from Pakistan.

Additionally, Pakistan has benefited from the FTA's promotion of its industry. Pakistan now has access to Chinese technology and knowledge, which has improved the country's industrial capacity. The FTA has also led to the transfer of Chinese enterprises to Pakistan, which has improved the economy of the nation and led to job opportunities(Hao, 2009).

3.4 Impacts of China-Pakistan Economic Corridor (CPEC) on Economic and National Stability

Developing nations prosper as a result of developments. Mega-investments in infrastructure projects like ports, roads, railways, and airports boost trade, provide greater employment opportunities, and raise living standards by stabilizing the nation's economy and guiding it toward developed status. One such chance for Pakistan to enhance its economic situation is CPEC. The CPEC is a 3,010-kilometre corridor that connects Gawadar to the Xinjiang region of China via pipelines, motorways, and railroads(Abbas, 2019). Pakistan seeks to upgrade its infrastructure through CPEC to spur economic growth and strengthen its ties with regional players. For China, CPEC offers a safe, quick, and direct route to the Indian Ocean and the Arabian Sea(Landry, 2021).

3.5 China-Pakistan Economic Corridor (CPEC) projects

Major China-Pakistan Economic Corridor (CPEC) projects include the following:

- **Energy projects:** aiming to reduce the power crisis in Pakistan. There are a total of 21 energy projects of which 11 have been completed five are under construction and five are under consideration

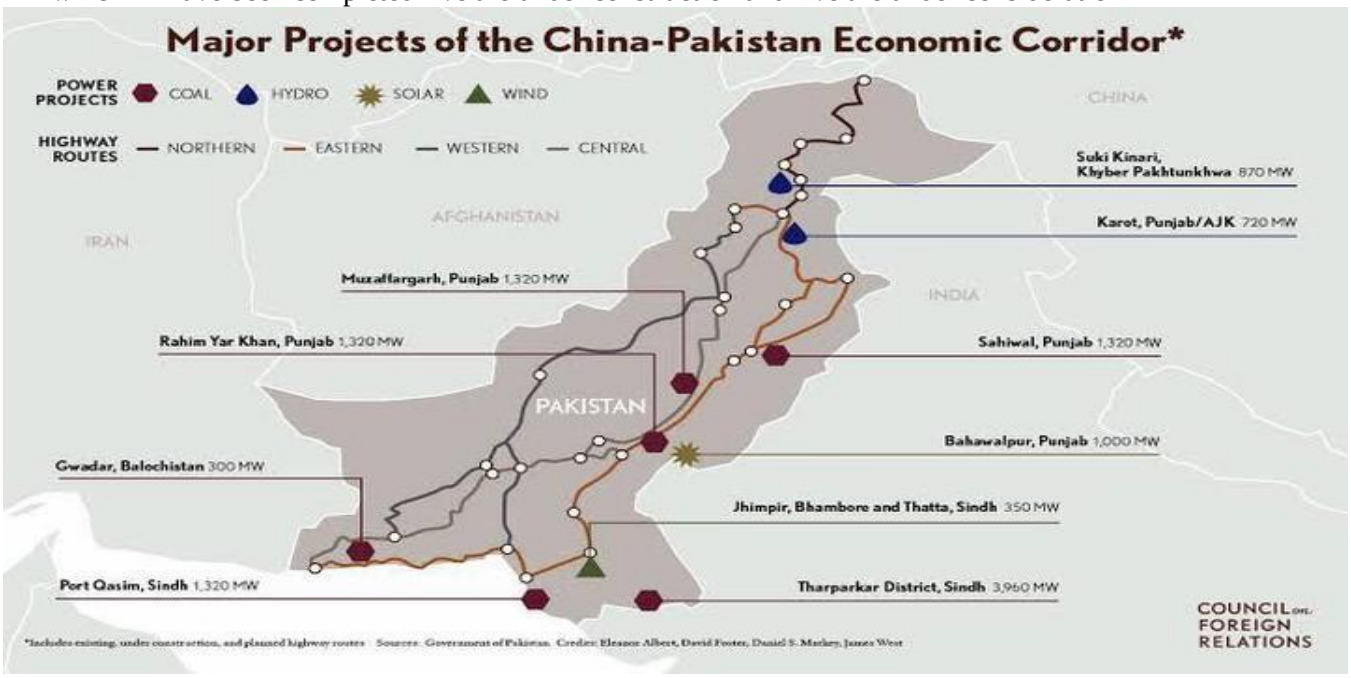

Figure 3: Map1- Major projects of China Pakistan Economic Corridor (Farooqui & Aftab, 2018)

- **Transport infrastructure:** Projects to have improved transport. Out of the total of eight projects, six have been completed including the orange line metro train and the Karachi-Peshawar motorway, etc. Figure 3: Major projects of CPEC. Map from open source
- **Gwadar projects:** A total of fourteen Gwadar projects under the CPEC are to be built for the development of Gwadar. Four projects have been completed while six are under construction and four are In-pipeline projects that include Gwadar smart city, Gwadar international airport, expressways, universities, and so on.
- **Industrial cooperation/special economic zones (SEZs)**: A total of nine special economic zones and industrial cities to be built in different cities in Pakistan
- **Social and economic development projects**: Under CPEC four social and economic development projects have been completed
- **China Pakistan Economic Corridor (CPEC) and related projects under public sector development programs (PSDP)**: From 2017 to 2019 total of three projects under CPEC and PSDP have been completed

Planning of CPEC follows four stages. These are:

1. **Early Harvest:** 2015-2019 Most of the projects related to the energy sector which is already been completed adding approximately 7000 MW of electricity to the national grid and thus easing energy shortages that had crippled the industry and exports
2. **Short-term projects**: up to 2022 mainly roads, Gwadar development, optic fiber network, and hydro, coal, mining, and power projects
3. **Medium projects**: up to 2025 Railways and industrial zones
4. **Long-term projects:** up to 2030 competition of industrial zones, agriculture tourism, etc.

3.6 China-Pakistan Economic Corridor (CPEC) and economic stability

Developed nations invest large amounts of money in projects to get better returns or to get other benefits that boost the economies and living standards of developing nations. As Chinese investment expands globally, the China-Pakistan Economic Corridor supports Pakistan's economy in the fields of trade, education, and IT.

Infrastructure, educational institutions, businesses, economic zones, energy projects, housing, and employment opportunities are just a few of the CPEC projects that will give locals thousands of new jobs.

Figure: 4 **China-Pakistan Economic Corridor (Bhattacharjee, 2015)**

3.7 Regional Connectivity under China Pakistan Economic Corridor

China keeps expanding its BRI to different countries. China's BRI project intends to link Asia with Africa and Europe via land and maritime routes that pass through more than 60 nations. Under the BRI, there are a total of six economic corridors, and CPEC is one of them. Economic corridors enhance regional connectivity, and better regional connectivity may result in greater spatial concentration rather than a more dispersed pattern of economic activity(Lall & Lebrand, 2020). These corridors not only improve inter-regional connectivity but also improve the region's connectivity to the world.

After the United States left the region, many analysts predicted the formation of the (Russia-China-CARS-Pakistan-Afghanistan-Iran) alliance because China wanted to lessen the security threat, which could only be accomplished by having "open borders" by bettering its economic and trade ties with these nations. Recently, there has been a conversation between Kabul and Beijing regarding the Peshawar-Kabul motorway, which signifies Afghanistan's official joining of China Pakistan Economic Corridor(Fazl-E-Haider, 2021) China's Xinjiang region, which borders Afghanistan, is home to a Muslim Uyghur community. To obtain assurances that no support will be given to Uyghurs from Afghanistan, China is bolstering its economic connections with Afghanistan.

China has Iran as one of the important points of BRI and has a proposed plan for a railway route passing through CAR nations(Humza & Khan, 2022). China hopes to have direct access to the Persian Gulf through Iran to meet its energy needs. India developed Iran's Chabahar port, also known as the sister port of Gwadar, and India is a member of an alliance with Japan and the United States to oppose China's dominance in the region. India is also vying with China for regional hegemony, and through Iran, India is creating obstacles for the CPEC in the Balochistan area.

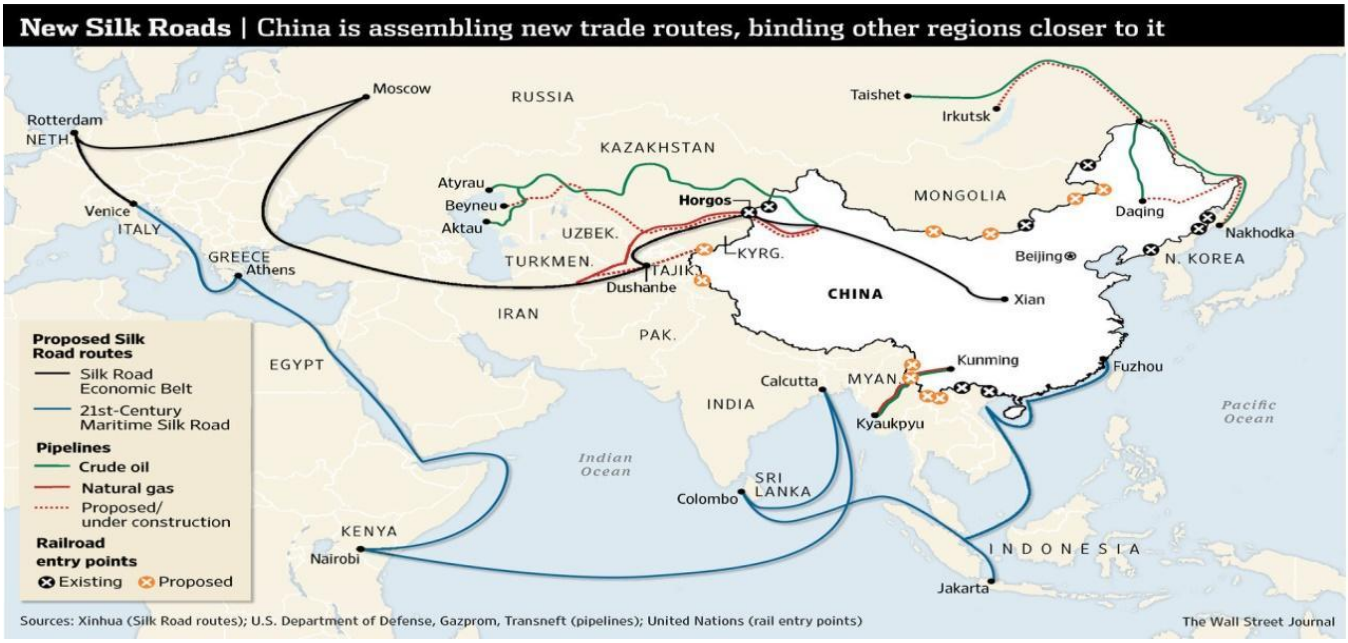

***Figure 5*: Trade Routes of China(Rasel et al., 2020)**

Figure 6 China-Iran rail route(Europe, 2019)

Central Asian countries which are resource-rich landlocked states can get the shortest access to warm waters through Pakistan. Recently PM Shehbaz Sharif of Pakistan assured President Emomali Rahmon of Tajikistan, of "access to Gawadar through CPEC route" at the shanghai cooperation organization's Summit 2022(Haider, 2022). This will enhance Pakistan's relations with CARS and the rest of the world as superpowers are seeking the energy reserves of CARS. Since China already has a dispute in the South China Sea and CPEC provides an alternate route for China's trade, China wants to have excellent diplomatic relations with Iran and Afghanistan to neutralize threats to CPEC and BRI. This regional connectivity has positive impacts on the economic growth of Pakistan as Pakistan has to spend less on border security and more on economic security.

3.8 China-Pakistan Economic Corridor (CPEC) and Economic Sustainability

By 2020, the CPEC project is expected to be worth $62 billion. As a result of the market's expected creation of more than two million new employment, the GDP growth rate is predicted to reach 7.5% (Mirza et al., 2019). The role of CPEC in the economic stability of Pakistan cannot be neglected as it directly or indirectly contributes to Pakistan's economy. But the question is, will Pakistan be able to sustain its economic growth under the long-term effects of the CPEC projects?

Due to boosted local demand, imports have increased significantly more than exports in recent years, creating economic unrest. Pakistan must boost exports and private investment to sustain the current rate of economic development. Moreover, a World Bank press release states that businesses have trouble obtaining long-term financing., high effective import tariff rates and low productivity of firms are the key factors that are hindering exports (Bank, 2021). The CPEC under its billion-dollar programs provides Pakistan with better firms, economic and industrial zones, and institutes for the betterment of the business environment. Pakistan is an agro-based country and The CPEC projects such as the formation of agricultural institutes and laboratories(Authority) can increase the productivity of goods and through the infrastructure developed under CPEC Pakistan can export easily in a short time with less cost. Another factor contributing to Pakistan's weak economic performance is its fluctuating GDP which needs sustainable flow. According to the World Bank, one of the four essential components Pakistan needs to maintain economic growth and reach its full potential is to strengthen the business climate by attracting more foreign direct investment (Waheed, 2015). China is Pakistan's major foreign direct investor investing in Pakistan on CPEC and Pakistan has a huge opportunity to grow economically, eradicate poverty, and profit from CPEC in a variety of ways.

3.9 SWOT Analysis of the China-Pakistan Economic Corridor

The CPEC is considered the game changer for Pakistan's economy because it has many opportunities for the country but where any project brings strengths there come threats with that project because of weaknesses in the system. The CPEC has the following strengths, weaknesses, opportunities, and threats:

Table 1: SWOT Analysis of CPEC

IN		**STRENGTHS**		**WEAKNESSES**
	1	Power Sector	1	Political ambiguity
	2	Employment rate	2	Resentment of Baluchistan and GB inhabitants
	3	Improved infrastructure	3	Lack of skilled education
	4	Industrial cooperation/special economic zones (SEZs)	4	Security issues
			5	Corruption
EX		**OPPORTUNITIES**		**THREATS**
	1	Regional interconnection	1	Security threat
	2	Economic development	2	Provincial issues
	3	Overcoming energy crises	3	Foreign involvement
	4	Development of infrastructure	4	Weak governance
	5	Skilled education		

Strength of CPEC is its major projects in the form of mega foreign direct investments. The lack of energy in Pakistan is a major factor impeding its economic growth. About $35 billion of CPEC investments would go into energy projects, including solar, coal, hydropower, and flammable gas ones. Officials have stated that 21 new operations will generate close to 17,000 megawatts of electricity. 17 energy projects under CPEC have been completed yet, while four more are being considered (Authority).

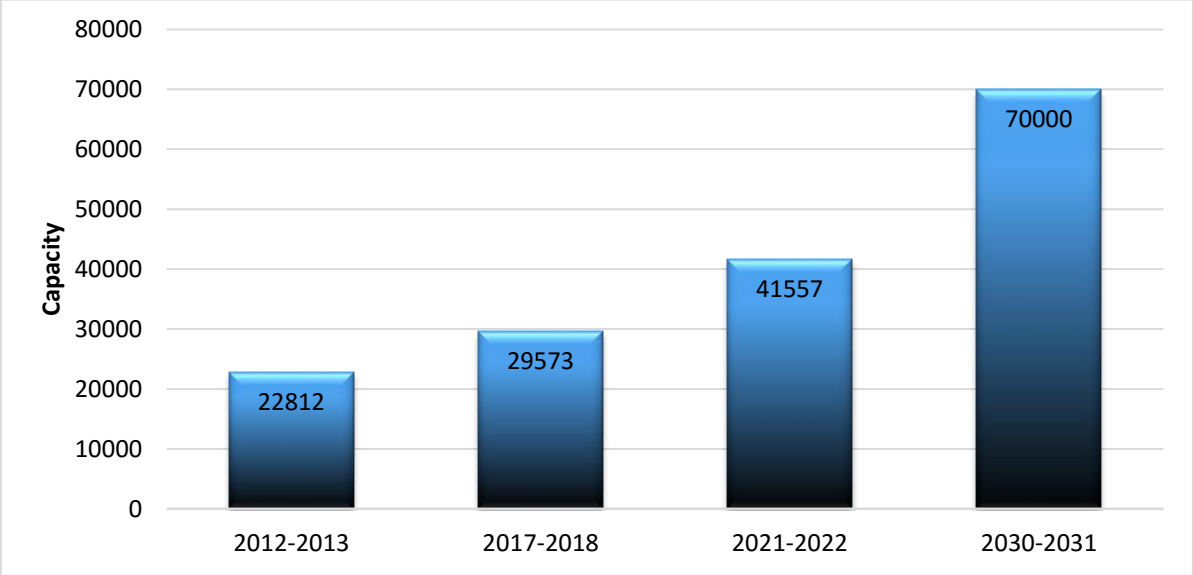

Figure 7: Power sector 2013-2030 (source: cpec.gov.pk)

Data from the "China Pakistan Economic Corridor (CPEC) Authority" shows that CPEC has created a total of 70,000 – 80,000 jobs since 2013 and it is estimated to create 700,000 to 800,000 jobs till 2030 (Assadi, 2020).

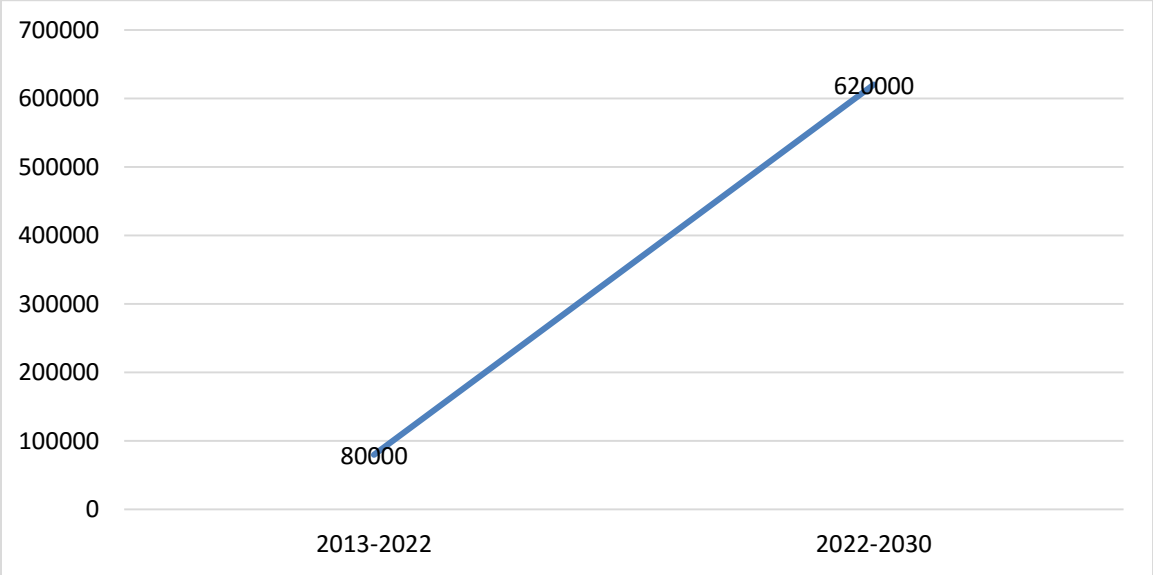

Figure 8: Employment rate under China Pakistan Economic Corridor (source: cpec.gov.pk)

A great infrastructure improvement has been seen under CPEC and many infrastructure projects are under consideration as well. A network of roads, railroads, and pipelines will be used as part of the CPEC megaproject. It seeks to connect China's Xinjiang province with Pakistan's Gwadar Port. Another strength of CPEC is the establishment of Special Economic Zones, the relocation of Chinese industry to Pakistan, and the production of industrial parts are all top priorities in the area of industrial cooperation.

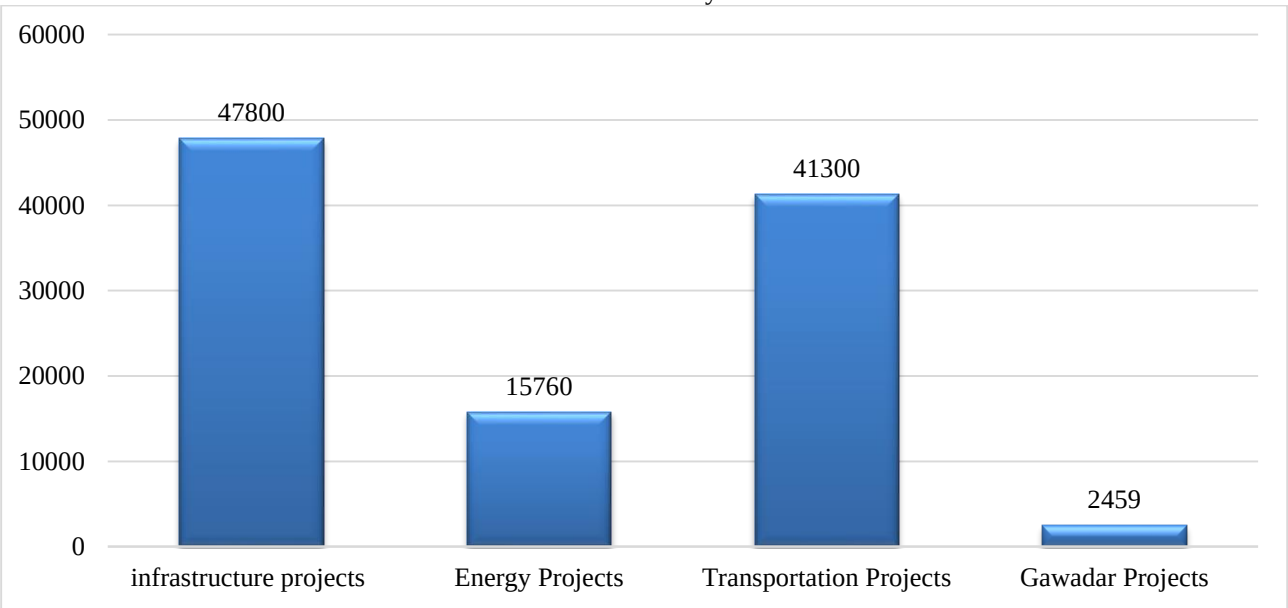

Figure 9: Jobs under CPEC Projects (source: cpec.gov.pk)

The CPEC projects have already begun to bear socioeconomic fruit, and the Pakistani people are either direct or indirect beneficiaries. It has elevated the standard of life for many people and expanded corporate activity, employment possibilities, and mobility of people and commodities. The Pakistani economy has benefited greatly from CPEC, which acts as an oxygen source for the country's struggling economy (Hang, 2017).

Megaprojects like the CPEC that originate from highly developed economies typically have some weaknesses that prevent them from being fully utilized in developing and underdeveloped economies. Essentially, the inconsistent development policies in their planning are to blame for these challenging phases. Political ambiguity is a recurring weakness of CPEC, and it may be impacted by our current political environment. Political upheaval in Pakistan has made it more difficult to complete the China-Pakistan Economic Corridor smoothly. Some Pakistani residents and political groups see the China-Pakistan Economic Corridor (China-Pakistan Economic Corridor (CPEC)) Project with skepticism, uncertainty, and instability.

The CPEC's ruthless implementation is thought to be another weakness of this project. People of Baluchistan and Gilgit Baltistan have reservations over some projects of CPEC because some communities have been displaced for the continuation of projects. Additionally, there are not enough opportunities for residents of these areas to participate in these projects. Furthermore, they believe that their basic rights i.e., fishing rights, have been taken away. Despite having the tenth-largest labor force, Pakistan lacks competent workers due to a lack of skilled education, training, and health. To construct and manage projects like infrastructure, electricity, internet connections, and pipelines, the CPEC project, however, requires higher expert staff in each discipline. As skilled labor will effectively boost economic output and a nation's per capita income, the government ought to invest in it.

Other significant weaknesses of CPEC include terrorism, internal strife, corruption, economic recession, and other domestic issues of Pakistan (Hussain, 2017). Because CPEC projects lack transparency, like many other domains in the country this project has also been the target of corruption. The current state of corruption in the host nation poses a risk to the project (Alam et al., 2019).

Opportunities that CPEC creates, include regional connections (as discussed above) which in turn will help the country to promote trade within the region and having a region with fewer or no security issues, the country will get more foreign direct investment and also country’s major defense spending will reduce and expanding on

production and exportation of projects and other development projects will eventually increase which will boost the economy of Pakistan by adding up to its GDP. It will strengthen infrastructural connections with neighboring nations, assist in the removal of all trade and investment obstacles, and foster a healthy business climate in the area. After the completion of these projects, there will be a considerable rise in employment and economic growth thanks to the utilization of CPEC routes for economic and free industrial zones.

Under CPEC projects Pakistan will get independent power production through the Chinese government's FDI (Foreign Direct Investment) which will reduce the energy crises in the country. CPEC will provide a platform for the construction of institutes like agricultural, fisheries, and wildlife institutes for education and research and will produce skilled individuals in different sectors (Authority). Security threat today is one of the major **threats** to CPEC. Extremism and terrorism in Pakistan are the key challenges preventing the effective completion of the CPEC project. The development of Pakistan involves even foreign forces.

Threats from the provinces include things like Balochistan having a waterway that connects the ports of Gwadar and Kashgar. The Baloch people believe that CPEC is unfair. KPK province believes that the CPEC project has been altered and that Punjab is receiving financial advantages instead of other provinces. A threat to the CPEC is also foreign participation. India, one of our neighbors, opposes the CPEC project and is working to halt Chinese investment in Pakistan. An ongoing danger to CPEC is also weak governance.

4. Conclusions and Policy Implications

It is also crucial to remember that economic security has been given priority in the national security triangle, which also includes traditional, economic, and human security. Focusing on economic security is the proper strategy because the country's money powers it and China is Pakistan's major foreign direct investors investing in Pakistan under The CPEC. CPEC may not directly contribute much to the economy of Pakistan but Pakistan can use CPEC projects for its purpose. For example, first, Pakistan can increase its export imports using Chinese-made routes, ports, and airports. Secondly, Pakistan can use the Industrial cooperation zones and special economic zones effectively which can add up to its economy. Lastly, Pakistan can benefit from The CPEC's regionalization, with an interconnected region with enhanced diplomatic and trade relations there is very less chance of border security issues and thus Pakistan will have to focus less on geopolitics and more on geo-economics.

In light of the above discussion, we can say that the CPEC positively impacts national and economic stability and to gain economic sustainability Pakistan has to play a major role. The sustainability of economic growth depends on a better business environment, and increased productivity of firms which intron increase exports, inaugurating long-term development programs, and attract more foreign direct investors project is the only source for Pakistan to get all of these only if the government has the potential to utilize it fruitfully. Thus, in one or all ways, The CPEC is effectively approaching the security, stability, and sustainability of Pakistan's economy.

Pakistan now has to consider its economy to make its place in the world rather than only focus on developing armaments. Only those countries can survive on the map of the world which is economically strong. Political stability in any country gives confidence to investors to invest in that country so, Pakistan needs to bring political stability to economic stability in its country.

Pakistan needs more CPEC-like programs and foreign direct investors to improve its business environment and economic stability. Pakistan also needs skilled youth to benefit from such programs. By using CPEC routes, if China can boost its trade, why not Pakistan? If China is getting the region connected for its national interest why not Pakistan can improve its diplomatic relations with its neighbors? The only thing Pakistan should focus on is effective policy-making and implementation. Pakistan should also have to overcome the issues of domestic instability otherwise economically weak and politically turbulent Pakistan can neither secure its border nor its economy.

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Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Disclosure statement

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Unlocking the Secret to Business Success: Analysing the Impact of Personnel Knowledge through Structural Equation Model

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Abstract
This study investigated the perceptions of business managers in the furniture sector regarding the relationship between personnel knowledge and business success. A quantitative research approach was used to collect data from business managers working in different furniture sectors in District Chiniot, Lahore, and Gujrat. The study utilized a Likert scale to measure the responses and Structural Equation Model (SEM) to analyse the data. The findings revealed that certain management practices, including safety, laws, motivation of personnel, total quality management, product certification, and competitive positioning, had a significant impact on both personnel knowledge and business success. Furthermore, the study found that factors such as new product development, sales abilities, competitive positioning, and product pricing were highly associated with changes in business success. The study recommends that businesses focus on training their owners first to enhance their employees' skills, which will ultimately lead to increased productivity and highlight the importance of skill development.

Keywords: Business managers, furniture sector, personnel knowledge, structural equation model, management practices, skill development, training services

JEL Classification: M10, M19, M21, M53, M54, C3

1. Introduction

Furniture is an essential part of home decor that adds beauty to living spaces. It also serves as a source of income for individuals and contributes significantly to the domestic economy. In the past decade, the demand for wooden furniture has increased in almost all major markets, with consumers seeking new designs and styles. However, the furniture industry has not seen significant growth in terms of large-scale production or automation of manufacturing processes. Most furniture companies, especially in major players like America, European Union, Germany, Italy, Japan, and China, continue to operate as Small and Medium-Sized Enterprises (SMEs) (Carle et al., 2009; Kuwayama, 2001 and Chen, 2006). In Pakistan, the furniture industry produces basic living, dining, and kitchen room furniture, as well as corner tables, magazine tables, standing small shelves, pedestal tables, small chairs, and home bars, among others. The main consumer markets are liberal in the ethnic and mixing, with antique furniture playing a significant role in Pakistani furniture industries due to its good price value under the consumer average purchasing power. Pakistani industries produce modern, Mughlai, and antique designs and styles as per customer requirements, with most wooden furniture being handmade using solid wood components. The industry relies on Sheesham (rosewood) and local hardwoods and competes with other countries such as China, India, Vietnam, and Malaysia (EU and TRTA, 2007).

The furniture industry in Pakistan is an important part of the country's economy. It creates jobs for over 100,000 people and contributes overall about $160 million to the economy. However, the amount of money earned from exporting furniture has decreased significantly in recent years, from $18 million in 2007 to just $6 million in 2016. This is a worrying trend because exports are an important source of revenue for many industries and countries (PSDF, 2015 and Manzoor, 2016). Compared to its competitors, Pakistan's furniture industry is still made up of small workshops and traditional operations. This means that the industry is not as efficient or effective as it could be. To reach its goal of exporting $850 million worth of furniture each year, the industry needs to modernize and become more competitive. Exporting more furniture can bring many benefits to Pakistan. It can decrease the trade deficit, which is the difference between what a country exports and what it imports. A trade deficit can be a problem because it means a country is spending more money on imports than it is earning from exports. Exporting more furniture can also create more jobs and bring in foreign revenue, which can help boost the country's overall economic growth (Imran et al., 2020).

To stay ahead, companies need to adapt to changes in consumer demand and technology. They do this by conducting scientific and technological research to create new products and manufacturing processes. By doing this, they can maintain their businesses over the long term and gain an advantage in the market (Khunsoonthornkit and Panjakajornsak, 2018). Pakistan needs to focus on developing its furniture industry by conducting scientific and technological research. The industry should modernize and become more competitive to keep up with other countries. This can be achieved by introducing new products, manufacturing processes, and adapting to changing consumer demands. By doing this, Pakistan can secure its position in the market and increase its exports, which can contribute to the country's economic growth. In Pakistan, there is a limited study have been conducted to determine, the connection between management practices and the success of the furniture industry. This includes factors such as safety, laws, personnel motivation, total quality management, product certification, and competitive positioning. It is unclear that these factors have any significant impact on personnel knowledge and the overall success of businesses in the furniture industry.

This study is important for analysing the furniture industry in Pakistan because it can provide valuable insights into the relationship between management practices and the success of businesses in this industry. Understanding this relationship can help companies make informed decisions about how to improve their operations and become more competitive. It can also help policymakers develop strategies to support the growth and development of the furniture industry, which can contribute to the country's overall economic growth. The study findings of this research will contribute to the development of the furniture industry, particularly to the economic development in Pakistan. The study provides an in-depth analysis of the various factors that influence business success in the manufacturing society and validates existing information. Policymakers can use these findings to identify appropriate areas that may require policy formulation to strengthen business development. This research provides a foundation for further studies in the field of furniture manufacturing and will help encourage workers to become economically empowered, thereby benefiting the community and the business sector.

The objective of this study is threefold. Firstly, it aims to evaluate the success of companies operating in the furniture sector, as well as the technical knowledge possessed by their personnel. This study will provide insights into the overall performance and competence of the companies within the industry. Secondly, the study seeks to identify the key factors that significantly contribute to the success of these companies and the technical knowledge of their personnel. By identifying these factors, it will be possible to understand the critical elements necessary for achieving success and enhancing the expertise of individuals working in the furniture sector. Lastly, the study aims to explore the correlation between management and technical subjects in the furniture sector. By analysing this relationship, it will be possible to gain a deeper understanding of how management practices and technical knowledge interact and influence the overall performance of companies in the industry.

2. Review of Literature

The literature mentioned in this section have contributed their insights on various aspects of performance measurement and employee training. Carneiro and Heckman (2003) explain the significance of evaluating the life cycle dynamics involved in learning and skill acquisition to formulate efficient policies regarding human capital. The authors contend that human capital is a valuable asset, and schooling is merely one part of a comprehensive process of accumulating skills throughout a lifetime. Hansson (2007) investigated the impact of training on company performance and found that the occurrence and degree of training are mostly determined by factors specific to the organization, such as human resource management practices. The turnover of staff doesn't appear to be a significant factor in clarifying the provision of training, but investing in training is crucial for firms to preserve their employees and reduce turnover. Khan and Shah (2011) argue that understanding performance measurement through literature is crucial, and it has gained significant importance and development in the last two decades. They suggest that solely measuring business routine is not enough, and long-term goals should be kept in mind. Khan (2012) emphasizes the importance of training and motivation in enhancing the productivity and efficiency of employees. According to him, training is the most significant aspect that contributes to employee performance when compared to other factors like working environment and management behaviour.

Gonchkar (2012) conducted a survey-based study and found that training and development programs have a significant impact on employee skills, knowledge, attitudes, and productivity. He argues that creating a favourable work atmosphere for workers to attend training programs is essential for improving employee performance. However, he also notes that training and development programs take time to deliver results. The paper conducted by Ling, Qing and Shen in 2014, the relationship between training and organizational commitment, and analyses the role of employability and expectation value in this relationship. A sample of 405 Chinese employees is used to test these hypotheses, with results showing that training is positively related to organizational commitment and employability. Employability partially mediates the relationship between training and organizational commitment, and expectation value moderates the relationship between employability and organizational commitment. Limitations include the cross-sectional design and data collection relying on self-report, but the study provides practical implications for organizations aiming to train and retain employees.

Khunsoonthornkit and Panjakajornsak (2018) conducted study focused on how learning organization and commitment affect the performance of research and development organizations in Thailand. The study found that learning organization positively influenced both organizational commitment and performance, but commitment did not directly impact performance. The results suggest that implementing learning organization practices can improve organizational commitment and performance in research organizations. The study used a confirmatory factor analysis technique to analyse the model fit. Overall, this study provides insights into how research organizations can benefit from implementing learning organization practices. Yoon et al. (2018) conducted research at how informal learning affects an individual's organizational commitment, and whether self-efficacy plays a mediating role in this relationship. The study analysed data from 317 Korean workers and used structural equation model to examine the relationship between informal learning, self-efficacy, and organizational commitment. The analysis found that informal learning increases self-efficacy, which in turn influences organizational commitment. The study has some limitations in terms of methodology, such as the reliance on a single source of data and the cross-sectional study design. However, the research highlights the importance of informal learning in the workplace and its potential to improve employee performance and organizational commitment.

In summary, the authors discussed in this text provide valuable insights into performance measurement, employee training, human capital policies, and statistical analysis. Their findings emphasize the importance of training and development programs for improving employee performance and the significance of human capital in developing effective policies. Additionally, the authors discuss the use of statistical tools such as structural equation modelling and path diagrams for analysing data in behavioural and social sciences. The researchers suggested that data normality, goodness of fit, and variance analysis are the important for SEM analysis.

3. Data and Methodology

3.1 Data

In this study, the researcher utilized secondary data that was collected from the Furniture Sector Skill study, in April 2015, the Innovative Development Strategies conducted research on behalf of the Punjab Skills Development Fund. The research aimed to determine the current supply and demand of skill requirements in the furniture industry and evaluate any gaps that may exist. A survey was conducted among 274 formal and 176 informal furniture establishments, carefully selected to represent a comprehensive sample of the furniture sector in Punjab, Pakistan, to gather the required data. The data obtained from this survey was then analysed and utilized to draw conclusions and make recommendations about the furniture sector in the region.

3.2 Method

The SEM is a statistical methodology that is widely used by researchers in social, educational, and medical fields. This is because SEM provides a comprehensive approach to testing fundamental theories and measuring the measurement error in latent variables. SEM is a statistical tool that encompasses several techniques, including path analysis, confirmatory factor analysis, causal models with latent variables, as well as analysis of variance and multiple linear regression. These methods are used in behavioural and social sciences to examine and explain causal relationships among various variables. Factor analysis is used to analyse basic constructs that influence the response to a number of measured variables. Arain, Hameed & Farooq (2012) suggested that to evaluate the consistency and validity of the scale used, confirmatory factor analysis (CFA) is employed in SEM. The results of SEM are reported using various types of fit indices. Schreiber et al. (2006) suggested four crucial fit indices, including CMIN/DF < 3, comparative fit indices (CFI) > 0.90, tucker-lewis index (TLI) > 0.90, and root-mean square error of approximation (RMSEA) < 0.08.

To check for common method variance, the study employed the Harman Single factor test and common latent factor. The researchers utilized SEM for confirmatory factor analysis and hypothesis testing, addressing measurement errors within the model. Despite minor multivariate normality issues, the maximum likelihood method was effective in estimating data that deviates slightly from normality, improving the accuracy and reliability of statistical analyses compared to traditional techniques like multiple regressions.

This method produces corrected statistics that are more accurate. Therefore, the study used the robust maximum likelihood method to estimate the confirmatory factor analysis. The factor analysis of the testing model was comprised of both structural and measurement models. The structural model was divided into two parts: management and technical subjects. The management subject was further categorized into company success (CS) and personnel knowledge (PK). Similarly, the technical subject was divided into company success (CS2) and personnel knowledge (PK2) with different items.

The measurement model consisted of items (F1, F2……F70) and measurement errors (e1, e2……e49). To begin the analysis, the researchers first estimated the measurement model, which involves measuring the relationships between the observed indicators and the underlying latent constructs. Once the measurement model was estimated, the researchers used the correlations or covariance matrix between

the factors or constructs as input to estimate the structural coefficients between the latent variables or constructs. These structural coefficients provide insights into the causal relationships between the latent variables and allow for the testing of hypotheses about these relationships. The estimation of both the measurement and structural models is essential for accurate statistical analysis using SEM. Figure 1 depicts the different components of the model.

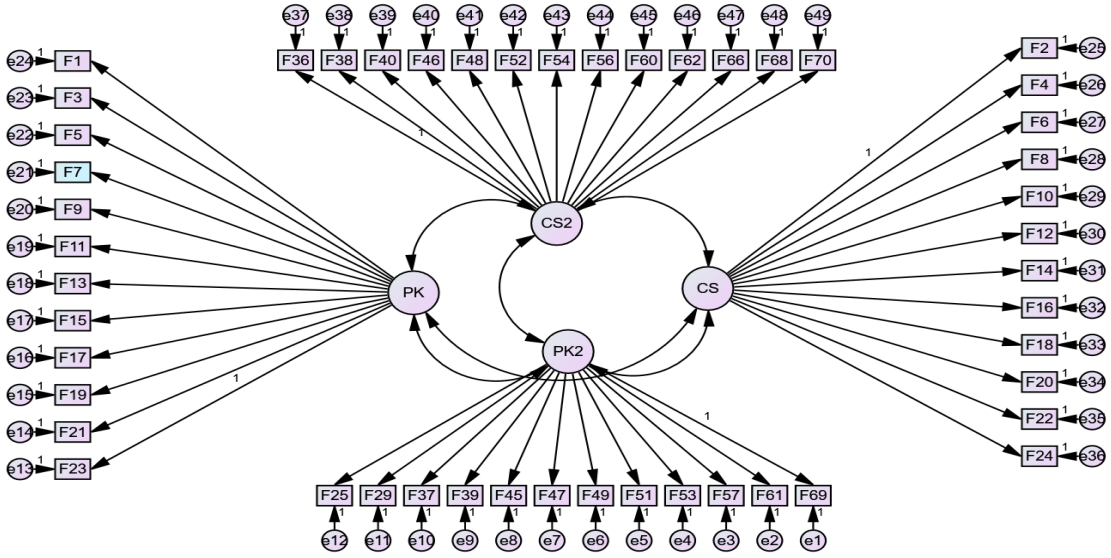

Figure 1: Study Model with Components

4. Results and Discussions

The study utilized the Analysis of Moment Structures (AMOS) software to estimate confirmatory factor analysis, which models' relationships between observed and latent variables. AMOS, a widely used statistical package, employs techniques like maximum likelihood estimation and SEM to uncover underlying relationships. Its use enabled a better understanding of complex variable relationships and more accurate estimates. Overall, leveraging AMOS and similar tools enhances the robustness and reliability of research findings.

4.1 Descriptive Analysis

4.1.1. Firm Size

The data presented in Table 1 indicates that the firms operating in the furniture sector generally had a small workforce. According to the study, the furniture sector mainly consists of small businesses. The median firm size in the sector was found to be very small, with only four employees. This indicates that a large proportion of businesses in the sector are small, with only a few employees. In fact, the study reports that more than 90% of the sampled firms employed fewer than ten individuals, which further highlights the prevalence of small businesses in this sector. Moreover, the study reveals that a significant proportion of the firms in the sector are small-sized, with limited workforce. The 54% of the sampled firms were found to have less than five employees, indicating the prevalence of micro-enterprises in the furniture sector. The trend was further pronounced in certain districts, such as Chiniot, Lahore, and Gujrat, where the percentage of firms employing less than five individuals was even higher, with figures of 49.3%, 46.0%, and 66.7% respectively. In contrast, Lahore was the only district where a substantial number of employees were found to be working in the furniture sector.

Table 1: Number of Employees in Furniture Establishments

Number of Employees	Chiniot	Lahore	Gujrat	Overall	
	%	%	%	N	%
Less than 5	49.3	46.0	66.7	**243**	**54.0**
5 to 9	42.0	44.7	22.7	**164**	**36.4**
10 to 19	7.3	8.0	2.7	**27**	**6.0**
20 to 29	0.7	0.0	3.3	**6**	**1.3**
30 to 39	0.0	0.0	1.3	**2**	**0.4**
40 to 49	0.0	0.7	1.3	**3**	**0.7**
50 to 100	0.7	0.0	2.0	**4**	**0.9**
100 or more	0.0	0.7	0.0	**1**	**0.2**
Total	100	100	100	**450**	**100**

4.1.2. Education Status

In Figure 2, there is a comparison made between the number of educated and uneducated workers in the most common jobs in the furniture sector. It was found that in the case of bed-frame makers, the number of educated workers was much higher than the number of uneducated workers. Similarly, among cabinet makers, assemblers, and to some extent carving machine operators, the number of educated workers was also higher than the number of uneducated workers. However, in all other trades, workers were found to have an equal likelihood of having some education or not having any education.

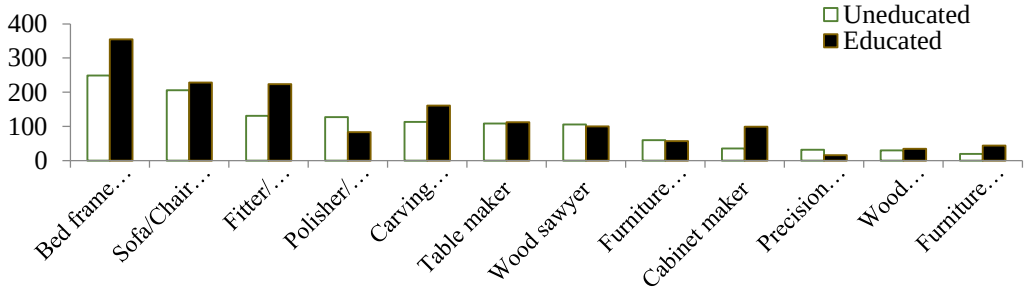

Figure 2: Number of Educated vs. Uneducated Workers in the Most Frequently Occurring Jobs

Source: (PSDF, 2016)

4.1.3. Training status

Table 2: Formal and Informal Training between the Workforces

	Chiniot		Lahore		Gujrat		Overall	
	N	%	N	%	N	%	**N**	**%**
Formal training	15	1.7	24	2.3	17	1.8	**56**	**2.0**
From private TSPs	2	0.2	1	0.1	0	0.0	**3**	**0.1**
From Tevta/Govt. TSPs	1	0.1	0	0.0	0	0.0	**1**	**0.0**
From NGOs	2	0.2	0	0.0	0	0.0	**2**	**0.1**
Other formal training	10	1.1	23	2.2	17	1.8	**50**	**1.7**
Informal training	523	59.8	532	51.9	186	19.3	**1241**	**43.4**
On-the-job training	259	29.6	497	48.4	120	12.5	**876**	**30.6**
Help from supervisor	245	28.0	23	2.2	62	6.4	**330**	**11.5**
Other informal training	19	2.2	12	1.2	4	0.4	**35**	**1.2**
No training	336	38.4	470	45.8	759	78.9	**1565**	**54.7**
Total	874	100.0	1026	100.0	962	100.0	**2862**	**100.0**

Source: (PSDF, 2016)

Table 2 presents data on the formal and informal training received by workers in the furniture manufacturing sector. The majority of workers in this sector had no formal training, as reported by 54% of the respondents. Only a small fraction, 2% of the workers, reported receiving formal training from private, government, or non-profit organizations. On the other hand, informal training was reported by 43% of the workers, either in the form of on-the-job training or through guidance from supervisors. This suggests that a significant proportion of the workers may not have the necessary skills and knowledge required for efficient performance in their job roles.

4.2. Inferential Analysis

4.2.1. Regression Coefficients

Table 3 presents the results of the analysis of the relationship between management subjects and their impact on personnel knowledge and company success. The table shows that certain management subjects have a significant influence on personnel knowledge and company success. Safety regulation, regulation laws, motivation of personnel, total quality management, product certification, and competitive positioning are the management subjects that have a high percentage of impact on personnel knowledge. On the other hand, new product development, sales abilities, total quality management, competitive positioning, and product pricing are the management subjects that have a high percentage of impact on company success. These findings suggest that the management of furniture manufacturing firms should focus on these specific areas to improve their personnel knowledge and company success.

Table 3: Standardized Regression Coefficients

Management Subjects					
	Personnel Knowledge			**Company Success**	
F1	Safety regulations	0.26	F2	Safety regulations	0.12
F3	New product development	0.16	F4	New product development	0.53
F5	Sales abilities	0.09	F6	Sales abilities	0.50
F7	Regulation laws	0.48	F8	Regulation laws	0.40
F9	Motivation of personnel	0.32	F10	Motivation of personnel	0.25
F11	Cost reduction	0.25	F12	Cost reduction	0.21
F13	Total quality management	0.31	F14	Total quality management	0.52
F15	Product certification	0.49	F16	Product certification	0.40
F17	Plant management and finance	0.40	F18	Plant management and finance	0.38
F19	Competitive positioning	0.39	F20	Competitive positioning	0.56
F21	Product pricing	0.32	F22	Product pricing	0.52
F23	Finding market information	0.03	F24	Finding market information	0.36
Technical Subjects					
F25	Effect of moisture on wood	0.17	F26	Effect of moisture on wood	.
F27	Drying	.	F28	Drying	.
F29	Lumber grading	0.18	F30	Lumber grading	.
F31	Basic wood properties	.	F32	Basic wood properties	.
F33	Inventory control/ Production scheduling	.	F34	Inventory control/ Production scheduling	.
F35	Wood gluing	.	F36	Wood gluing	0.02
F37	Wood machining processes	.	F38	Wood machining processes	0.05
F39	Wood identification	.	F40	Wood identification	-0.06
F41	Exporting economics	.	F42	Exporting economics	.
F43	Computer education (CAC/CNC/CAM/CAD)	.	F44	Computer education (CAC/CNC/CAM/CAD)	.
F45	Product improvement	0.17	F46	Product improvement	0.36
F47	Wood finishing	0.32	F48	Wood finishing	0.05
F49	Gluing/Jointing	0.59	F50	Gluing/Jointing	.
F51	Sawing/cutting technology	0.77	F52	Sawing/cutting technology	0.05

F53	Finishing and coating	0.46	F54	Finishing and coating	0.17
F55	Basic problem solving skills	.	F56	Basic problem solving skills	0.29
F57	Sanding/abrasives	0.5	F58	Sanding/abrasives	.
F59	Product distribution	.	F60	Product distribution	0.53
F61	Quality and Process control	0.08	F62	Quality and Process control	0.64
F63	Dealing with changing raw materials	.	F64	Dealing changing raw materials	.
F65	Developing business plans	.	F66	Developing business plans	0.66
F67	Utilizing composite products	.	F68	Utilizing composite products	0.3
F69	Plant maintenance	0.19	F70	Plant maintenance	0.39

The table indicates that there are certain technical factors that are closely related to personnel knowledge, including the effect of moisture on wood, lumber grading, wood finishing, gluing/jointing, sawing/cutting technology, and finishing and coating. On the other hand, quality control, developing business plans, and plant maintenance are factors that contribute to company success from a technical perspective. These findings suggest that a strong focus on these technical factors can have a significant impact on the success of a furniture manufacturing company.

4.2.2. Correlation

The Table 4 displays the correlation coefficients between different variables in the furniture market sector. The correlation coefficient is a statistical measure used to determine the strength and direction of the relationship between two variables. It is typically denoted as "r" and can range from -1 to +1. A correlation coefficient of 0 indicates no relationship between the two variables. A value of -1 indicates a perfect negative correlation, meaning that as one variable increases, the other decreases, and a value of +1 indicates a perfect positive correlation, meaning that as one variable increases, the other also increases. The strength of the correlation is determined by the absolute value of the correlation coefficient, with a value closer to 1 indicating a stronger relationship. According to the table, the management subject's personnel knowledge and your company relation have a positive correlation, indicating that the better the personnel knowledge, the higher the chances of success for the company. However, from a technical perspective, personnel knowledge and company association have a negative correlation, which suggests that the furniture market sector is lacking in technical knowledge.

Theoretically, technical subject is positively related to company success and personnel knowledge. However, cross-correlation analysis reveals that personnel knowledge and your company success have negative correlations in both management and technical subjects. This may indicate that there are some factors other than technical knowledge that affect company success and personnel knowledge. Interestingly, there is a positive association between your company success and personnel knowledge in one-to-one correlations, such as the company's success to company success and personnel knowledge to personnel knowledge, in both management and technical subjects.

Table 4: Correlation Coefficient

Management subjects			
PK	<-->	CS	0.328
Technical subjects			
CS1	<-->	PK1	-0.208
Cross correlation			
PK	<-->	CS1	-0.047
PK	<-->	PK1	0.476
CS	<-->	CS1	0.676
CS	<-->	PK1	-0.022
CS1	<-->	PK1	-0.208

4.2.3. Model specification

The SEM analysis can be prone to uncertainty, especially when working with cross-sectional data that were not collected under controlled conditions or do not adhere to normality assumptions. In order to address this issue, the current study implemented a model specification that accounted for measurement error by removing certain factor items. Specifically, variables such as drying, basic wood properties, wood gluing, wood identification, and wood machining processes were eliminated from the model in order to improve its specification and increase the reliability of the results.

Model Goodness of Fit

Upon analysing the consistency index results of the structural equation model, it is observed that there is a very high degree of goodness of fit between the model and the data. The results are shown in Table 3, which reveals that the chi-square value is 1.8 and has an insignificant probability value of 0.00. It should be noted that the chi-square value is sensitive to sample size, and for large sample sizes, it is divided by the degree of freedom. As a rule of thumb, a value less than 5 is considered acceptable.

Reliability fit indices

The previous statement emphasizes the importance of having other goodness of fit indices aside from the chi-square value to properly evaluate the model. There are other indices such as the goodness of fit index (GFI), adjusted goodness of fit index (AGFI), comparative fit index (CFI), and root mean square error of approximation (RMSEA) that can aid in evaluating the model. Table 5 shows that all these indices have high values, indicating that the model is a good fit for the data and is reliable.

Table 5: Goodness of Fit Indices

Fit Indices	Rule of Thumb	Model Values
GFI	Close to 1	0.84
AGFI	Close to 1	0.82
CFI	Close to 1	0.64
RMSEA	Less than 0.06	0.04
Chi-Square	Less than 5	1.8

4.3. Discussion

The study highlights the challenges faced by the furniture sector in Pakistan, which are primarily attributed to the low education levels and limited exposure to formal skill development among firm owners. This finding is consistent with previous research that has emphasized the importance of education and skill development for the growth and success of businesses (Kamal, 2005). The study highlights that while many firm owners rely on on-the-job training and learning-by-doing approaches, this perception is likely due to their limited exposure and low levels of education, leading to a general disregard for efficiency and productivity. This finding is consistent with the research conducted by Boscolo (2018), which emphasized the importance of formal training and its positive impact on the productivity of firms.

The study recommends initiatives to address the skills gap in the furniture sector, including increased awareness among firm owners regarding the importance of formal skill development programs. This recommendation is consistent with previous studies that have highlighted the importance of skill development programs for enhancing productivity and competitiveness (Brunello and Wruuck, 2021). Moreover, the study suggests that policymakers should provide training and educational opportunities to address the skills gap in the furniture sector. This recommendation is consistent with the literature on skills development policies, which has emphasized the importance of government intervention in providing training and education opportunities (Ramírez-Montoya et al., 2018).

On the job market, a worker's socioeconomic standing is positively impacted by their skill level. Formal training helps to raise earnings, and skilled workers are better positioned to demand greater pay. Additionally, socioeconomic score is influenced by work status, with regular employment being more lucrative than day wage labour. These elements emphasise the significance of skills and employment

position in affecting employees' socioeconomic results (Shahid, Xiang and Hameed, 2021). The study also highlights the correlation between personnel knowledge and company success, emphasizing the importance of technical and management skills for the growth and success of businesses. This finding is consistent with the research conducted by Singh et al. (2021), which emphasized the importance of managerial skills for the success of businesses. The study recommends initiating skill development programs for the furniture sector in Pakistan, which should be aimed at the owners of furniture firms. Principles like problem-solving, cooperation, partnership, solution-orientation, and a win-win or positive-sum approach are all part of integrating strategy. It places a strong emphasis on interdisciplinary cooperation, strategic alliances, pragmatic solutions, and win-win outcomes. Organisations and people may adopt a thorough and cooperative strategy to overcome difficult issues and achieve long-term success by incorporating these ideas. This recommendation is consistent with previous research that has emphasized the importance of targeting training programs to the specific needs of the industry (Dabic et al., 2020).

5. Conclusions and Policy Implications

The descriptive statistics reveal significant challenges in the furniture sector of Pakistan. Firm owners have low education levels and limited exposure to formal skill development, resulting in a lack of awareness regarding the importance of formal training. Many rely on on-the-job learning, underestimating the need for efficiency and productivity. The study emphasizes the necessity of increasing awareness among firm owners about the significance of formal skill development programs to bridge the skills gap. Policymakers should provide training and educational opportunities to address this gap, leading to improved productivity and industry growth. Additionally, the study highlights the correlation between management factors (safety regulations, laws, motivation, quality management, certification, and competitive positioning) and personnel knowledge and company success. On the other hand, from a technical point of view, the effect of moisture on wood, lumber grading, wood finishing, gluing/jointing, sawing/cutting technology, and finishing and coating have a strong relationship with personnel knowledge and company success.

The study highlights the need for skill development programs targeting furniture firm owners in Pakistan. The sector faces challenges due to low education levels and limited exposure to formal training. Owners rely on on-the-job learning, unaware of the value of formal training, hindering sector growth. To address this, awareness about formal training's benefits must be raised. Providing sector-specific training programs and making owner participation mandatory can help overcome these challenges. Emphasizing efficient and productive practices and the role of formal training is crucial for the sector's success. To address this challenge, the study recommends providing high-quality training services to firm owners. These programs should demonstrate the tangible productivity gains that can be achieved through skill development and highlight the value of such development to enhance the efficiency and productivity of the sector. The idea is that by demonstrating the value of skill development to the owners, they will be more likely to invest in training their workers, which will ultimately lead to greater productivity gains for the entire sector.

The study suggests that improving the skills of firm owners should be the starting point for any skill development initiative in the furniture sector of Pakistan. It is essential to provide high-quality training services to the owners, which can demonstrate the actual benefits of skill development in terms of productivity gains and increased efficiency. By educating and training the owners, they can become more aware of the value of skill development, and it may also help them in making better investment decisions. Moreover, by focusing on the owners, the initiative can have a multiplier effect, as owners can then invest in training their employees, which can further enhance productivity gains. Consequently, the sector can become more competitive, and the workers can also improve their skills and enhance their employment opportunities. Therefore, the study emphasizes that policymakers should prioritize initiatives that aim to develop the skills of firm owners, which can have long-term positive impacts on the entire furniture sector.

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Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Disclosure statement

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Job Search, Spatial Constraints, and Unemployment Duration: An Empirical Analysis of the Cameroonian Case

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Abstract
The individual transition from unemployment to employment is conditioned by various elements. If some of them concern directly the individual characteristics of workers, while others implicate indeed their environment when searching for a job. The residential location, housing status, and high travel distances to each labor market area are factors that can influence the exit rate of unemployment. This paper aims to integrate, in a job search model with endogenous intensity, the spatial horizon of prospecting. This horizon is introduced through the prospecting distance, which influences both the arrival rate of offers and the search costs. The equilibrium properties of the model lead to an indeterminate effect of the prospecting distance on the unemployment duration. The micro econometric estimation of the structural model allows us to deal with this ambiguity. The method adopted takes into account not only the selection rule on access to employment but also the endogeneity of the choice of spatial mobility. Results highlight that the exit from unemployment is shorter as the prospecting distance increases, but the increase in this prospecting distance does not lead to a decrease in the reserve wage.

Keywords: Job Search, Unemployment Duration, Prospecting Distance

JEL Classification: C41, J61, J64

1. Introduction
For several years in Cameroon, the problem of unemployment, particularly among young people, has fueled debates in the political field and is at the same time the subject of reflection in the academic field. Indeed, the duration of unemployment is, according to Roubaud and Torelli (2013), estimated at 35 months in Cameroon. Compared to those observed in developing and developed countries, this duration of unemployment is quite long. That said, it is four times longer than in South Africa (9 months), nine times longer than in Brazil (4 months), and six times longer than in the United States (ILO, 2014). Faced with the difficulties of integrating and returning to employment, the literature has identified several potential factors that can reduce the duration of unemployment. The first factors, widely studied, are individual characteristics (Edwin, 2021 ; Issofou, 2015). They are, for the most part, socio-demographic (gender, age, family status), and socioeconomic (initial training, qualifications, parents' social background). The second factors are cultural. These include the influence of the "Bamileké" ethnic group on entrepreneurial socialisation (Meliki, 2015), and the dominant modes of transition (the informal environment) (Fambeu, 2018). The third factors are institutional. They highlight the public policies carried out by the government over the recent decade (Avom and Nguekeng, 2019). Finally, spatial factors, which are more recent but less studied, especially in Africa, focus on the search environment, including spatial constraints encountered by job seekers during their search (Anderson et al., 2018 ; Bastiaanssen et al. 2020 ; Dong Liu and Mei-Po Kwan,2020 ; Fan et al., 2014 ; Gobillon et al., 2011, Marinescu and Rathelot, 2018 ; Matas et al., 2010 ; Rupert and Wasmer, 2012).

For these spatial factors, the econometric studies that have accompanied the discussions have, however, made a significant contribution since the work of Mortensen (1986) and Lancaster (1990) to shedding light on the conditions for a return to employment. In these studies, it is shown that the decision rule for accepting a job is reduced to the determination of the reservation wage. The purpose of the latter is to make predictions about the variation of the search distance on the unemployment exit rate. Thus, in general, if the role of imperfect information and heterogeneity of agents (characteristics of job offers and job applications) has been particularly emphasised in the literature, on the other hand, the influence of the spatial component of the job search in Cameroon has been relatively less developed in both theoretical (De Lesdain, 1999) and econometric (Bougna and Nguimkeu, 2018) works. Yet, it is possible to consider that the place of residence (centre or suburb), the travel cost for the employment area, or the possibility of collecting information on employment using the internet are all variables likely to influence success in prospecting.

The study of return to work from the perspective of bringing together job search theory and spatial economics to account for the spatial mismatch is not new. Holzer et al. (1994), for example, found a relationship between job search, commuting, and job location for young black and white job seekers in the United States. Roger (1997) analysed the relationship between unemployment duration and the spatial distribution of jobs in Pennsylvania. Van Den Berg and Gorter (1997) establish, in the Dutch case, a more original relationship in which the job seeker's utility function explicitly takes into account both wage and commuting time. Wasmer and Zenou (2004) reveal the interactions between residential location and the labour market in the United States, and Bouabdallah et al. (2002) explain in the French case the effect of the choice of the spatial search horizon on the duration of unemployment.

Overall, the model analysed is sequential and the widening of the spatial search horizon is explained either by the owner of a transport vehicle, or by the Housing tenure status, or by the labour market prejudices of some employers concerning the reputation of the residential area. These past studies have confirmed the existence of the influence of spatial constraints encountered by job seekers during their search on the duration of unemployment. However, to our knowledge, no study on this relationship has been conducted in Africa in general and in Cameroon in particular. This paper aims to extend beyond standard search models to integrate prospecting distance in a job search model with endogenous intensity. This objective contributes in two ways to extending the existing literature on the country's spatial economy. First, by explicitly addressing the choice of the spatial horizon of job search and the effect of this choice on unemployment duration, we develop a structural model of a job search adapted to the Cameroonian context. The reason for this is that the location of jobs and households makes the configuration of Cameroon's urban space particular, resulting in high unemployment rates in the centres and suburbs of Cameroon's large cities[1]. Moreover, this configuration of space seems to manifest one of the specificities of the Cameroonian spatial mismatch. Secondly, we empirically report on the conditions under which the extent of the spatial horizon of the search conditions the duration of unemployment in Cameroon.

The paper is organised as follows: Section 2 presents a structural model in which the choice of spatial search horizon affects the unemployment exit rate. Section 3 presents the methodology used to assess the influence of search distance on unemployment duration. Section 4 highlights the main results. The final section concludes the article.

2. Structural Model of Job Search

2.1 The Assumptions of the Model

We consider a partial equilibrium job search model that incorporates the main assumptions of the Mortensen (1986) endogenous search intensity model. The structure presented in this paper is an extension of the model developed by Sabatier (2002). The environment is stationary, the spatial area of exploration and the reservation wage are endogenous. Individuals are assumed to be risk-neutral, their time horizon is infinite and their rate of preference for the present is noted r. The characteristics of the vacancies are known to all the job seekers except

[1] Due to the potential for business location, the large cities of Cameroon have a polycentric configuration of spaces, i.e., on the one hand, disparate and multiple locations of employment areas (primary and secondary markets). On the other hand, city centres are juxtaposed with old, overcrowded old districts and high-standard districts. This configuration therefore leads to differences in the daily commute to work and even in hourly wage rates.

for the wage offered, noted w. This one is defined as a random variable with density function $f(w)$ and distribution function $F(w)$ known.

Job search behaviour is modelled through the effort made by each job seeker. And as Kahn and Low (1990) point out, this effort is mainly a search for information. In this respect, the collection of information on job vacancies, made indispensable by the tension of unemployment in the labour market, depends on the search channel used by individuals (national employment fund (FNE), internet, social network, personal initiative...), and on the spatial area of prospecting d. As Bouabdallah et al. (2002), we consider that the prospecting distance is, on the one hand, always positive in the case of a first insertion and, on the other hand, greater than the previously occupied commuting distance ($\bar{d}$), i.e. : $0 < \bar{d} < d$. This leads to considering the possibility that an individual who has already experienced a transition in employment characterised by a journey $\bar{d}$, will retain in his next unemployment period a prospecting area (d) greater than the one already agreed.

For each search sequence of duration h, the job seeker receives at most one job offer according to a Poisson process of parameter λ. The arrival rate of offers is given by the relation :

$$\lambda(s, d) = s + d^{1+\alpha}$$

It therefore depends positively on both the search channel (s) and the prospecting distance (d). This means that job seekers may mobilise the same search channel, but have different prospecting distances and thus not have the same probability of receiving a job offer. In other words, a large investment in the search and a large prospecting area ensure a higher probability of receiving a job offer. The influence of the prospecting distance on the arrival rate of offers is, however, more or less important depending on the efficiency effects linked to the search channel through the scale parameter α. These effects can occur before and after contact with an employer.

In the first case (*before*), they are related to the very nature of the search channel. For example, going through a social network (family, friends, acquaintances, etc.) can position the first person contacted as a relational bridge whose responsibility is to disseminate the information to other individuals. These last ones are then again, links in the chain of relationships that widen the spatial horizon of information gathering. These unobservable externalities make it possible to increase the efficiency of the social network by circumventing the spatial friction problems of unemployment. Similarly, existing bilateral cooperation agreements between the FNE and business promoters, or private placement firms and business promoters, allow for a wider and faster diffusion of the spatial horizon of information.

In the second case (*after*), when the search channel and the prospecting distance result in a meeting between a job offerer and a job seeker, even if this meeting does not lead to hiring, the interview provides the job seeker with new information. They may relate to an aspect of the skills to be acquired for the future position to be filled, or more broadly to the company's economic sector (Sabatier, 2002). In both cases, the job seeker can adjust his spatial search horizon according to the latest collected information.

Ultimately, both before and after, these efficiency effects make it possible to redirect the search channel by favouring the expansion of the prospecting distance. The parameter α is understood, for this purpose, as the average probability that the search channel adopted at the outset leads to the expansion of the prospecting area ($0 \leq \alpha \leq 1$).

The search cost function is a convex and increasing function of the search channel. It also increases with the distance of the prospecting. The more the job seeker mobilises channels that extend his prospecting distance on the labour market, the more the associated cost increases.

It is written: $C_R(s, d) = s^2 d^{1-\alpha}$

With $C_R(0) = 0$; $C'_R(0) = 0$; $C'_R(s) > 0$; $C''_R(s) > 0$; $C'_R(d) > 0$; $C''_R(d) > 0$

As Bouabdallah et al. (2002), the effective travel cost incurred for each job corresponds to the value taken by the search cost function for the commuting distance $\bar{d}$ of the accepted job after matching with the vacancy, i.e. $\bar{C} = C_R(\bar{d})$. We assume therefore that the cost of travel in prospecting and the cost of travel in employment are characterised by the same functional form. In sum, if d^* is the optimal prospecting distance determined by the job seeker, we can write :

$\bar{C} = C_R(\bar{d}) < C_R(d^*) \ \forall\ 0 < \bar{d} < d^*$

Finally, at each search sequence h, the individual receiving the offer has the choice to accept and stop prospecting or to refuse and continue looking for a job.

2.2 Reserve wage and optimal prospecting distance

To stop searching, the job seeker compares the benefit of continuing to prospect with that of stopping searching. Thus in the stationary state, the expected utility of the job seeker accepting a job with a wage W and a commute $\bar{d}$ is given by the relation :

$$W(w-\bar{C},\bar{d}) = \frac{1}{1+rh}\left[(w-\bar{C})h + W(w-\bar{C},\bar{d})\right] \quad (1)$$

Where $w-\bar{C}$ is its instantaneous income net of costs (travel and research) associated with prospecting. Thus, relation (1) shows that the utility expectation associated with taking a job is defined as the discounted sum of wages received during the time interval h and the discounted expectation of future earnings.
Multiplying equation (1) by $1+rh$ we obtain the relation :

$$rW = w-\bar{C} \quad (2)$$

At the same time, in the stationary state, the expected utility of a job seeker verifies :

$$V = \frac{[b-C_R(s,d)]h}{1+rh} + \frac{1-\lambda(s,d)h}{1+rh}V + \frac{\lambda(s,d)h}{1+rh}E_w[Max\,(V,W)] \quad (3)$$

Where b is the utility of the leisure activity.
Relationships (3) shows that the utility expectation of a job seeker is the sum of the discounted instantaneous income net of the instantaneous cost of searching $(b-C_R(s,d))$, the instantaneous costs of accepting a job at a wage (W) higher than the reservation wage, and the discounted gains from continuing to search (V).
Multiplying equation (3) by $1+rh$ and rearranging the terms gives :

$$rV = b - C_R(s,d) + \frac{\lambda(s,d)}{r}H(w) \quad (4)$$

Where $H(w) = \int_{w^*}^{+\infty}[1-F(w)]dw$
Thus, given that individuals maximise their expected revenue streams under the assumption that their decisions at all future search sequences are optimal (Bellman's optimality principle), we define the reservation wage, w^*, and the optimal prospecting distance d^* (see demonstrations in the Appendix).

$$w^* = b + \bar{C} - \frac{2\alpha r s^2 d^{1-\alpha} - (1+\alpha)s}{r(1+\alpha)} \quad (5)$$

And

$$d^* = \left[\frac{(1-\alpha)s^2 r}{1+\alpha}\right]^{\frac{1}{2\alpha}}[H(w)]^{-\frac{1}{2\alpha}} \quad (6)$$

With a simple comparative statics exercise, it is possible to assess the total effect of increasing the prospecting distance on the unemployment exit rate. This rate, denoted θ, is defined as the product of the offer arrival rate and the probability of being offered a wage above the reservation wage. Thus we have :

$$\theta = \lambda(s,d)\left(1-F(w)\right) \quad (7)$$

As Rogers (1997) points out, calculating the derivative concerning d, the total effect of the unemployment exit rate is ambiguous :

$$\frac{d\theta}{dd} = \frac{d\theta}{d\lambda}\frac{d\lambda}{dd} + \frac{d\theta}{d\bar{C}}\frac{d\bar{C}}{dd} + \frac{d\theta}{dC_R}\frac{dC_R}{dd}$$

$$\frac{d\theta}{dd} = \underbrace{\left(1-F(w^*)\right)\frac{d\lambda}{dd}}_{\textbf{direct effect}\ (<0)}\ \underbrace{\lambda F'(w^*)\frac{dw^*}{d\lambda}\frac{d\lambda}{dd}}_{\textbf{indirect effect 1}\ (>0)}\ \underbrace{-\lambda F'(w^*)\frac{dw^*}{d\bar{C}}\frac{d\bar{C}}{dd}}_{\textbf{indirect effect 2}\ (<0)}\ \underbrace{\lambda F'(w^*)\frac{dw^*}{dC_R}\frac{dC_R}{dd}}_{\textbf{indirect effect 3}\ (>0)} \quad (8)$$

This result emphasises first that a distance to jobs that is accompanied by a reduction in the arrival rate of job offers (*direct effect*) leads to a decrease in the reservation wage and reduces the duration of unemployment (*indirect effect 1*). Second, cumulatively, up to a certain threshold, the increase in the cost of commuting with the distance to jobs leads to an increase in the reservation wage, which harms the duration of the exit from unemployment (*indirect effect 2*). And finally, when the distance travelled during the search increases, ceteris paribus, this leads the job seeker to reduce his reservation wage, which reduces his unemployment duration (*indirect effect 3*).To remove this ambiguity, we propose to estimate econometrically the structural parameters of the model.

3. Data and Methodology

3.1 *Data and Variables Presentation*

The analyses are conducted using data from the fourth Cameroonian household survey (ECAM 4) of 2014. This is a budget-consumption survey that allows the government and its development partners to assess progress in improving the living conditions of the population and to make adjustments to economic policies. It covers topics such as household composition and characteristics, economic activities and income of household members, housing characteristics, household environment, etc., and follows on from the 2007 ECAM3 survey.

The study concerns urban residents, aged between 15 and 65. The sample used includes 13522 individuals from all over the country. The originality of this sample lies in the selection of individuals whose highest diploma obtained is at least 10 months old. In this perspective, the dependent variable "*duration of unemployment*" is calculated based on the question "*how long (Name) has he/she been working in this job*" as a difference between the duration of the current job and the age of the diploma. It allows us to evaluate, in months, the unemployment episodes of the individuals in the sample. It should be noted that we are reasoning about stocks and that we are interested in the job found after a complete episode of unemployment. There is therefore no left censoring of unemployment duration. One of the variables of interest in the model is the spatial area of prospecting. For its construction, it is necessary to specify its content since it is endogenous in the structural model.

The main difficulty in constructing it is that it is indirectly observable from the locations of homes and workplaces. However, according to the survey information, it is possible to observe the reasons for the mobility of individuals since the end of 2007. Thus, for those individuals in the population whose return to work was accompanied by a move to a location other than the one in 2007, the prospecting area is considered to have been expanded. The same applies to those who did not move to the same borough, but whose acceptance of the new job led them to change locality. For individuals with an ongoing unemployment episode, the widening of the prospecting distance is assessed by the fact that they consider moving to a new locality for a job or the search for a job. From this information, a PROSPECT variable is constructed as a binary variable that takes the value of unity for individuals in the sample whose return to employment is accompanied by an increase in prospecting distance and zero otherwise. We note that for 24.23% of individuals, spatial mobility accompanied access to the new job (see Table 1).

The control variables are the demographic variables (age, gender, education level, household size), the job search channel (social network, FNE, internet...), the standard of living variables (housing status and means of transport), and the spatial variable measuring the distance to the workplace.

As shown in Table 1, more than 40% of the population covered is young, female, and under 25 years of age. This population is relatively uneducated, with 28% holding a BEPC/CAP or less and 33% having no more than primary education. Nearly 98% of people found a job after a complete episode of unemployment. The average duration of an unemployment episode is between 67 and 68 months, i.e. more than 5 years. Given the context, this duration should be interpreted as an episode where the unemployed do not have access to a real permanent job rather than as some duration during which the individuals did not engage in any activity, even the most marginal.

During the unemployment spell, the most used job search channels are the social network (95.27%), followed by personal initiatives (2.14%). Three times less (0.31%) used the FNE and private employment agencies as well as advertisements on the internet, radio, and television (0.54%). It is tempting to conclude that the unemployed are pessimistic about the capacity of FNE agencies and private employment agencies to help them enter the labour market.

Table 1: Description of Data Used

	Observations
The staff concerned (urban area)	13522
Percentage of people employed	2,17 %
The average duration of unemployment	67,98 months
Individual characteristics (%)	
15-25 years	40,19
25-35 years	28,08
35-65 years	32,75
Is female	51,30
Average household size	5,72 people
Is without level	9,13
Primary level	23,81
Lower secondary level	28,34
Upper secondary level	24,7
Higher level	14,02
Channel and means of Job search (%)	
FNE and private employment agencies	0,31
Personal initiative	2,14
Internet, television, radio	0,54
Social network	95,27
Has a transport vehicle	21,26
Housing tenure status (%)	
Owners	49,84
Tenants	41,24
Receives housing allowance	8,91
Distance from home to workplace *(%)*	
Less than one hour	91,76
Between one and two hours	3,29
More than two hours	4,95
Spatial area of prospecting (%)	
PROSPECT	24,23

In addition to information on individual attributes and the search channel, some variables make it possible to understand, directly or indirectly, the travel and mobility constraints encountered by the researchers during the prospecting. In this respect, while more than 21% of the population own a transport vehicle, almost 50% own their home, 41.24% are tenants and only 8.91% receive a housing allowance. Van Den Berg and Gorter (1997) have also shown that family situation is a particularly discriminating criterion in the wage/commuting time trade-off. In our sample, we note that the majority of individuals come from households with more than five people.

Finally, the model assumes that the arrival rate of job offers varies with the place of residence according to proximity to jobs. In this study, workplaces are approximated to food markets. The distance (time) to the local food markets closest to the place of residence makes it possible to evaluate the proximity of individuals to job opportunities in their districts. This measure makes it possible, to account for the multicentric nature of areas, from the point of view of commuting. Thus, for almost the entire population (91.76%), the marginal cost of travelling to the workplace is less than one hour.

3.2 *The Empirical Model*

The structural model described in Section 2 assumes that the exit rate of unemployment depends exclusively on the search behaviour and the wages offered. Therefore, we are interested in how the choice of search distance influences the unemployment duration of a job finder. The proposed empirical model aims in this respect to estimating the survival time in the unemployment states conditional on the decision to enlarge the prospecting area. To do so, it is important to take into account the sources of bias relating firstly to the selection rule governing the probability of access to employment and secondly to the endogeneity of the decision to increase the prospecting distance. To do this, we apply in a first step Heckman's (1979) procedure by selecting the persons having had a job with the following Probit equation:

$$y_i^* = \beta_0 + \beta_1{}'X_i + \varepsilon_i$$

Where

$$y_i = \begin{cases} 1 \; if \; y_i^* \geq 0 \; (the \; individual \; has \; a \; job) \\ 0 \; otherwise \; (unemployment) \end{cases}$$

X_i is the vector of individual characteristics and search channels. From the predicted value of y_i^* , the inverse of mill's ratio is calculated and introduced as the second variable of interest in the duration equation through the following relationship:

$$Imr = \frac{\phi(\hat{\beta}_0 + \hat{\beta}_1{}'X_i)}{\Phi(\hat{\beta}_0 + \hat{\beta}_1{}'X_i)}$$

Furthermore, since the mobility choice is influenced by several attributes, the endogeneity of the prospecting distance is treated according to the suggested procedure of Heckman and Robb (1985). This procedure consists in instrumenting the PROSPECT variable on the variables controlling the constraints perceived by individuals on their mobility possibilities. Given the discrete nature of PROSPECT, the instrumentation is carried out using the estimation of a Probit model. The predictor $\widehat{\text{PROSPECT}}$ is then introduced into the final estimation of the following lognormal duration model:

$$DURCH_i = \gamma' X_i + \delta' \widehat{\text{PROSPECT}}_i + \alpha' Imr_i + v_i$$

Whereas X_i is a vector of control variables for the model. The parametric estimation of the duration model under this specification provides the estimators $\hat{\gamma}, \hat{\delta} \; and \; \hat{\alpha}$. The selection rule will be acceptable in this context if the estimator $\hat{\alpha}$ is statistically significant that is, if $E(\varepsilon_i, v_i) \neq 0$.

4. Results and Discussions

4.1 *Econometric analysis*

The econometric results are reported in Tables 2, 3, and 4. The estimation of the selection Probit equation in Table 2 leads to robust results at 76.25%. The calculation of the marginal effects leads to three main conclusions. First, compared to men, women's chances of access to employment decreased by 14.2%. This result reflects the strong discrimination against women in the process of insertion into the urban labour market in Cameroon. Secondly, referring to the uneducated, the probability of access to employment also increases as age and level of education

increase. We note that this probability is greater for primary school graduates (17.1%) than for secondary school graduates (6%) and higher education graduates (8.2%).

The reason for this could be that primary school graduates face lower financial burdens and thus have lower expectations regarding the wages offered in the urban labour market. Finally, for the search channel during the prospecting, the institutional intermediaries are abandoned by the graduates in favour of the social network (58.3%) and personal initiative (13%). This could be due to their greater sensitivity to the risk of deterioration of human capital. Therefore, they are more likely to turn to family and friends, who seem to provide more success or to directly canvass employers, rather than to institutional intermediaries, whose weaknesses include their inability to reduce the extent of discrimination.

Table 2: Probit on access to employment

VARIABLES	ACCESS	Margins
Age	0.041***	0.012***
	(0.001)	(0.0003)
Gender (ref. Male)		
Female	-0.460***	-0.142***
	(0.024)	(0.007)
Level of education (ref. No level)		
Primary	0.564***	0.171***
	(0.052)	(0.016)
Secondary	0.187***	0.06***
	(0.046)	(0.015)
Higher	0.258***	0.082***
	(0.054)	(0.017)
Size of household	-0.052***	-0.016***
	(0.004)	(0.001)
Job search channel (ref. No)		
Social network	2.234***	0.583***
	(0.162)	(0.020)
Personal initiative	0.472**	0.130**
	(0.204)	(0.049)
Public and private placement institutions	0.309	0.088
	(0.363)	(0.097)
Network, television, radio	0.308	0.088
	(0.286)	(0.077)
Constant	-2.778***	
	(0.177)	
Observations	13522	
Wald chi2(10)	1844.07	
Prob > chi2	0.0000	

Correct prediction percentage	76.25 %

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.

Regarding the enlargement of the spatial prospecting area, Table 3 does not refute the static properties of the structural model. It provides results that are robust to almost 76%. We note that the propensity to move is an increasing function of age. Concerning the gender of individuals, being a woman tends to reduce the propensity to increase the spatial prospecting area by 2.2 points. It is also noted that referring to homeowners, tenants, and those receiving housing allowances, who generally bear less of the higher costs of mobility, have a higher propensity (28.4% and 15.2% respectively) to increase the prospecting area.

And, as in the spatial mismatch work (Bastiaanssen et al. 2020; Dong Liu and Mei-Po Kwan,2020) the constraints on search costs experienced by individuals who increase their prospecting area are mitigated for those who have a vehicle. The highly significant influence of these variables shows that the expansion of the prospecting area is associated with residential status.

Table 3: Probit on extending the prospecting distance

VARIABLES	PROSPECT	MARGINS
Age	0.002*	0.0005*
	(0.001)	(0.003)
Gender (ref. Male)		
Female	-0.079***	-0.022***
	(0.025)	(0.007)
Size of household	-0.002	-0.0007
	(0.001)	(0.001)
Log Distance Home-market	-0.013	-0.004
	(0.010)	(0.003)
Have a car or motorbike (ref. No)		
Yes	0.083***	0.024***
	(0.029)	(0.009)
Housing status (ref. owner)		
Tenant	0.956***	0.284***
	(0.029)	(0.008)
Housing allowance	0.587***	0.152***
	(0.045)	(0.013)
Constant	-1.192***	
	(0.059)	
Observations	13473	13473
Wald chi2(7)	1361.62	
Prob > chi2	0.0000	
Correct prediction percentage	75.73%	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

The estimation also shows that individuals whose commute time to work is considered high are generally less mobile. However, while the expected sign supports expectations from the economic point of view[2], the insignificance of this variable does not seem to provide conclusive information.

Finally, the findings in Table 4 show the influence of the distance measured by the increase in the spatial prospecting area on the unemployment exit. A lognormal parametric estimation of the duration model has been carried out controlling for possible selection and endogeneity biases.

Table 4: Lognormal estimation of unemployment exit

VARIABLES	DURCH
Age	0.002***
	(0.001)
Gender (ref. Male)	0.000
Female	(0.007)
Level of education (ref. No level)	
Primary	0.003
	(0.013)
Secondary	0.010
	(0.012)
Higher	0.016
	(0.014)
Invers of Mill's ratio	0.069*
	(0.037)
Predictor of the PROSPECT variable	-0.003
	(0.008)
Job search channel (ref. No)	
Social network	0.927***
	(0.084)
Personal initiative	-0.080
	(0.117)
Public and private placement institutions	-0.028
	(0.190)
Network, television, radio	-0.563***
	(0.167)
Sigma	0.371***
	(0.011)
Constant	3.034***
	(0.126)
Observations	13473
Wald chi2(11)	507.10

[2] The less affluent unemployed canvass only in a limited area around the dwelling.

Prob > chi2	0.0000

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

The statistical significance of the inverse of Mill's ratio clearly shows that there is a selection bias that justifies the use of the three-step method. Also, the statistically significant value of the *sigma* coefficient, which is less than unity, allows us to conclude that the instantaneous probability of exiting the unemployment state increases with its duration. The coefficient of the predictor of the PROSPECT variable has a negative sign, which reinforces, *ceteris paribus*, the idea that the duration of the unemployment episode is shorter as more individuals invest in mobility.

However, the insignificance of this variable seems to predict that the positive direct effect of the increase in the offer arrival rate that is associated with the enlargement of the spatial area of prospection does not, on average, sufficiently offset the negative induced effect of the increase in the reservation wage net of the associated commuting cost. This is probably due to the size of the informal sector in the urban labour market which, given the vulnerability of workers in this sector, is unable to offer wages that cover all costs.

Finally, we note that among the search methods used to get out of unemployment, the active procedure of looking for advertisements on the internet, television, and radio is more effective than that mobilizing personal or family relations. This may be due to the informal environment of the urban habitat in Cameroon, highlighted by Kobou et al. (2021), which tends to offer small jobs that, although accepted, do not stop the search. Our results confirm that, as in other studies in the field (Avom and Nguekeng, 2019; Cavaco and Lesueur, 2004; Sabatier, 2002), procedures involving intermediation (public or private) are less effective in reducing the duration of unemployment than other procedures.

4.2 Discussion

In Cameroon, unemployment is very long-term. While its measurement in the study may seem trivial, it is nonetheless an indicator of the extreme difficulty encountered by the unemployed in integrating and/or reintegrating into the urban labour market. Given the context, it is obvious that for a way out of unemployment, the social network and the search for classified ads on the internet reveal the existence of a large economy. They allow for a significant increase in the production of information and transcend the effect of the costs associated with the distance one would have to travel. Moreover, they even seem to be perfectly complementary insofar as searching for advertisements on the Internet makes it possible to collect a large quantity of information, and activating the social network then makes it possible to select a limited number of job offers by acquiring more precise information on each of them. Thus, to think in this context that the distance to jobs of a well-informed unemployed individual does not encourage him to reduce his reservation wage is trivial.

This finding is quite robust among young people. Overall, this is more the case for less educated women with children and first-time claimants in higher education. The latter may modify their behavior to target several job categories and change the expected economic outcome. Our results on the female unemployed are thus in line with those obtained by Avom and Nguekeng (2019) on Cameroonian data, Cavaco and Lesueur (2004), Brunet et al. (2007) on French data, and Van Den Berg and Gorter (1997) on Dutch data.

5. Conclusions and Policy Implications

This article aimed to highlight the conditions in which the extent of the spatial horizon of the job search conditions the exit rate of unemployment. For this purpose, we first integrated the search distance into an endogenous search partial equilibrium model. This modifies simultaneously the arrival rate of offers and the instantaneous income of the job seeker. The equilibrium properties of the theoretical model led to an ambiguous effect of the spatial search horizon on the unemployment duration.

Considering the sources of bias relating, firstly, to the selection rule governing access to employment and, secondly, to the endogeneity of the decision to increase the prospecting distance, a three-stage structural model estimation procedure made it possible to remove this indeterminacy. As in the American studies on spatial mismatch, spatial mobility factors (residential status and ownership of a transport vehicle) play a significant role in the propensity to extend the prospecting horizon. The results on the duration of unemployment lead to the conclusion that, while the shorter the exit from unemployment, the more individuals invest in mobility, the wider the spatial search area does not seem to lead to a lower reservation wage. They also highlight economies and diseconomies of scope and scale. Finally, active search on the internet, television and/or radio and, to a lesser extent, the social network, are the two most effective ways to get out of unemployment quickly. The social network (mainly family and friends) favours rapid access to supported jobs only but does not guarantee satisfaction with the employment conditions.

The results converge to show that beyond individual attributes, the cultural environment, and the nature of public policies, the spatial area of prospecting also plays a determining role in the conditions of return to employment. In terms of recommendation, this means that future policies regarding public transport improvements should be more concerned with job seekers living in areas distant from the employment areas. However, we recognise the limitation of estimating job accessibility in a framework of spatial units that are more easily interpreted by policy makers at different levels of government agencies to facilitate the decision-making process. To this end, we hope that our results will stimulate further research efforts that can assist in the early identification of individuals who may need additional assistance and interventions that maximise the probability of finding the desired new job.

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The data that support the findings of this study are available from the corresponding author upon reasonable request.

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How Does Economic Growth Respond to Public Infrastructure Expenditure Shocks? Evidence from SVAR in Nigeria

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Abstract

This paper investigates the economic growth response to public infrastructure expenditure shocks in Nigeria. Quarterly time-series data spanning 1981:Q1 to 2019:Q4, sourced from the Central Bank of Nigeria Statistical Bulletin are used in the study. The structural vector auto-regressive method following Blanchard and Perrotti's (2002) with Augmented Dickey-Fuller, Phillips and Perron, and Kwiatkowski-Phillips-Schmidt-Shin stationarity tests are employed in the paper. The results of the stationarity tests showed that all the model's variables namely; real gross domestic product, public infrastructure expenditure, and government revenue became stationary after their first difference. However, the study extracted and classified the variance decomposition and impulse response functions into three regimes namely; short, medium, and long-term respectively. The findings reveal that in the short term, 10.5% variations in economic growth were associated with public infrastructure expenditure shocks while in the medium term, 29.7% variations in economic growth were associated with public infrastructure expenditure shocks, and in the long term, 42.6% variations in economic growth were associated with public infrastructure expenditure shocks in Nigeria. Economic growth responses to public infrastructure expenditure shocks were positive and statistically significant in the three regimes of short, medium, and long-term respectively. The study recommends that the federal government should concentrate more on reforms and spending policies that will result in the best possible policy and ultimately high and sustainable growth in Nigeria.

Keywords: Economic Growth, Public Infrastructure, Expenditure Shocks, SVAR

JEL Classification: E62, H54

1. Introduction

Generally, two principles seem to emanate from economic literature about public infrastructure expenditure and economic growth. The foremost is whether investing in public infrastructure is a helpful instrument of Keynesian economics, particularly when the economy is in a recession, or a slowdown state as experienced in the year 2016 in Nigeria, with a high unemployment rate (NBS, 2017). According to Keynesian economists, an increase in government expenditure, particularly during downturns and recessions, causes a multiplier impact on aggregate demand that raises employment, income, savings, investment, and profits. Thus, in other words, public infrastructure expenditure can help alleviate not only high unemployment, and poverty menaces associated with the business cycle as well as have multiplier effects on the economy toward recovery and growth trajectory path. The second principle is that by enhancing the supply side of an economy, public infrastructure spending can increase its production capacity. It states that increasing public infrastructure spending can increase the economic output of other capital used in the production process of an economy and by extension its growth. In addition to monetary and fiscal policy shocks, technological shocks also have an impact on economic growth (Ramey, 2016). The study focuses on economic growth response to fiscal policy shocks precisely public infrastructure expenditure shocks in Nigeria.

Perotti (2005) has identified and classified four different methods used in the literature to determine the consequences of fiscal policies i.e. public infrastructure expenditure or tax shocks on macroeconomic variables as follows; (i) the identification of fiscal shocks that capture episodes using dummy variables (Burnside, Eichenbaum, & Fisher, 2000), (ii) Identification through the imposed sign rules on the impulse response function (Uhlig, 2005), (iii) Cholesky ordering for the recognition of fiscal policy shocks (Bernanke and Blinder, 1992), (iv) incorporation of decision delays between the formulation of policy and economic activity as well the elasticity of fiscal parameters (Perotti, 2005).

This paper contributes to the existing literature by measuring public infrastructure in monetary terms using the flow of public infrastructure expenditure to explain how economic growth responds to public infrastructure expenditure shocks in Nigeria. The paper is also unique in its classification of variance decomposition into three regimes of short, medium, and long-term respectively. Finally, the paper applied structural vector auto-regressive methodology following Blanchard and Perotti's (2002) model in a quarterly time series context spanning from 1981:Q1 to 2019:Q4 and the relevance of endogenous growth theory proposed by Barro (1990) which is of the view that public infrastructure expenditure played a vital and significant role in the growth of a nation and by extension the sources of growth are found within an economy. The study is divided into five sections, nevertheless. After the introduction, the review of literature is in section two, the methodology is in section three, section four consists of results and discussions, and section five concludes the paper.

2. Literature Review

The analysis of economic growth responses to public infrastructure expenditure or fiscal shock has a long history but this study provides a brief review of the subject matter. For example, Alami, Idrissi, Bousselhami, Raouf and Boujettou (2021) employed quarterly time-series data and structural auto-regressive estimation techniques to investigate the macroeconomic of budgetary shocks' effect on Morocco's economy. The findings indicate that while structurally beneficial shocks to public spending have an adverse effect on economic growth, negative economic growth ultimately has a long-term effect on average price levels and interest rates. Fatih (2021) used annual time series data and structural auto-regressive techniques to investigate the effect of shocks in government expenditure on Algeria's macroeconomic variables. The results show that exports and imports both respond positively to shocks of public expenditure, while export responses are moderate, whereas inflation responds negatively to expenditure shocks. The study proposes Algeria diversifies its economy and increase its tax revenue.

Rahaman and Leon-Gonzalez (2020) utilized a Bayesian structural vector auto-regressive method to determine the effects of public expenditure shocks in Bangladesh. The findings reveal that the expansion of public expenditure shock results are a massive improvement in private investment and consumption, and the decrease in output owing to the tax increase shock is highly robust. However, investment does not fall due to tax increases but private consumption decreases. The result suggests that in Bangladesh, stabilizing output through fiscal policy is preferable to doing so through monetary policy. As a result, the fiscal authority might raise spending without affecting Bangladesh's private investment. Munir and Riaz (2020) examined the macroeconomic consequences of exogenous public expenditure shocks in Pakistan using quarterly time-series data and a structural vector auto-regressive technique. The findings reveal that whereas current expenditure raises general prices, developmental expenditure lowers general prices, resulting in a real increase in the gross domestic product above current expenditure. Although both non-tax and tax revenue correlated with general prices and inversely correlated with interest rates, tax revenue raises the real gross domestic product more than non-tax revenue. The findings imply that the government should direct its spending toward useful projects and adopt a stringent responsibility policy for the creation and collection of the tax to set Pakistan's economy step toward development.

Hussain and Liu (2018) assessed the macroeconomic impact of shocks on public expenditure in Canada using annual time-series data and a structural vector auto-regressive. The result shows that the multiplier for Canadian government spending ranges from 0.92 to 1.52, as shown by government spending shocks. Parraga-Rodriguez (2016) used quarterly time series data spanning from 1969:1 to 2007:4 and a structural vector auto-regressive method to analyze the effects of government expenditure shocks in America. The findings reveal that whereas a rise in government expenditure has a multiplier impact between zero and one, increases in transfers have a multiplier impact over one. Ioana (2015) employed a structural vector auto-regressive technique to investigate the

impact of Romania's public expenditure shocks. The findings reveal that fiscal shocks have a smaller impact on macroeconomic variables, and fiscal multipliers are comparatively small.

Cebi and Culha (2013) used quarterly time-series data from 2002:1 to 2012:4 and a structural vector auto-regressive technique to assess the effect of shocks to government spending on Turkey's real exchange and trade balance. The results reveal how a rise in government spending shocks caused the trade balance to worsen and the exchange rate to rise. Contrary to the increase in the exchange rate and widening of the trade imbalance produced by shocks to government non-wage spending, shocks to government investment have relatively little impact. The analysis concludes that government spending matters and that shocks to government expenditure are linked to tax increases. To evaluate the efficiency of public expenditure output in Romania, Leonte and Stoica (2012) used a structural vector auto-regressive technique with quarterly time series data spanning from 1999:1 to 2010:3. The findings reveal that Romania's gross domestic product responded positively but modestly to increase in public spending. According to the study's conclusions, a fiscal expansion in the Romanian economy would have a multiplier impact on the Keynesian variety.

Natasa, Andreja, and Ales (2011) examined how the macroeconomic dynamics of the Slovenian economy are impacted by fiscal shocks using quarterly time-series data from 1995Q1 to 2010Q4. The findings indicate that shocks in government expenditure have a beneficial immediate impact on Slovenia's GDP, investment, and private consumption. In the time after the shock, the effect is negligible. Furthermore, the findings reveal that during the shock phase, positive tax shocks hinder the economy's growth, private spending, and investment. After that, the effect again loses statistical significance. The analysis concludes that temporary changes in Slovenian government spending and taxation cannot be utilized to stimulate the economy. Cloyne (2011) used quarterly time series data from 1955:1 to 2007:4 and a structural vector auto-regressive method to investigate shocks to government expenditure, wealth impacts, and taxation with distortions for the United States. The findings show a favorable empirical response to growth, consumption, and real wage, among other important variables. Furthermore, the findings also reveal that the wealth impact is minimal; capital usage, investment adjustment costs, sticky prices, and habit all played significant roles; yet, the systemic distortions are significantly reduced by the hike in tax rates, despite their relatively small scale. De Castro and De Cos (2006) examined the impact of exogenous spending shocks in Spain using the structural vector auto-regressive method. The results show that raising government expenditure results in increased growth in the short-term, but at the expense of increased inflation, greater public deficits, and lower growth over the long term. The results also show that tax increases temporarily boost the public budget balance while hindering economic growth over the medium term. The study concludes that fiscal policy has grown more counter-cyclical during the study period and that the consolidation processes do not appear to have had any negative effects on output growth.

In summary, the vast literature reviewed on the topic was on advanced economies with little or no attention paid to economic growth responses to public infrastructure expenditure shocks in Nigeria. There is no research work on the issue of economic growth response to public infrastructure expenditure shocks, particularly from the Nigeria point of view. To the best of our knowledge, this area of the study appeared untouched and therefore needs attention. This paper filled this gap by adopting Blanchard and Perrotti's (2002) model using structural vector auto-regressive methodology and the classification of the variance decomposition into three regimes namely, the short, medium, and long term respectively.

3. Methodology

The paper investigates economic growth response to public infrastructure expenditure shocks in Nigeria utilizing quarterly time-series data. The Central Bank of Nigeria (CBN) Statistics Bulletin, 2020 served as the data's primary source and it spans from 1981:1 to 2019:4. Government revenue was proxy as (GR_t), public infrastructure expenditure as (PIE_t), and the real gross domestic product as a measure of growth (GDP_t). In the spirit of Blanchard and Perotti (2002), in equation (1), the fundamental VAR model is defined as follows;

$$Y_t = \Gamma_1 Y_{t-1} + ...\Gamma_p Y_{t-p} + u_t \qquad (1)$$

Where $Y_t \equiv (GR_t, PIE_t, GDP_t)'$ is an endogenous three-dimensional vector of quarterly government revenue, public infrastructure expenditure, and the real gross domestic product. Thereafter, in the estimation of equation (1), the reduced-form residuals $u_t \equiv \left(u_{gr,t}, u_{pie,t}, u_{gdp,t}\right)^1$ structural shocks can be derived and expressed as linear combinations $e_t \equiv \left(e_t^{\,gr}, e_t^{\,pie}, e_t^{\,gdp}\right)^1$ in the form $Au_t = Be_t$. Transforming the form and writing it in matrix form gives equation (2) as follows;

$$\begin{bmatrix} 1 & 0 & -a_{13} \\ 0 & 1 & -a_{23} \\ -a_{31} & -a_{32} & 1 \end{bmatrix} \begin{bmatrix} u_{gr,t} \\ u_{gie,t} \\ u_{rgdp,t} \end{bmatrix} = \begin{bmatrix} b_{11} & b_{12} & 0 \\ b_{21} & b_{22} & 0 \\ 0 & 0 & b_{33} \end{bmatrix} \begin{bmatrix} e_t^{\,gr} \\ e_t^{\,gie} \\ e_t^{\,gdp} \end{bmatrix} \qquad (2)$$

Equation (2), $\sum u = A^{-1}BI\ B^1A^{-1^1}$, $\sum u$ contains $\frac{n(n+1)}{2} = \frac{12}{2} = 6$ free components. There should be certain limitations placed on A and B. Apply the equation, $2n^2 - \frac{n(n+1)}{2} = \frac{n(3n-1)}{2} = \frac{24}{2} = 12$ for the system to be recognized, restrictions need to be put in place. Where our n denotes the number of system variables and is equal to 3. From equation (2), A and B have three constraints out of the nine restrictions that result in having three 1's and six 0's a_{13} and a_{23} are the government's tax revenues' elasticity to GDP as well as the elasticity of public infrastructure expenditure to GDP. The final constraint forms two model requirements. (equation 2); the first specification sets, $b_{21} = 0$ and $b_{12} \neq 0$, where the second specification set $b_{21} = 0$ and $b_{12} \neq 0$ as earlier mentioned, the first specification was that decisions about government revenue come to precede those regarding spending on public infrastructure; according to the second criterion, decisions about revenue come before those about spending on public infrastructure. We do a Granger Causality test between revenue and public infrastructure spending as a diagnostic test. The structural shocks' standard deviations are represented by the B matrix's diagonal elements because we assumed that these shocks are standardized at 1.

4. Results and Discussions

4.1 *Econometric analysis*

Stationarity tests for data involve testing for stochastic characteristics of the study's series. However, three stationarity tests were employed to support robustness and result comparison. The outcome of the stationarity test revealed that government revenue (GR), public infrastructure expenditure (PIE), and real gross domestic product (GDP) have a unit root. Table 1 shows the outcome. The results as shown in Table 1, reveal the stationarity. The results indicate that every variable used in the study namely; economic growth (GDP), public infrastructure expenditure (PIE), and government revenue (GR) were not stationary in using the ADF, PP, and KPSS. The time series variables only became stationary after rendering the first difference, that is, order one I (1) at a 5% significance level.

Lag Length Test for the SVAR Model

Lag selection is critical in the analysis. An adequate number of auto-regressive lags are added to the SVAR model to prevent misleading results. A crucial step in establishing a stable SVAR model is determining what number of lag values should be a component of the model. On the other hand, improper lag length specification in an SVAR model might cause unstable impulse reactions and variance decompositions (Braun and Mittink, 1993). Moreover, while under-fitting can prevent some system dynamics from materializing, inefficiency might result from the model being over-fitted. Table 2 shows the result.

Table 1: Stationarity Test Result

Variables	ADF–STATISTICS		PP- STATISTICS		KPPS-STATISTICS		REMARKS	
	Level	1st Diff.	Level	1st Diff.	Level	1st Diff.	Order of Integration	
GR_t	0.5252	5.9293	0.5252	5.9293	3.3562	0.0909	I(1)	Stationary
PIE_t	2.8344	3.1017	2.8344	3.1017	3.1432	0.0831	I(1)	Stationary
GDP_t	1.5849	5.6628	1.5899	5.6628	1.4960	0.2046	I(1)	Stationary

Critical Values for ADF and PP are: 1% = 3.62; 5% = 2.94; 10% = 2.61
Critical Values for KPSS are: 1% = 0.74; 5% = 0.46; 10% = 0.34
Source: Extract from the ADF, PP, and KPPS test results estimated using E-views version 10

Table 2: Lag Length Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-3898.957	NA	1.59e+19	52.72915	52.78990	52.75383
1	-3171.899	1414.816	9.74e+14	43.02566	43.26867	43.12439
2	-3166.979	9.373992	1.03e+15	43.08079	43.50608	43.25359
3	-3158.618	15.59102	1.04e+15	43.08944	43.69698	43.33628
4	-3140.591	32.88737	9.20e+14	42.96745	43.75726	43.28835
5	-3045.552	169.5288*	2.88e+14*	41.80476*	42.77683*	42.19971*
6	-3044.189	2.377265	3.20e+14	41.90796	43.06229	42.37696
7	-3042.481	2.907017	3.54e+14	42.00651	43.34310	42.54956
8	-3040.270	3.676198	3.89e+14	42.09824	43.61710	42.71535

* indicates lag order selected by the criterion
Source: Authors' Estimation using Eviews Output Version 10

From Table 2, all five criteria namely; sequential modified, Schwarz criteria, Hannan-Quinn information criteria, Akaike information criteria, and the Final predict error all favor 5-lag length at a 5% significant level. Thus, the lag length criteria result presented in Table 2 revealed 5 - lag length as the optimal at a 5% level of significance. An exclusion of five lags was considered to be the minimum number necessary for the model to establish the validity of the outcome using the Wald test. Table 3 shows the outcome.

Table 3: VAR Lag Exclusion Wald Tests

	GR	PIE	GDP	Joint
Lag 1	166.7868	133.4706	303.5936	597.3604
	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Lag 2	7.96E-29	3.51E-29	2.97E-28	5.43E-28
	[1.0000]	[1.0000]	[1.0000]	[1.0000]
Lag 3	1.44E-28	8.23E-30	6.97E-28	1.03E-27
	[1.0000]	[1.0000]	[1.0000]	[1.0000]
Lag 4	26.91510	24.95205	238.5572	279.0171
	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Lag 5	42.17780	24.02108	226.6291	281.4360
	[0.0000]	[0.0000]	[0.0000]	[0.0000]

Note: Numbers in [ ] are p-values. * indicates statistically significant at 5% level
Source: Authors' Computation using E-views Output Version 10

The result presented in Table 3 shows that χ^2 statistics for the overall endogenous variables' significance in VAR namely; the real gross domestic product (GDP), public infrastructure expenditure (PIE), and government revenue (GR) at 5 lag lengths were jointly significant at 1% level, indicating that the 5-lag length is optimal. Therefore,

this paper used a 5-lag length in the analysis. The structural vector auto-regression estimate is next and Table 4 shows the outcomes.

Table 4: Structural VAR Result

Model: Ae = Bu where E[uu']=I				
A =				
1	0	0		
C(1)	1	0		
C(2)	C(3)	1		
B =				
C(4)	0	0		
0	C(5)	0		
0	0	C(6)		
	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	-0.393962	0.107577	-3.662127	0.0003
C(2)	-0.015978	0.008487	-1.882593	0.0598
C(3)	-0.017197	0.006153	-2.794905	0.0052
C(4)	0.170285	0.009799	17.37814	0.0000
C(5)	0.225105	0.012953	17.37815	0.0000
C(6)	0.017020	0.000979	17.37815	0.0000
Log-likelihood	464.7847			
Estimated A matrix:				
1.000000	0.000000	0.000000		
-0.393962	1.000000	0.000000		
-0.015978	-0.017197	1.000000		
Estimated B matrix:				
0.170285	0.000000	0.000000		
0.000000	0.225105	0.000000		
0.000000	0.000000	0.017020		

Source: Authors' Calculation utilizing E-views 10

Table 4 displays the result of structural vector auto-regression estimates. The result reveals that the estimated government revenue coefficient proxy as tax to economic growth was statistically significant and positively signed. It suggests that a 1% increase in government tax would increase economic growth by 0.17%. The findings conform to the endogenous theory which agrees that the effect of taxation on growth is positive. The coefficient of public infrastructure expenditure to economic growth was also statistically significant and positively signed. It suggests that a 1% rise in public infrastructure expenditure would increase economic growth by 0.22%. The findings also supported the endogenous growth theory proposed by Barro (1990) which holds the view that public infrastructure expenditure had a significant impact on the economic growth of a nation and by extension, the sources of growth are found within an economy. This result supports the views of Munir and Riaz (2020) and Rahaman and Leon-Gonzalez (2020).

The VAR Model's Stability

Because the modulus of all the roots is smaller than one and the reduced-form VAR model lies inside the unit circle, it appeared stable as in Appendix I. We first discovered the residuals in reduced form, followed by structural shocks and impulse response, and variance decomposition. However, determine the following:

$$\begin{bmatrix} 1 & 0 & -a_{13} \\ 0 & 1 & -a_{23} \\ -a_{31} & -a_{32} & 1 \end{bmatrix} \begin{bmatrix} u_{gr,t} \\ u_{pie,t} \\ u_{gdp,t} \end{bmatrix} = \begin{bmatrix} b_{11} & b_{12} & 0 \\ b_{21} & b_{22} & 0 \\ 0 & 0 & b_{33} \end{bmatrix} \begin{bmatrix} e_t^{gr} \\ e_t^{pie} \\ e_t^{gdp} \end{bmatrix} \quad (2)$$

The model needs to be restricted in three ways to be found. We obtained a_{13} Using log (GR) regression on c and log (GDP), $a_{13} = 3.9$. We set $a_{23} = 0$ and $b_{21} = 0$. It follows from this that public infrastructure expenditure decision-making precedes government revenue.

Impulse Response Function

The function of the impulse response (IRF), which maintains the original units of the data and offers an estimate of uncertainty, looks at how one variable reacts to random shocks in another variable. Using a structural decomposition of the computed SVAR's residual covariance matrix, the result described in the paper was reached. Furthermore, IRF is helpful because it offers a more statistically sound way to gauge how one variable responds to changes in another. In this paper, the IRF helped in the determination of the response of economic growth (GDP) to public infrastructure expenditure shocks (PIE) and government revenue (GR). The study focuses specifically on the economic growth response to public infrastructure expenditure shocks within the study period in Nigeria. The result is presented in Figure 1.

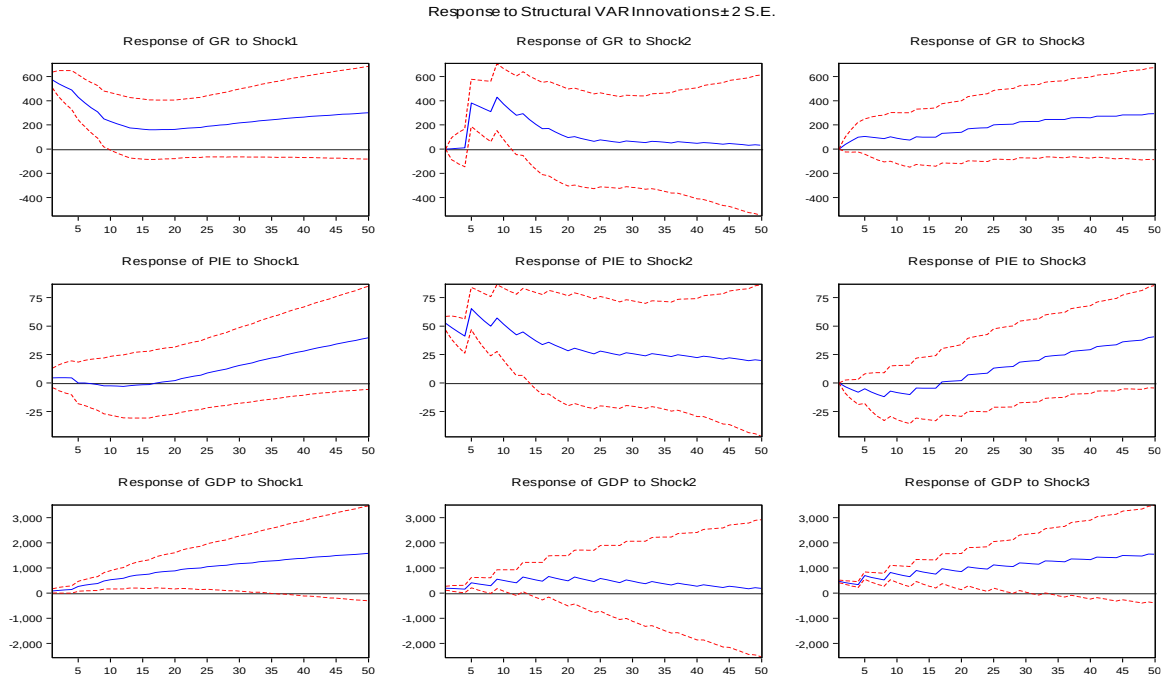

Figure 1: Impulse Response of Structural VAR Result

Figure 1 depicts the responses to shocks among the macroeconomic variables within three regimes namely; short, medium, and long- term respectively. It depicts that, the reaction of growth (GDP) to public infrastructure expenditure shock effect is positive and statistically significant for the three regimes of short-term, medium-term, and long-term respectively. An increase in public infrastructure expenditure shock by 1%, as in Figure 1, rises

economic growth (GDP) by 10.5% and it is positive and statistically significant. The economic growth response to tax shock (GR) was statistically significant and positive for the three regimes namely short, medium, and long – term respectively. This outcome is in line with the view of Ioana (2015). The variance decomposition is next and Table 5 shows the result.

Table 5: Variance Decomposition of Economic Growth (GDP)

Period		S.E.	Shock1	Shock2	Shock3
ST	8	0.054690	7.557558	10.57409	81.86835
MT	24	0.115914	16.88322	29.73076	53.38602
LT	48	0.169447	28.59881	42.69875	28.70245

Note: ST = Short - Term, MT = Medium Term, LT = Long - Term
Source: Extract from E-views Output version 10

Variance decomposition (VD) is used to examine the fitted SVAR that deviates from the actual values of the vector of endogenous variables. The variation in macroeconomic variables and the underlying structural shocks are also related using VD. In SVAR, to understand how the model's variables vary, the variance decomposition is examined. Table 5 illustrates the economic growth movement as well as its relationship to shocks. The VD was extracted and classified into three regimes namely short, medium, and long-term respectively. The result reveals that for the short–term, 10.5% of economic growth's fluctuations are associated with public infrastructure expenditure shocks (PIE). While in the medium term, 29.7% of the variation in economic growth is related to public infrastructure expenditure shocks. In the long–term, 42.6% of economic growth's fluctuations are associated with public infrastructure expenditure shocks. This implies that the government of Nigeria has to put more emphasis on public infrastructure expenditure policies and reforms to achieve ultimately, the best course of action and sustainable growth, especially as Nigeria's economy depends heavily on crude oil and agriculture for its growth.

5. Conclusions and Policy Implications

This paper examined the response of economic growth to public infrastructure expenditure shocks in Nigeria. The structural vector auto-regressive technique was employed in the study. The impulse response function and variance decomposition were used to analyze the responses of economic growth to public infrastructure expenditure shocks. From the discoveries of the paper, we can conclude that economic growth response to the impact of public infrastructure expenditure shocks was positive and statistically significant for the three regimes namely; short, medium, and long-term respectively. Therefore, these recommendations are provided based on the paper's findings. Given that the Nigerian economy is recognized to be a crude oil-based and agricultural economy, the federal government should concentrate on government spending policies and reforms that would result in optimal policy and eventually inclusive and sustainable growth. For the economy to be on the path of not only inclusive growth but also prosperity in Nigeria, the federal, state, and local governments should direct all of their spending toward productive projects and adopt a strong responsibility for the generation and collection policy of income via tax.

The scope of the paper covers from quarter one of 1981 to quarter four of 2019. As such, it is limited to only the time frame stated. Structural restrictions resolve the non-uniqueness problem of the innovations, structural vector auto-regression modeling has its limitation even if the restrictions imposed are firmly based on some economic theories, they may not truly reflect what goes on in the actual underlying system or Nigerian economy.

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Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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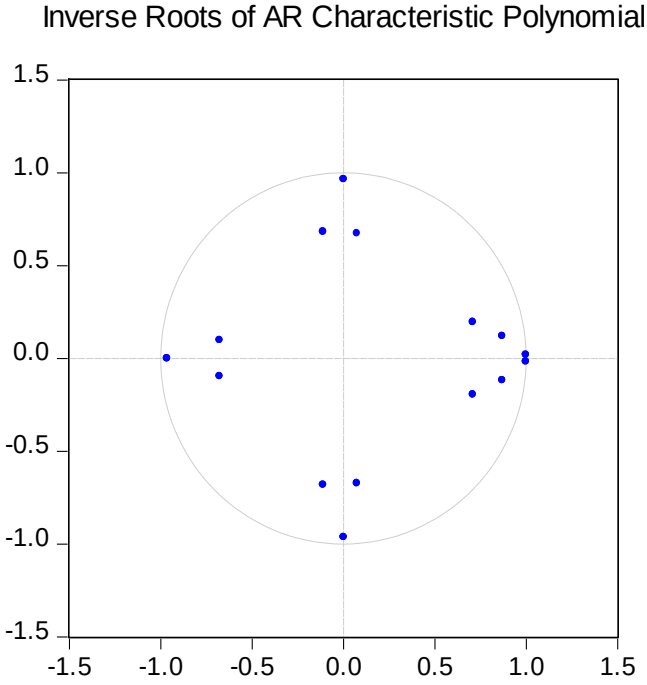
APPENDIX I: STABILITY RESULT OF THE MODEL



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APPENDIX II: OLS RESULT OF THE MODEL

Dependent Variable: LOG(GR)

Sample: 1981Q1 2019Q4

Included observations: 156

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-34.50479	1.401919	-24.61255	0.0000
LOG(GDP)	3.988438	0.136007	29.32523	0.0000

R-squared	0.848122	Mean dependent var	6.544961
Adjusted R-squared	0.847135	S.D. dependent var	2.455226
S.E. of regression	0.959942	Akaike info criterion	2.768850
Sum squared resid	141.9092	Schwarz criterion	2.807950
Log-likelihood	-213.9703	Hannan-Quinn criterion	2.784731
F-statistic	859.9689	Durbin-Watson stat	0.032041
Prob(F-statistic)	0.000000		

Source: Extract from E-views Output version 10

APPENDIX III: SVAR RESULT OF THE MODEL

Structural VAR Estimates

Included observations: 151 after adjustments
Estimation method: Maximum likelihood via Newton-Raphson (analytic derivatives)

Convergence achieved after 35 iterations

Structural VAR is just-identified

Model: Ae = Bu where E[uu']=I

A =

1	0	0
C(1)	1	0
C(2)	C(3)	1

B =

C(4)	0	0
0	C(5)	0
0	0	C(6)

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	-0.007802	0.007475	-1.043729	0.2966
C(2)	-0.130380	0.066972	-1.946771	0.0516

C(3)	-3.788669	0.726461	-5.215243	0.0000
C(4)	571.7893	32.90278	17.37814	0.0000
C(5)	52.52398	3.022416	17.37814	0.0000
C(6)	468.8761	26.98079	17.37814	0.0000
Log-likelihood	-3128.296			

Estimated A matrix:

1.000000	0.000000	0.000000
-0.007802	1.000000	0.000000
-0.130380	-3.788669	1.000000

Estimated B matrix:

571.7893	0.000000	0.000000
0.000000	52.52398	0.000000
0.000000	0.000000	468.8761

Estimated S matrix:

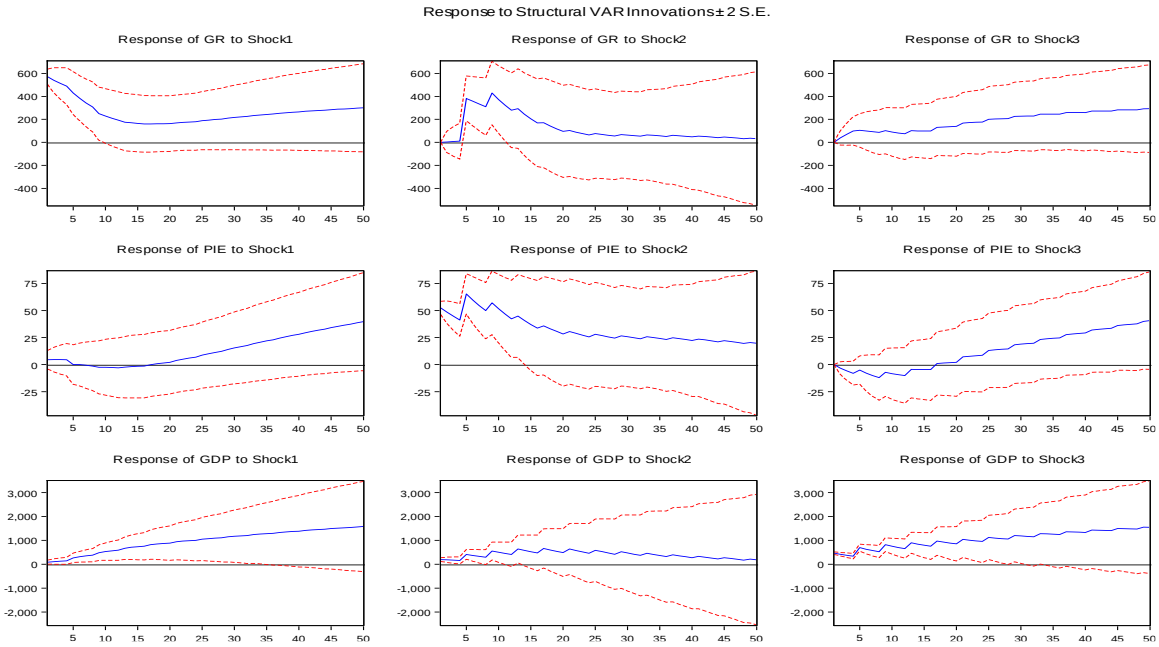
571.7893	0.000000	0.000000
4.461253	52.52398	0.000000
91.45186	198.9960	468.8761

Estimated F matrix:

22352.60	-1743.776	17187.60
4014.462	365.0783	3697.898
101174.4	-21108.61	97556.23

Source: Extract from E-views Output version 10

APPENDIX IV: IMPULSE RESPONSE FUNCTION RESULT OF THE MODEL



Source: Extract from E-views Output version 10

APPENDIX V: VARIANCE DECOMPOSITION RESULT OF MODEL

Variance Decomposition of GR

Period	S.E.	Shock1	Shock2	Shock3
1	571.7893	100.0000	0.000000	0.000000
2	787.7632	99.75725	0.002733	0.240019
3	942.7706	99.25058	0.008781	0.740642
4	1066.536	98.53977	0.017759	1.442475
5	1215.721	88.27646	9.870358	1.853187
6	1327.502	82.36375	15.52179	2.114460
7	1414.166	78.47375	19.22945	2.296798
8	1482.739	75.71729	21.85321	2.429504
9	1566.889	70.34549	27.06063	2.593886
10	1629.317	67.03023	30.26474	2.705029
11	1676.298	64.89441	32.31303	2.792563
12	1712.027	63.48524	33.64432	2.870438
13	1748.898	61.84848	35.06164	3.089877
14	1777.123	60.82150	35.87117	3.307329
15	1799.243	60.17945	36.29077	3.529781
16	1817.031	59.78385	36.45512	3.761029
17	1836.676	59.27739	36.53785	4.184764
18	1854.061	58.93341	36.44058	4.626015
19	1869.881	58.69658	36.22092	5.082500
20	1884.624	58.52992	35.91871	5.551373
21	1902.484	58.22786	35.54284	6.229307
22	1920.175	57.97585	35.10599	6.918167
23	1937.747	57.76396	34.62708	7.608954
24	1955.227	57.58469	34.12093	8.294374
25	1976.041	57.28499	33.55546	9.159548
26	1997.180	57.01966	32.96908	10.01126
27	2018.505	56.78886	32.37116	10.83998
28	2039.900	56.59121	31.76955	11.63924
29	2064.365	56.30118	31.12900	12.56982
30	2089.163	56.04762	30.48687	13.46551
31	2114.107	55.83116	29.84883	14.32001
32	2139.046	55.65039	29.21960	15.13001
33	2166.616	55.40158	28.56989	16.02853
34	2194.402	55.18859	27.92859	16.88282
35	2222.217	55.01107	27.29917	17.68976
36	2249.913	54.86695	26.68447	18.44858
37	2279.776	54.67215	26.06161	19.26624
38	2309.736	54.50841	25.45157	20.04002
39	2339.627	54.37483	24.85654	20.76864
40	2369.314	54.26927	24.27830	21.45242
41	2400.751	54.12495	23.69890	22.17615
42	2432.202	54.00529	23.13386	22.86084
43	2463.523	53.90945	22.58468	23.50586
44	2494.597	53.83562	22.05263	24.11175
45	2527.072	53.73145	21.52318	24.74537
46	2559.511	53.64593	21.00840	25.34567
47	2591.789	53.57846	20.50940	25.91214
48	2623.804	53.52771	20.02716	26.44513

49	2656.932	53.45299	19.54954	26.99747
50	2689.990	53.39205	19.08637	27.52158

Variance Decomposition of PIE

Period	S.E.	Shock1	Shock2	Shock3
1	52.71310	0.716270	99.28373	0.000000
2	71.83240	0.804644	98.99737	0.197986
3	84.94365	0.872262	98.51580	0.611937
4	94.87365	0.918322	97.88487	1.196806
5	115.3102	0.621784	98.38474	0.993477
6	130.0660	0.488706	98.37092	1.140376
7	141.4041	0.414755	98.10774	1.477505
8	150.4466	0.373674	97.68301	1.943314
9	161.0663	0.350747	97.75882	1.890437
10	169.3670	0.337722	97.70746	1.954815
11	175.9675	0.334674	97.57194	2.093389
12	181.2838	0.342117	97.37660	2.281279
13	186.8145	0.338323	97.45683	2.204848
14	191.2890	0.332523	97.50822	2.159253
15	194.9197	0.326908	97.53878	2.134314
16	197.8725	0.322265	97.55435	2.123387
17	201.0912	0.312041	97.62953	2.058434
18	203.8162	0.305295	97.68593	2.008778
19	206.1238	0.304082	97.72407	1.971850
20	208.0804	0.309323	97.74514	1.945537
21	210.4780	0.335684	97.64675	2.017569
22	212.6578	0.384215	97.50582	2.109963
23	214.6411	0.456354	97.32491	2.218735
24	216.4489	0.552168	97.10742	2.340415
25	218.8168	0.700182	96.65373	2.646091
26	221.1133	0.892937	96.13348	2.973581
27	223.3325	1.128929	95.55528	3.315787
28	225.4719	1.405202	94.92778	3.667018
29	228.2222	1.752191	94.01920	4.228612
30	230.9795	2.157102	93.03853	4.804369
31	233.7229	2.614353	92.00028	5.385369
32	236.4367	3.117399	90.91768	5.964917
33	239.7577	3.688811	89.57088	6.740305
34	243.1249	4.316392	88.16701	7.516601
35	246.5101	4.991707	86.72338	8.284915
36	249.8910	5.706095	85.25496	9.038945
37	253.8406	6.469984	83.57616	9.953858
38	257.8546	7.277150	81.86683	10.85602
39	261.9024	8.118526	80.14374	11.73774
40	265.9593	8.985331	78.42080	12.59387
41	270.5293	9.876360	76.55272	13.57092
42	275.1716	10.79361	74.68208	14.52431
43	279.8560	11.72908	72.82298	15.44794
44	284.5572	12.67524	70.98682	16.33794
45	289.7107	13.62224	69.06528	17.31248
46	294.9388	14.57950	67.16438	18.25612
47	300.2127	15.54086	65.29482	19.16432

48	305.5079	16.50057	63.46504	20.03439
49	311.1949	17.44369	61.59671	20.95960
50	316.9548	18.38468	59.76511	21.85021

Variance Decomposition of GDP

Period	S.E.	Shock1	Shock2	Shock3
1	517.5014	3.122929	14.78650	82.09057
2	701.0054	4.272099	15.07584	80.65206
3	825.3016	5.545534	15.29273	79.16173
4	919.0402	6.908490	15.44330	77.64821
5	1254.427	8.336122	19.17281	72.49107
6	1486.018	10.46970	19.88577	69.64453
7	1665.689	12.80947	19.81542	67.37511
8	1813.827	15.19487	19.42841	65.37672
9	2123.141	16.33468	21.05210	62.61322
10	2369.521	18.16242	21.42885	60.40873
11	2575.808	20.19919	21.27593	58.52487
12	2754.000	22.25566	20.86357	56.88076
13	3043.122	23.12924	21.50190	55.36885
14	3289.360	24.47323	21.53287	53.99390
15	3504.270	25.99342	21.24031	52.76627
16	3695.091	27.54944	20.76759	51.68297
17	3964.431	28.24145	20.83843	50.92012
18	4203.285	29.24498	20.59034	50.16468
19	4417.997	30.38721	20.15251	49.46027
20	4613.071	31.57284	19.60328	48.82388
21	4865.828	32.15217	19.34698	48.50085
22	5096.841	32.93803	18.92307	48.13890
23	5309.681	33.82665	18.39594	47.77741
24	5507.123	34.75440	17.80953	47.43608
25	5748.488	35.25116	17.39245	47.35640
26	5974.402	35.88555	16.89223	47.22221
27	6186.796	36.59353	16.34252	47.06394
28	6387.293	37.33266	15.76809	46.89925
29	6622.100	37.75947	15.29913	46.94141
30	6845.858	38.27898	14.79392	46.92711
31	7059.494	38.85074	14.27030	46.87897
32	7263.854	39.44633	13.74211	46.81156
33	7495.381	39.81227	13.28362	46.90411
34	7718.843	40.24151	12.81383	46.94466
35	7934.550	40.70805	12.34218	46.94977
36	8142.846	41.19268	11.87635	46.93098
37	8372.740	41.50669	11.45821	47.03510
38	8596.554	41.86444	11.04126	47.09429
39	8814.228	42.24896	10.63048	47.12056
40	9025.793	42.64714	10.23009	47.12277
41	9254.496	42.91752	9.862815	47.21966
42	9478.428	43.21829	9.502474	47.27923
43	9697.322	43.53824	9.151681	47.31007
44	9911.022	43.86838	8.812785	47.31883
45	10138.24	44.10208	8.496901	47.40102

46	10361.55	44.35684	8.190218	47.45294
47	10580.59	44.62523	7.894123	47.48065
48	10795.08	44.90103	7.609946	47.48902
49	11020.15	45.10355	7.341659	47.55480
50	11241.87	45.32052	7.083124	47.59635

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Twin Deficits Revisited: The Role of Fiscal Institutions in Pakistan

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Abstract
The economy of Pakistan is facing the problem of the persistent current account and the budget deficit in the past many years. This study addresses the important question of whether the budget deficit affects the current account components of the balance of payments, creating imbalances therein as well. The main objective of this research is to investigate the association between the budget and the current account deficit in Pakistan. The study has taken data from the period 1980-2021. Johansen's cointegration approach has been applied to find the long-run association and the results imply a positive and considerable long-run association between budget deficit and current account deficit. The Vector Error Correction Model (VECM) specifies the convergence or deviation of the market in the short run to the long run. The finding shows that there is a long-run connection between the budget and the current account deficit. The study suggests that government should focus on a sound budgeting policy and focus to make exports more competitive in the foreign market.

Keywords: Current Account Deficit, Budget Deficit, Ricardian Equivalence, Keynesian Hypothesis

JEL Classification: F32, H61, O23, E62

1. Introduction
The problem of the deficit of the Current Account (CA) and Budget Deficit (BD) has been the most critical issues for the economy of Pakistan. An increasing BD worsens the deficit in trade, referred to as a twin deficit. A BD reflects that government spending is more than its revenues. The twin deficit negatively affects the economy as inflation, growth of public debt and external debt, low living standards, and deterioration of purchasing power. A higher BD could lead to a reduction in investment and national savings (Ebrahim Abbassi, 2015). Towards financing a BD, the government may borrow money by issuing bonds or other forms of debt. This borrowing adds to the national debt, which is the total amount of money owed by the government to its creditors.

A Budget Deficit can have both positive and negative effects on the economy. In the short term, it can stimulate economic growth by increasing government spending, creating jobs, and increasing the demand for goods & services. The risk of inflation, higher interest rates, and a subsequent slowdown in economic development exist if the deficit persists and grows too large. The government may choose to balance the budget by reducing expenditures, raising taxes, or doing both at once. This may be accomplished by taking steps like scaling back on government programs that are not necessary, decreasing wasteful expenditure, enacting tax changes, and raising taxes. It is crucial to remember that cutting the BD could necessitate making challenging decisions and balancing conflicting goals.

When there is a trade or CA imbalance, imports outpace exports. BDs, in contrast to CA deficits, may also trigger debt crises, currency crises, and reversals in the balance of payments. Over the past few decades, Pakistan has consistently had trade and budget imbalances highlighting the existence of the 'twin deficits' hypothesis. The rising CA deficit forces the government to increase spending, which increases the BD. Trade and BDs over the long run hurt how a nation views its long-term development. In other words, it denotes a

situation in which a nation spends more on imports of goods and services than it does on exports and investments.

Numerous variables, such as a lack of export competitiveness, elevated levels of domestic consumption, and significant foreign investment, can contribute to a deficit in the CA. In the short term, a deficit in the CA can be financed through foreign borrowing or selling off assets, but in the long term, it can indicate a downgrading of the nation's currency, higher inflation, and a decrease in economic growth. To address a CA deficit, a country may need to take steps to improve its competitiveness through measures such as investing in education and infrastructure, increasing productivity, and implementing structural reforms to make it easier to do business. The country may also need to reduce its domestic consumption and increase its savings rate to reduce its reliance on foreign borrowing. The twin deficit may negatively impact economic activity and growth (Vamvoukakis, 1997).

It's critical to understand the connection between the two deficits to achieve stable economic growth. Policymakers must understand how the budget and CA deficits are related since persistently high deficits result in excessive debt problems both internally and internationally and burden future generations (Gebremariam, 2018). Due to the trade imbalance caused by low export raw commodity prices compared to import pricing and comparatively small national savings when compared to national investments, there is a funding gap that must be filled by foreign capital inflows. Exchange rate volatility, a global trend of weak development, and an elevated level of foreign debt incurred to reduce BDs are other factors contributing to the CA deficit. A deficit is not always bad as it confers both positives and negatives for a country. It depends on the circumstances a country is involved, in and the duration and size of the deficit. A persistent deficit is not a good indicator for the developing economy and brings a negative effect on the economy.

Accordingly, a BD can lead to a deficit in trade because the country is borrowing to finance its spending, including spending on imports. A country may have an imbalance if its imports exceed its exports, creating a negative CA balance. A nation with a budget surplus, on the other hand, can utilize the extra money to invest in its export-oriented businesses or cut back on imports, which would help close the CA deficit or even create a trade surplus. The relationship between budget and trade deficits is complicated, and other elements like exchange rates, productivity, and competitiveness can also influence a nation's trade balance. For Pakistani policymakers, the widening deficits in the CA, as well as deficits in the budget, have been of major concern proving the twin deficit phenomena true. Understanding the link between budget as well as trade imbalances throughout the economy is necessary given the current circumstances.

Therefore, the goal of this study is to determine whether there is any correlation between Pakistan's deficit in the CA and the BD. The major goals of this study are to analyze the short-term link as well as the long-term association between the BD as well as the deficit in the CA. identify variables influencing the relationship between the BD and the CA, and investigate the twin deficit hypothesis.

2. Review of Literature

The “twin deficits” hypothesis suggests that the fiscal deficit of a government leads to a current account deficit due to this the US economy requires to take such measures that will reduce the large deficits for the economy. For this purpose, Vector Autoregressive (VAR) model is used to investigate the impact of external policy shocks such as terms of trade on the magnitude of the twin deficit in the case of Australia, the UK, Canada, and the US. There is significant literature available on the twin deficits of Pakistan, jointly and separately (Andlib, et al., 2012, Padda, 2014, Safdar & Padda, 2017). The findings show that in less open economies the impact of external shocks is very restrictive. It is suggested that a reduction in the cost of spending may reduce the impact of the current account deficit on the economy (Kim & Roubini, 2008).

In the instance of Lebanon, Marashdeh & Saleh (2006) reexamined the association between the deficit in the budget and the deficit in trade. It is established that the trade deficit has a long-term effect on the BD in Lebanon. The Bounds test demonstrates that the effect of the civil war is the main factor contributing to the considerable and positive connection between trade and BD. The post-war period also witnesses the twin deficit

problem. The government expenditure and increase in imports had been financed through domestic and external debt. It is recommended that policies should be strengthened on the demand and supply side of services from the exportable service sector. Mukhtar et al. (2007), investigate the reason for the persistently extreme deficit in the CA and BD in Pakistan. Although the findings of this study are similar to the previous ones, this study lacks the validation of a single equation approach to examine the twin deficit hypothesis. Moreover, this study aims to find empirically the conventional effect of trade deficit through a BD in Pakistan.

Sunday (2013), analyzed the association between deficit financing and trade balances in the case of Nigeria. Using Vector Autoregressive (VAR) and Granger causality tests it is analyzed that in the short-run deficit financing and trade balances (surplus) possess positive relations while in the long run, the former diminishes the latter. It is suggested that deficit financing is a useful instrument for the government both in the short run as well as a long run and if there are effective policies regarding the proper management of deficit financing it can reduce the trade deficit in Nigeria in the long run.

Forte & Magazzino (2013), examined the association between the BD and deficit in trade in the case of European Countries. The evidence which supports the hypothesis regarding the persistent BD generating a trade deficit has been found and this proves the scheme that public liability creates a burden. The empirical results from the past and current values show the influence of the government budget on trade weight in the first sub-period.

Tufail et al. (2014), observed the relationship between the trade deficit and BD and found the long-run association between them. They estimated that a BD had a definite effect on the trade deficit by using the Johansen Co-Integration method. Trade openness, Real GDP, Exchange Rate, and Financial Development are the variables used in this study, and time series data from the period 1972-2011 is used. This study established that the BD, real GDP had a positive effect on the trade deficit. Contrary to this, exchange rates and financial development hurt the trade deficit. This study also recommended that financial development could play a part in reducing the trade deficit of the economy.

Ehlendawy (2014), stated that the noticeable BD of the Egyptian economy has affected the CA by creating imbalances. The researcher's findings show the presence of a long and short-run association linking the BD to the balance of payment component. The Granger causality test is used to find a significant counter-effect between the two types of deficits. The test also reveals the confirmation of the reverse hypothesis.

The twin deficit theory under Keynesian economy is stated as a fiscal deficit that will give rise to domestic absorption, and expansion of exports and hence increases trade deficit. On the contrary, the Ricardian hypothesis suggests that a rise in BD will urge people to save more due to anticipation of an increase in the tax rate in the future, and the shift in people's choice to consume less will have no impact on the real interest rate and trade deficit.

To empirically check the existence of the twin deficit hypothesis in the case of India monthly and quarterly data for the period 1998-2009 is taken, for this purpose applying bound testing and error correction model is used. The results show that the twin deficits hypothesis holds in the short run only supporting the Keynesian channel in the case of India (Ratha, 2012). In the case of Pakistan, to empirically investigate the validation of the twin deficit hypothesis annual time series data from the period 1972 to 2008 is used. The results of the cointegration test show the long-run relationship of BD and CAD and Granger causality results indicate uni-directional causality running from current account to fiscal deficit. Hence the twin deficit phenomenon also holds in the case of Pakistan (Saeed & Khan, 2012).

Ahmed et al. (2023) examined that governments fiscal interventions play a role in adaptations toward climate change and if urbanization is not supported by the government then it can reduce the adaptive capacity of the people. Iftikhar et al. suggested that the digital divide can reduce human capital and resultantly the decline in GDP. Reed et al. (2019) highlighted that CAs and BDs have an important impact on the reliability of any

country in paying off debts. The study determined a dynamic relationship between CA deficits, BDs, and the debt crisis of the Iranian economy. By using the Vector Autoregressive model (VAR) long-term relationship is analyzed between the BD and CA deficit in increasing the debt crisis. The major reason for the dependence of two variables is the underlying dependence of Iran on oil revenues. The study recommended that to reduce both types of deficit and to sustain its debt credibility authorities need to reduce its dependence on the current government and state budget on oil revenues. South Africa faces the issue of a persistent budget deficit which reduces the economic growth of the economy as well as an imbalance of the trade account. To examine the relation between two deficit time series data is used from 1994 to 2016. The autoregressive distributive lag method is used to test the cointegration and relationships between variables. The results confirm the existence of a positive and significant relationship between the two deficits in the short run. It is recommended that the policymaker should focus on reducing the two deficits taking into account the problem of rising inflation and increasing investment to achieve stable economic growth (Ncanywa & Letsoalo, 2019).

From the literature, many studies are conducted to investigate the relationship between the two deficits both empirically and theoretically. However, the findings of each study vary holding to examine the twin deficit hypothesis in the case of both developing and developed economies. In this context, the present study focuses on finding the relation between budget deficit and trade deficit and the existence of the twin deficit hypothesis in the case of Pakistan. In the literature, the studies conducted in the case of Pakistan (see for example, Tufail et al. (2014), Saeed & Khan (2011)) has used the past two decades of data to empirically evaluate the relationship between two deficit but the current study uses time series data for the past three decades from 1980 to 2021 to empirically investigate the association between two deficits and pointing out important macroeconomic variables that hampers this relationship in case of Pakistan.

3. Theoretical Framework

Ricardian equivalence with the Keynesian thesis is two significant methods for demonstrating the theoretical link between the deficit in the CA (trade deficit) and the deficit of budget. The CA position does not alter the BD, and taxes have a different but similar impact on saving, according to the Ricardian equivalence theory. Rational people would raise their savings in anticipation of an increase in taxes, which the government uses to cover the BD. They will boost their savings by an amount equal to the anticipated tax rate from their disposable income. Therefore, savings of an equal amount are used to balance increases in BDs. The deficit in the CA is unaffected by the BD (Marinheiro, 2008).

The Keynesian hypothesis anticipates a causal link between the deficit in trade as well as the BD. Rendering to the Keynesian hypothesis, a BD will boost domestic absorption. Imports will rise to close the production gap caused by increased aggregate demand since it is believed that domestic output will remain steady. The CA situation will deteriorate, and the trade imbalance will rise as a result of rising imports and falling exports. According to this claim, the deficit in the CA, as well as the BD, are directly related (Bagheri et al. 2012).

Mundell-Fleming framework (1996) extended the Keynesian proposition, that an increase in the BD will push the local rate of interest upward this in turn will cause capital inflows as imports seem to be cheaper which results in exchange rate appreciation, which would lead to an upsurge in deficit in the CA (Ogbonna, 2013).

3.1 Methodology

The theoretical link between the deficit in the CA as well as the BD is represented by national income accounts:

$$GDP= C+S+T= C+I+G+X-M$$

The condition for twin deficits to be identical can easily be found from the above identity:

$$S+T+M= I+G+X$$

$$X-M= (T-G) +(S-I)$$

Whereas X-M is the deficit in the Trade TD, (T-G) represents BD, and (S-I) represents Saving Deficit SD occurs when private investments exceed private savings in the private sector. From the above equation, the deficit in the CA can be described as the sum of the BD and the saving deficit.

3.2 Model Specification

The model used in this study followed the specific theoretical framework. From the empirical literature on the Ricardian equivalence hypothesis and Keynesian proposition, important variables are pointed out that affect the CA deficit (Onafowora & Owoye, 2006). Ricardian equivalence is an economic theory that suggests that the timing and composition of government spending do not affect aggregate demand and economic activity in the long run. The theory is named after David Ricardo, an economist who developed the theory of comparative advantage.

People choose to save and spend money based on their lifetime income rather than their current income, according to the Ricardian equivalence theory. To counterbalance the anticipated rise in future taxes needed to pay off the government debt, people will save more if the government increases expenditure and finances, by borrowing. As a result, there will be no impact on overall demand or economic activity from the rise in government expenditure. According to Ricardian equivalence, fiscal policy, including taxes and government expenditure, is unsuccessful at promoting economic development over the long run. The argument contends that monetary policy, which includes changing the money supply and interest rates, is a better instrument for regulating the economy. Ricardian equivalency opponents contend that people might not completely foresee their future tax obligations and might not change their saving and spending habits correspondingly. Furthermore, the theory makes the unfounded assumption that government expenditure has no significant impact on the economy, which is not always true, especially in the short run.

$$CAD_t = \alpha_1 + \alpha_2 BD_t + \alpha_3 WIR_t + \alpha_4 MON_t + \alpha_5 REER_t + \alpha_6 TO_t + e_{1t}$$

WIR is the weighted interest rate on deposits and is taken as a proxy of real interest rate, MON is broad money supply, REER is the real effective exchange rate and TO is trade openness.

3.3 Data Description

This is time-based research and the data used in the study is gathered from secondary sources i.e., the Economic Survey of Pakistan, the World Bank, and the State Bank of Pakistan for the period 1980-2021. Data on variable Current Account Deficit (CAD) is sourced from the World Development Indicator and expressed as a percentage of GDP. The budget balances of the country show its financial health. The data on BD is also taken as a percentage of GDP from the Economic Survey of Pakistan for 42 years.

The weighted interest rate on deposits is taken as a proxy for the real interest rate. The data for WIR is in percentage and taken from the State Bank of Pakistan annual report. Broad money (MON) is another variable that is taken as a measure of the supply of money that signifies the number of liquid assets in the economy. The Real Effective Exchange Rate (REER) determines the estimate of a currency versus a weighted average of other foreign currencies. An increase in REER implies that imports are cheaper and exports become expensive. The trade openness (TR) index is the trade share calculated as the ratio of exports and imports to GDP. The data for Broad money (MON), REER, and TR are taken from World Development Indicator (WDI).

4. Results and Discussions

This section will discuss empirical results and findings by applying econometric techniques.

4.1 Unit Root Test

To test the stationarity of the given data unit root assessment is used. Based on the integrated level of variables, an appropriate technique is decided. Table 1 shows the stationarity of variables at first difference. The CA deficit (CAD) is stationary at first difference with an ADF value of -5.990514 which is less than the critical value of -2.934247. The BD is also stationary at first difference with ADF statistics -7.528501 being less than

the critical value at a 5% level of significance i.e., -2.943427. Similarly, the weighted interest rate is stationary at first difference with ADF statistics value at -5.322470 less than critical value -3.621023.

Table 1: Results of the Unit Root test

Variables	ADF statistics	Critical values	Probability	Stationarity
WIR	-5.322470	-2.610263	0.0001	I (1)
CAD	-5.990514	-2.934247	0.0000	I (1)
BD	-7.528501	-2.943427	0.0000	I (1)
MON	-5.330327	-3.621023	0.0001	I (1)
REER	-7.199567	-3.536601	0.0000	I (1)
TO	-7.596498	-3.200320	0.0000	I (1)

Source: Authors' calculations

4.2 VAR lag order selection criteria

Table 2: VAR results

Order of lag	AIC	SC
0	31.82405	32.09068
1	26.27474	28.14115*
2	26.73778	30.20398
3	26.65815	31.72414
4	24.84447*	31.51024

Source: Authors' calculations

Other variables real effective exchange rate, Money supply, and Trade openness are also stationary at first difference with ADF statistics value -5.330327, -7.199567, and -7.596498 less than critical value i.e., -3.621023, -3.536601 and -3.200320 (table 2). The lag length selection for the cointegration test is based on the minimum value of AIC (Akaike information criteria). Here, the minimum AIC is at lag 4 and therefore selected for the cointegration analysis to determine the presence of the long-run association between variables.

4.3 Johansen Cointegration Test:

To test the long-run association between variables Johansen Cointegration technique is used. It follows the Max eigenvalue test and the Trace test. These two tests are used to find out whether that long-run relationship exists or not.

Table 3: Trace test results

No. of CEs	Eigenvalue	Trace statistics	Critical value	Probability
None*	0.747831	121.4007	95.75366	0.0003
At most 1*	0.665536	74.56046	69.81889	0.0199
At most 2	0.412074	37.32281	47.85613	0.3325
At most 3	0.262971	19.26358	29.79707	0.4741
At most 4	0.188219	8.889283	15.49471	0.3757
At most 5	0.051549	1.799459	3.841466	0.1798

Source: Authors' calculations

Table 3 demonstrates the result of the trace test which shows the rejection of the null hypothesis (existence of no long-run relationship) at a 5% level of significance. The trace statistics value i.e., 121.4007 is greater than the critical value 95.75366 with a probability value of 0.0003 which indicates the rejection of the none* hypothesis. Second trace statistics i.e., 74.56046 is also greater than the critical value i.e., 69.81889 with a probability value of 0.0199 which indicates the rejection of at most 1* hypothesis. The results of the trace test indicate the presence of 2 cointegration equations.

Table 4 shows the results of the Max-Eigen value test which also indicates the existence of two cointegration equations. On the other hand, the Max-Eigen value test indicates rejection of the null hypothesis at a 5 % level of significance which means that there exists a long-run association between variables.

Table 4: Rank test (Maximum Eigenvalue)

No. of CEs	Eigenvalue	Max-Eigen Statistics	Critical value	Probability
None*	0.747831	46.84024	40.07757	0.0075
At most 1*	0.665536	37.23765	33.87687	0.0191
At most 2	0.412074	18.05923	27.58434	0.4902
At most 3	0.26297	10.37429	21.13162	0.7089
At most 4	0.188219	7.089824	14.2646	0.4786
At most 5	0.051549	1.799459	3.841466	0.1798

Source: Authors' calculations

Table 5 shows the long-term significance of each independent variable's effect on the dependent variable. According to the positive sign of the BD coefficient, a 1% rise in the BD will, ceteris paribus, result in an average long-term increase in the CA deficit of 0.22716%. According to the coefficient of weighted interest rate, a 1% increase in interest rates would, ceteris paribus, cause an average long-term increase in the CA deficit of 1.160233%.

Table 5: Coefficient of the cointegration equation

Variables	Coefficients	Standard Errors	t-values
BD	0.13459	0.06934	3.3890
WIR	1.23950	0.14316	8.10451
MON	-0.17428	-0.02647	-6.05519
REER	0.0125	0.00321	3.88845
TO	0.598961	0.07181	5.97348

Source: Authors' calculations

In Table 5, the value of the coefficients of the cointegration equation is given. The wide money coefficient was negative, indicating that a 1% increase in the money supply would, result in a long-term reduction in the CA deficit of 0.17483% on average, ceteris paribus. The coefficient of trade openness has a positive sign, meaning that over the long term, a 1% increase in trade openness would, result in an average rise in the CA deficit of 0.598961%, ceteris paribus.

4.4 Vector Error Correction Model (VECM):

This test is conducted to establish a short-run link among variables and to test whether the diversion from the mean in the short run diverges toward the mean in the long run. The cointegration equation depicted the value of a coefficient less than 0. This suggests that any deviation in long-run equilibrium will be corrected.

Table 6: Vector Error Correction results

Variables	Coefficients	Standard Errors	t-value
CAD	0.359234	0.17699	1.6578
BD	-0.45678	0.29196	-2.46571
WIR	-0.67890	0.21302	-2.75476
MON	-0.32567	0.1362	-2.35980
REER	0.307705	0.15833	1.94344
TO	0.472776	0.17064	1.77065
EC	-0.62567	0.20987	3.5032

Source: Authors' calculations

The adjustment coefficient of EC means other things held constant in the previous period deviancy from long-run balance is corrected in the present period at an adjustment speed of 62.5% (table 6).

From the results above, policymakers must strike a balance between short-term adjustments and long-term structural reforms to address twin deficits effectively. The specific policy mix will depend on Pakistan's unique circumstances and objectives, taking into account factors such as the level of debt, inflation, exchange rate regime, and external economic conditions. Overall, the twin deficit presents challenges that require careful policy management to achieve fiscal and external sustainability, promote economic growth, and maintain stability in the economy.

4. Conclusions and Policy Implications

The relationship between BD and CAD is complex and not always straightforward. A budget deficit can lead to a trade deficit if the government borrows to finance its spending, including imports of goods and services. Conversely, a budget surplus can lead to a trade surplus if the government uses the excess funds to invest in export industries or reduce its reliance on imports. In this regard, the main objective of the study is to examine the relationship between budget and trade deficit. For this purpose, time series data is used from 1980 to 2021 for Pakistan. Johansen's co-integration test is applied to investigate the long-run relationship between variables; the result of the cointegration test shows the existence of a long-run association between the two deficits. The results of the Vector Error correction model (VECM) represent the convergence of variables from the short run to the long run. Although the relation between variables is not significant in the short run, based on the empirical results of the study, the twin deficit hypothesis holds only in the long run in the case of Pakistan validating the Keynesian theory that fiscal deficit rises domestic absorption, increasing interest rate and foreign investment which will result in an expansion of trade deficit. Hence, the results also indicate the rejection of the Ricardian equivalence hypothesis in the case of Pakistan. It is therefore suggested that such policies should be designed to make our exports more attractive in the foreign market and necessary measures should be taken to reduce the dependence on imports. The government should focus more on revenue collection through direct taxation and reduce the irrelevant current cost of spending. However, to implement all these measures and policies effectively a stable political situation of the country is also required.

To address the fiscal deficit component of the twin deficit, policymakers may need to implement fiscal consolidation measures. These measures could include reducing government spending, increasing taxes, or a combination of both. The aim is to improve the government's fiscal position by reducing the deficit, which can help stabilize the economy and restore market confidence. Addressing a twin deficit often requires structural reforms to boost the competitiveness of the economy. This can involve measures to enhance productivity, promote investments, and improve the business environment. By increasing competitiveness, countries can boost exports and reduce the current account deficit. A twin deficit may put pressure on the country's currency. In some cases, policymakers may consider allowing the currency to depreciate to improve export competitiveness and reduce the current account deficit. However, this approach can have implications for inflation and borrowing costs, and it needs to be managed carefully. To reduce the current account deficit, policymakers may implement measures to promote exports. This can include providing incentives for export-oriented industries, improving trade infrastructure, negotiating trade agreements, and focusing on diversifying export markets. Encouraging export growth can help narrow the trade imbalance and improve the overall balance of payments. To reduce imports, policymakers may also consider promoting import substitution industries. This involves supporting the domestic production of goods that are currently being imported. By substituting imports with domestically produced goods, the country can reduce its dependence on foreign products and lower the current account deficit. Policies that attract foreign direct investment can help finance the current account deficit by bringing in capital inflows. Creating an attractive investment climate, offering incentives for foreign investors, and removing barriers to FDI can encourage capital inflows and help offset the current account deficit.

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The data that support the findings of this study are available from the corresponding author upon reasonable request.

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