



Ailya Hanif<sup>1</sup>, Nimra Zafar<sup>2</sup>, Basharat Batool<sup>3</sup>, Sundas Shafi<sup>4</sup>, Muhammad Hanif<sup>5</sup>

## Abstract

Finance, transportation, communication, wholesaling, and other business services depend on the services industry. Services and their subservices contribute to various economic activities and may also boost economic growth by improving other enterprises. Therefore, service export determinants must be studied. Endogenous growth theory underpins human capital buildup in commerce and also this theory provides ground for technical advancement and learning by doing to boost productivity and trade. Endogenous growth and network externalities theories underpin ICT in trade. Therefore, this study analyzes the impact of ICT on service exports along with human capital and trade openness as an explanatory variables in selected South Asia. Panel data from 2005 to 2020 is collected for selected South Asian nations. Panel cointegration tests confirmed the long run relationship between variables when panel data order was confirmed. Panel fully modified least squares is used for long run estimates and results indicate that ICT and human capital boost South Asian service exports. Governments should improve internet access, cell phone and broadband infrastructure, digital payments, and e-commerce. These countries should also collaborate on SAARC human capital development.

**Keywords:** human capital, ICT, service exports, panel study

## 1. Introduction

The services industry is the largest and most rapidly expanding sector globally, contributing the majority of overall production and employment in most advanced nations. According to the World Bank (2023), the services sector contributes to 47 percent of the total Gross Domestic Product (GDP) in low-income nations, 53 percent in middle-income countries, and 73 percent in high-income countries. The services industry plays a substantial role in facilitating cross-border trade and attracting foreign direct investment, offering major contributions. The services sector is anticipated to continue its upward trajectory, growing in significance due to developments in knowledge-based and skill-oriented activities. In an increasingly globalized services industry, policymakers need to grasp the concept of export competitiveness in order to choose suitable offshore export destinations or promote their own regions as viable options for exporting.

The significance of global trade for a nation's economic well-being and advancement has been firmly established in the field of economics. Based on the fundamental principles of the nature and origins of a country's economic success, it is necessary for nations to sell goods and services to generate income in order to cover the cost of importing goods that cannot be produced inside their own borders. Several theories have been proposed to elucidate the reasons behind the participation of nations and specific enterprises in international trade. In recent years, many industrialized and developing nations have chosen the services sector as the primary driver of economic growth in the current millennium (Noland, Park & Estrada, 2012; Park & Shin, 2012). An efficient services sector is essential for the growth of the economy and facilitation of global trade. The services sector plays a vital role in supporting and facilitating other economic sectors and industries, including finance, transportation, communication, wholesaling, and various commercial services. The increase in the trade of services and the wide range of subservices, along with their significant contribution to other economic activities, can likewise stimulate economic growth by improving the performance of other firms. This is due to the services sector's capacity to offer significant intermediate inputs, especially in a progressively globalized economy (McGuire, 2002).

The endogenous growth hypothesis establishes the foundation for the significance of human capital accumulation in commerce. The endogenous growth theory focuses on the role of technological advancement and learning by doing in increasing productivity, which in turn has a beneficial impact on trade (Romer, 1990). Similarly, Chou et al. (2014) contended that the combination of endogenous growth theory and network externalities theory offers a conceptual framework for understanding the role of information and communication technology (ICT) in commerce. Hence, literature has identified many channels of ICT that can have an impact on trade, particularly in the service sector. ICT decreases the expenses associated with conducting transactions, hence promoting competition. Additionally, it aids in eliminating the imbalance of information in foreign markets. The use of ICT also helps importers and exporters by providing more cheap access to international markets. ICT also makes it easier for technology to proliferate, which helps underdeveloped countries catch up to developed ones (Najeeb, 2022).

Studies examining the relationship between ICT and commerce tend to focus on the general impact of ICT on trade in services, leaving out the possible diversity of effects it may have on specific service goods. Based on ICT utilization, services can be categorized into two types (Nath & Liu, 2017). ICT is used in both production and consumption in ICT-enabled services (Luong & Nguyen, 2021), but non-ICT services only use ICT as a supplementary or incidental tool (Biryukova & Matiukhina, 2019). ICT may have a variety of effects on commerce in the first category of services. ICT is crucial to the globalization of many industrial process components and the fragmentation of the global value chain (Beecroft et al., 2020). Businesses may effectively supply services by interacting and exchanging information in real-time with suppliers and customers worldwide, made possible by information and communication technology. Furthermore, less expensive service providers may outsource and offshore their business (Tabatabaei & Mohammadi, 2021). Moreover, since ICTs are an essential tool for providing services in a variety of settings, their expansion may have a favorable impact on trade flows (Rodríguez-Crespo, & Martínez-Zarzoso, 2019). The growth of ICT may also lead to an expansion of a nation's ICT-enabled service sectors, such as computer services that offer technical support for computers and mobile phone hardware and software. ICT may also have an impact on non-ICT service sectors like building, travel, and tourism.

<sup>1</sup> Department of Economics, Kohat University of Science and Technology, Kohat, Pakistan

<sup>2</sup> Department of Economics, Kohat University of Science and Technology, Kohat, Pakistan

<sup>3</sup> Department of Economics, Kohat University of Science and Technology, Kohat, Pakistan

<sup>4</sup> Department of Economics, Kohat University of Science and Technology, Kohat, Pakistan

<sup>5</sup> Corresponding Author, Department of Economics, Kohat University of Science and Technology, Kohat, Pakistan, [hanifhanfii4321@gmail.com](mailto:hanifhanfii4321@gmail.com)

Adoption of ICT may reduce fixed entry costs in a market, resulting in higher exports (Mirtsch et al., 2021). While ignoring the potential variation in its impacts on various service kinds, research on the relationship between ICT and commerce concentrates on the general influence of ICT on the trade in services. Furthermore, since ICT is an essential tool for providing services in a variety of contexts, its growth may benefit the flow of products and services (Rodríguez-Crespo, & Martínez-Zarzoso, 2019). A nation's ICT-dependent service businesses, including computer services, which provide technical support for computer and mobile phone hardware and software, may increase as a result of the proliferation of ICT. ICT may also have an effect on non-ICT service industries like building, travel, and tourism. Exports can increase when ICT is implemented since it lowers the entry costs into a market (Mirtsch et al., 2021).

Investing in human capital is said to be essential to luring overseas nations for outsourcing. Furthermore, empirical data indicates that the export of services appears to be more dependent on human capital (Siddique, Mahmood, & Noureen, 2016). Human capital has a significant role in the provision of services. Countries possessing ample, well-educated, and skilled populations have the capacity to engage in more services exports (Najeeb, 2022). Furthermore, empirical data indicates that human capital plays a crucial role in the export of services. It not only generates additional chances for service providers to export their services but also reduces the costs associated with importing services (Ahmed & Ahsan, 2014). Researchers incorporated service value added as a determinant of service exports. In this study, service value added will be used as a control variable. There is a scarcity of research papers that have investigated the factors influencing exports, particularly service exports, in South Asia. Other research studies analyze the factors that influence exports or the correlation between exports and other economic variables. Brun, Gambetta, and Varela (2022) conducted a study examining the influence of currency rates on exports, whereas Rehman et al. (2020) explored the relationship between infrastructure and exports. Beecroft et al. (2020) investigated the effect of ICT on the export of manufactured goods, while Nath and Liu (2017) examined the impact of ICT on the trade of services. This study examines the influence of ICT and human capital on the export of services in South Asia, distinguishing it as a distinctive and pioneering study.

## 2. Review of Literature

The export performance will be impacted by ICT, which will reduce the fixed and variable expenses associated with exporting. Fixed export costs are the expenditures that enterprises incur when they acquire information about consumer preferences and overseas markets in this context. The cost of communicating with international trade partners and clients is included in marginal export costs, which are the expenses associated with maintaining export operations. Numerous empirical studies have emphasized the significance of fixed and marginal export costs in the determination of export operations. Bugamelli and Infante (2003) identified substantial disparities in the capacity of Italian manufacturing companies to gather data on consumer preferences and international markets. Furthermore, Das et al. (2001) conducted an analysis that employed panel data to construct an empirical model for Colombian chemical producers. They discovered that there is a substantial variation in accumulated export costs among various facilities, which is accounted for by both fixed and marginal cost heterogeneity. Despite the fact that fixed export costs are less consistent, empirical data suggests that marginal export costs still have a significant impact on exports. The volume of bilateral trade was significantly negatively impacted by the exorbitant expenses associated with telephone communication, according to Fink et al. (2005). Moreover, the report illustrated that ICT, through enabling affordable global communication, substantially decreases trade expenses. Considering its advantages, ICT should have a significant influence on both fixed and marginal expenses related to exporting. Initially, ICT should streamline the process, reduce costs, and expedite the ability of enterprises to investigate client preferences and demand in foreign markets. Furthermore, ICT should diminish the financial and temporal expenses associated with connecting with international partners and clients. The former represents a set cost associated with entering overseas markets, while the latter refers to variable costs required to sustain and grow export activity. Accordingly, a reduction in fixed export expenses will impact a company's choice to start exporting on a large scale, whereas a decrease in variable export expenses will lead to a rise in the proportion of exports in relation to total production.

According to the "New Trade Theory," the level of efficiency of a corporation is the determining factor for its involvement in export activities. According to Melitz (2003), export-oriented enterprises are the most efficient. The model establishes the degree of effectiveness of a particular company, with labor productivity being the primary emphasis. Considering the benefits of utilizing ICT to enhance ICT has the potential to enhance worker performance and, as a result, indirectly boost export activities by enhancing labor productivity. ICT, or Information and Communication Technology, can enhance labor productivity, resulting in a reduction in the production cost. Consequently, lower production costs permit a company to absorb fixed expenses associated with exporting and go into a foreign market. Therefore, among the obvious consequences such as reduced expenses in trade, ICT can also have an indirect influence on commerce by enhancing the efficiency of labor. Remarkably, in the late 1980s, the influence of ICT was either nonexistent or even detrimental. Furthermore, in the present century, the contribution of ICT has been unexpectedly smaller than anticipated. Robert Solow observed that computers were widely present but did not contribute significantly to productivity figures (Solow, 1987).

Empirical evidence from research that explicitly examine Europe reveals that the impact of ICT on productivity growth in the EU is not as strong as in the United States. Crafts (2008) attributes the decline in productivity to inadequate investment in intangible capital. Intangible capital in this context refers to the implementation of organizational changes and the conducting of firm-specific tests with new technology. Nevertheless, according to the study, the processes associated with "co-invention" within companies require more time compared to technological modernization. Therefore, the impacts of ICT could not become apparent immediately (Crafts, 2008; Akhvediani, 2016).

Hummels and Klenow (2005) made a substantial empirical contribution to the examination of the extensive and intense aspects of trade. By analyzing export data from a diverse range of nations and 5000 product categories, researchers found that a significant proportion, namely two-thirds, of the largest countries' exports can be attributed to a substantial margin. This study further supports the notion that trade margins can serve as a valuable indicator for elucidating trade specialization and complementing the findings of trade theories. Prior research has explored the expanded and heightened trade margins in many contexts and circumstances, while

also identifying novel categories of trade margins. Felbermayr and Kohler (2006) provide a definition of the extensive and intensive connections between terms of trade at the national level. The big margin is directly linked to a country's ability to form trade agreements with new trading partners. On the other hand, the term "intense margin" pertains to the enhancement of trade links with current trading allies. The investigation into trade margins is still far from being concluded. Lucio et al. (2018) found that the literature has identified differences among exporters in terms of the extensive margin of trade, which refers to the number of products exchanged, the destination of trade, and the routine of firm-level transactions. Additionally, there are discrepancies in the intense margin of trade, which refers to the level of export intensity. Prior studies examining the influence of ICTs on commerce have mostly focused on overall trade, disregarding the existence of trade margins. Consequently, the discoveries may not precisely depict evolving trading patterns. The literature on the impact of ICT on business exhibits specific traits. Primarily, previous research has predominantly focused on national-level data, examining the quantity of subscriptions. Moreover, the majority of them were cross-country regressions. Panel data has been increasingly used to illustrate the development of ICTs across time. Furthermore, numerous prior studies have employed a bilateral trade framework, which enables the incorporation of supplementary variables to isolate the effects of geographical determinants. Additionally, variables that measure the quantity of subscriptions are frequently utilized as indicators to represent ICTs, along with other indices that are subjectively created.

Recent advancements in economic development models, along with a significant increase in international commerce, have prompted a reevaluation of the relationship between foreign trade and the pace of economic growth. The theory of endogenous growth, which gained popularity after the 1980s, explains the dynamic effects of foreign trade or trade liberalization. It emphasizes the importance of learning by doing, research and development (R&D), knowledge accumulation, and knowledge and technology-based economic growth (Young, 1991). Nonetheless, it is challenging to deduce adequate conclusions regarding trade and economic expansion from these ideas. Based on theoretical frameworks about the relationship between human capital and export, it is suggested that export performance can enhance human capital and also stimulate export activities. Extensive research indicates that exports have the potential to enhance human capital. Firstly, exporting facilitates learning and enhances human capital by enabling the acquisition of new managerial, marketing, and manufacturing skills (Grossman & Helpman, 1990). Furthermore, despite the reliance on labor-intensive export businesses that lack skilled workers, overseas commerce facilitates the transfer of technology from rich countries to underdeveloped ones (Choi, Zhou, & Ko, 2023).

### 3. Research Methodology

This study is a panel study focused on South Asia. Panel methodologies will be utilized to accomplish the goals of this investigation. These panel techniques are panel unit root tests, panel cointegration and panel fully modified ordinary least squares. This study employed Im, Pesaran, and Shin (2003) and Levin, Lin and Chu (2002) unit root tests whereas Pedroni (1999) panel cointegration test are employed for cointegration. Phillips and Hansen (1990) developed fully modified ordinary least squares and Pedroni (2000) reformed it to make suitable for panel data analysis. The model used in the study is represented by Equation (1) in a panel setting that includes both the country and time period. Additionally, the study will utilize panel data spanning from 2005 to 2020 for specific South Asian countries. The nations included in this list are Bangladesh, India, Maldives, Nepal, Pakistan, and Sri Lanka. The selection of these countries is based on the availability of data. All variables are sourced from the World Bank (2023). From theoretical and empirical literature, ICT and human capital can influence service exports (Rodríguez-Crespo, & Martínez-Zarzoso, 2019; Siddique, Mahmood, & Noureen, 2016). Therefore, in this study, ICT and human capital are independent variables, while service value added represents the whole value of the service sector. Thus, this study incorporates service value added as a control variable. The model presented is an empirical one.

$$SX_{it} = f(ICT_{it}, HC_{it}, SV_{it})(1)$$

Whereas  $SX$ , is services exports,  $ICT$  Information, communication & technology,  $HC$  is human capital and  $SV$  is services value added.

### 4. Results and Discussion

The panel unit root tests results show that all variables are stationary by taking their first difference. The panel cointegration tests can be employed to determine cointegration among variables after determining the order of integration of variables. As the results of panel unit root tests indicate that all variables are integrated of order one then, one can employ panel cointegration tests. This study employed Pedroni panel cointegration test and results of this test are provided in Table 2. These results indicate that cointegration exists in long run among variables as majority of the tests rejects the null hypothesis of no cointegration against the alternative hypothesis that panel cointegration is present. One can concludes from these results that the explanatory variables are determinants of service exports in South Asia. Once it is found that  $ICT$ , human capital and service value added are determinants of service exports then one can employ cointegration regression to determine the impact of  $ICT$  on service exports along with human capital and service value added.

**Table 1: Panel Unit root tests**

Variables	Im, Pesaran & Shin		Levin, Lin & Chu	
	at level	At first	level	at first
$\log SX$	-1.51	-3.56	-0.74	-3.9
$\log ICT$	-0.22	-2.97	1.40	-2.81
$\log HC$	-0.96	-7.35	-0.71	-5.87
$\log VA$	0.27	-4.71	1.89	-2.93

\*shows significance level at one percent level

**Table 2: Panel cointegration tests results**

Tests	Weighted Stat.	Tests	Stat.
Panel v-Statistic	0.245720	Group rho-Statistic	0.714758
Panel rho-Statistic	0.034443	Group PP-Statistic	-4.807512*
Panel PP-Statistic	-3.082931*	Group ADF-Statistic	-6.162601*
Panel ADF-Statistic	-3.426106*		

\*shows significance level at one percent level

The long run results are provided in Table 3 below. These estimates are obtained through panel fully modified least squares as this cointegration cares about endogeneity which usually arise during cointegration process. The interpretations of these results are as follows. This study found that ICT has positive and significant effect on service exports. One percent change in ICT will be responsible for 0.245 percent change in service exports. Additionally, these results indicate that human capital has positive and significant effect on service exports. One percent change in human capital will be responsible for 0.871 percent change in service exports. Likewise, this study found that services value added has positive and significant effect on service exports. One percent change in services value added will bring 0.537 percent change in service exports.

The result finding of this study regarding the effect of ICT impact on service exports is strengthening the claim of Nath and Liu (2017) that ICT positively influence service trade. Moreover, the result finding regarding the effect of human capital is according to what Siddique, Mahmood, and Noureen (2016) argued that human capital has a vital role in services exports. Likewise, this finding of the study also backing the argument of Najeeb (2022) that human capital enhances the capacity to enhance service exports. The positive effect of service value added on service exports show that service value added is the base for more service exports. Based on the results of this study, ICT has a significant influence on the export of services in South Asia. It is recommended that governments enhance and ensure the availability of internet access, together with the infrastructure for mobile phones and broadband internet. Additionally, they should promote digital payments and facilitate the growth of online commerce. Similarly, these countries should cooperate with each other to enhance their human resources by leveraging the groundwork of SAARC.

**Table 3: Long run Results**

Exogenous Variable	Endogenous Variable: <i>logSX</i>	
	Co-eff.	t-stat.
<i>logICT</i>	0.244953	2.484617
<i>logHC</i>	0.870844	-3.639545
<i>logSV</i>	0.537088	4.799126

\*shows significance level at one percent level

## 5. Conclusion

When it comes to other economic sectors and businesses, such as finance, transportation, communication, wholesaling, and other commercial services, the services sector is absolutely essential. An increase in the trade of services and the availability of a large number of subservices, in addition to their significant contribution to a wide range of economic activities, may also stimulate economic growth by improving the performance of other firms. Thus, it is of the utmost importance to investigate the factors that determine service exports. The function of human capital accumulation in trade is supported by the endogenous growth theory, which serves as the foundation for this theory. This endogenous growth hypothesis also places an emphasis on the development of technology and learning through doing as a means of increasing productivity, which in turn has a positive impact on commerce. In a similar vein, the framework for information and communication technology in commerce is provided by endogenous growth theory and network externalities theory. In this study, the impact of ICT and human capital on service exports for South Asia is investigated, with the value added of services serving as the control variable. In addition, data from a panel will be collected for a selection of South Asian countries from the years 2005 to 2020. Bangladesh, India, the Maldives, Nepal, Pakistan, and Sri Lanka are the countries that fall under categories. Following the verification of the order in which the panel data were presented, the panel cointegration tests were conducted to ascertain the long-term interactions between the variables. The panel totally modified least squares method is utilized in order to acquire the estimates for the long term. According to the findings of this study, ICT has a substantial impact on service exports in South Asia. It is suggested that governments should improve and guarantee the accessibility of the internet, as well as the infrastructure for mobile phones and broadband internet, as well as encourage digital payments and promotion of online commerce. In a similar vein, these nations ought to collaborate with one another in order to improve their human capital by building on the foundation of SAARC.

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