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# The Role of Research in Economic Development

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**Abstract-** This study channels via the association between analysis utilizations, and financial advancement at the national level in creating country. Innovative works are basic driving advancement, national improvement and financial development, yet there likewise should be objective will to succeed. There must be a solid collaboration amongst the scholarly world and the industries. At the same time, hypothetical, as well as experimental writing has radically demanded that the thing of interests in examine is an irreplaceable part of economic development. The affiliation between inquire about uses and monetary execution has pulled in a lot of consideration in the scholastic field for a long while. Notwithstanding that, the subject has been for some time stressed by governments and private undertakings. The vast majority of the modern financial experts have ascribed the sustained development in developing nations to their escalated inquiries in research works. The dialog of the connection between economic development and research expenses has an uncommon direness, for instance Turkey's aspiring financial targets. The emphasis on human capital as a driver of economic development for developing nations has prompted undue consideration on school accomplishment. Developing nations have made impressive advance in shutting the hole with regarding school accomplishment, yet ongoing exploration has underscored the significance of subjective aptitudes for economic development. This outcome shifts regard for issues of school quality around the developing nations has been significantly less fruitful in shutting the holes. Without enhancing school quality, developing nations will think that it is hard to enhance their long run financial performance. This paper exposes the impact of research in economic development of developing nations where it is taken in high-regard, shows where research has taken them to, influencing their GNP, NDP, new inventions, established standards.

Keywords: Research, Human Capital, Economic Development

## 1. Introduction

Research University in low-and centre wage nations have critical parts to play in creating separated and successful scholastic frameworks, and in making it workable for their nations to join the worldwide learning society and contend in complex information economies [1]

An in-depth study of something with a focus and undivided attention to get intense knowledge about it for addition to already existing stock of knowledge is known as Research.



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It is apparent that for accomplishing long haul financial aspects development the measure of Research is profoundly critical. The immediate impact can be estimated with trouble due to the slack and the genuine relationship. So, following the genuine impacts of the fruitful item advancements, improvements will be increasingly essential yet additionally troublesome in light of the fasten mechanical changes also, the expanding number of new customers and markets. In any case, even of them, still numerous of the change tries occurred without the perception of its ease of use or the absence of sources [2].

Research and development are key long determinant of profitability and buyer welfare. Be that as it may, the amount Research and Development is sufficient? A great part of the hypothetical writing has concentrated on reasons, for example, imposing business model evaluating and people in general amiable attitude of information—why there might be too minimal private Research and Development. Notwithstanding, there are similarly convincing reasons, identified with the contorted impetuses from patent races and the exchange of rents through imaginative obliteration, to feel that there might be excessively Research and Development. In the end, the inquiry with regards to the sign and extent of the deviation of Research and Development venture from its socially ideal level is an experimental one that can be drawn closer from various headings. [3]

Jones and Williams [4] demonstrate to translate existing econometric assessments of profits to Research and Development with regards to endogenous development models and locate that ideal Research and Development venture is no less than four times more noteworthy than genuine spending. This approach yields a reasonable answer with regards to the level of over-or underinvestment in Research, however it doesn't reveal which factors decide the general outcome, the learning of which may have critical arrangement suggestions.

## **2. Literature Review on the Purpose of Research and the Significance of Research**

Falk [5] inspected the impact of Analysis and Development uses on monetary development for OECD nations with board information investigation strategy by utilizing the information identified with the period 1970-2004. As per the Findings, both the proportion of organization's Research and Development uses to GDP, and the offer of Analysis and Development interests in cutting edge innovation segments, has solid beneficial outcomes on both per capita pay and normal hourly profit per capital in the long haul.

Nadir and Kim [6] examined the spread of global Research and Development, business and proficiency for G-7 nations. In this unique circumstance, he dissected the impact of universal Analysis and Development overflow on the expansion of aggregate factor profitability, impact of overflow on the generation structure, impact of innovation exchanges on fare and import models, and computing the personal come back rates of Research and Development speculations and physical capital also social come back rates of Research and Development for seven noteworthy industrialised nations. Because of the examination, it was presumed that there are huge contrasts between a nation's own Research and Development endeavours and the level of advantage picked up from the Research and Development ventures of different nations. It was additionally presumed that the course of worldwide overflow consequences for factor requests and yield is steady between the nations, yet their extent fluctuates as per distinctive nations and periods.

Nunes et al. [7] directed an examination to decide if there is a comparable similarity as far as Research force and development amongst little and average size endeavours with high innovation and the individuals who need high innovation. As per the discoveries, Research force confines the development of ventures with high innovation at bring down levels of power, and urges them to develop at higher Research Expenditures and Economic Growth Relationship in Turkey 191 levels.

In any case, Research and Development power confines the development of endeavours without high innovation paying little heed to the level of Research and Development level. In their investigations on global Research and Development overflow and associations, Coe et al. [8] came to the summary that hierarchical contrasts are huge factors for add up to determinant profitability and Research and Development overflow influences its level.

Horowitz [9] has examined the relations amongst Research and Development increment and provincial monetary development for different states in United States utilizing the information for the period 1920-1964 and inferred that development condition, connection estimation coefficients are reliable with development, and locales are happy with the way that Research and Development exercises are very predictable with development rates.

Kim [10] hypothesized the impact of Analysis and Development exercises on monetary development in Korea by utilizing Analysis and Development based Cobb-Douglas creation work and the information for the period 1976-2009. As indicated by observational discoveries got because of the examination, components of creation (work and capital) make a commitment to monetary development by around 65%. Additionally, commitment rate of Research and Development stocks on monetary development is around 35%. After investigation, it is seen that estimated commitment of private and open Research and Development stocks on monetary development are separately 16% and 19%.

Funke and Niebuhr [11] dissected the connection amongst Research and Development overflow and financial development for West Germany utilizing the information for the period 1976-1996. As indicated by the information acquired, dispersal of data is past local limits. Likewise, in geological terms, overflow between close areas were for the most part viewed as essential.

Sadraoui et al. [12] broke down the causality amongst Research and Development coordinated effort and financial development by dissected the connection amongst Research and Development consumptions and monetary development for China and achieved the summary that GDP will expanded by roughly 0.92% if there is 1% expansion of Research and Development uses [13]. Ulku [14] examined the connection amongst Research and Development, advancement and financial development with board information technique for 20 OECD nations and 10 nations, which are not individuals from OECD by utilizing Patent and Research and Development information for the time of 1981-1997. The information got propose that impact of Research and Development stocks on advancement is huge just in OECD nations with expansive markets, and there is a positive connection between GDP per capita and advancement in both OECD nations and nations, which are not individuals from OECD.

Altin and Kaya [15] broke down the connection amongst Research and Development uses and monetary development by utilizing the information for Turkey for the period between 1990-2005 and found that there isn't a causality connection amongst Research and Development uses and financial development in the long haul, yet there is a causality similarity from Research and Development uses to financial development in the long haul. Korkmaz [16] dissected the connection amongst Research and Development speculations and monetary development with Co-joining strategy by utilizing the information for the period 1990-2008 and arrived at the decision that there is a co-reconciliation between the two variations and the two variations influence each other in the long haul. Also, SimsekveBehdioglu [17] led an investigation on the significance of financial development by breaking down the Research and Development exercises in Turkey and OECD nations with bunch examination for the period from 1999-2002 and arrived at the conclusion that Turkey falls behind OECD nations concerning Research and Development markers.

Taban and Şengür [18] clarified the connection amongst Research and Development and monetary development by utilizing the information for the period between 1990-2012 in Turkey and coinorporation models, and went to a position that Research and Development consumptions emphatically influence financial development over years. According to Gülmез and Yardımcıoğlu [19] broke down the connection amongst Research and Development uses and monetary development in OECD nations by utilizing the information for the period 1990-2010 and reached the decision that there is a huge intuitive connection amongst Research and Development consumptions and financial development variations in the long haul. One strand of models incorporates those by Barro [20], Barro and Lee [21] and Baumol [22], which contend that human capital assumes a critical part as an encouraging variable on the universal exchange of innovation from advancing nations to 'replicating' ones, helping them to 'make up for lost time' with the created nations. Jin [23] develops a growth mode, assuming that the creation of new thoughts/plans is an immediate capacity of the human capital (which has the type of logical information). Hence, interest in human capital, by enhancing innovative work, involves a development in physical capital speculation, which thusly brings about higher genuine development rates.

In all actuality, from a theoretical viewpoint, though specific change may grow the enthusiasm for human capital and along these lines the wage premium of expert over unskilled specialists, a bigger measure of direction should provoke a higher supply of talented work and a short time later to a fall in the wage differential.

## 2.1 Purpose of Research

Research is a logical and deliberate scan for appropriate data on particular theme. It is a workmanship and in addition art of examination. The propelled Learners' Dictionary of momentum English characterized as "a watchful examination or request extraordinarily through scan for new actualities in any branch of information." Redman and Mary characterize look into as a "systematized push to increase new learning". A few people consider examine as a movement, a development from the known to the obscure. Exploration is a scholarly procedure whereby an issue is seen, separated into its constituent components, and examined in the light of certain fundamental presumptions (J.H.Shera).

## 2.2 Significance of Research

As indicated by Hudson Maxim Significance as, "All advances is conceived of request. Uncertainty is frequently superior to anything carelessness, for it prompts request and request promptsexamination"Research instils logical and inductive reasoning and it advances the improvement of coherent propensities for considering and association. The part of research in a few fields of connected financial matters, regardless of whether identified with business or to the economy in general, has significantly expanded in present day times. Research gives the fundamental to about all administration strategies in our economic framework.

Research gives the premise to almost all administration approaches in our economic framework. Research has its uncommon centrality in taking care of different operational and arranging issues of business and industry. In a few ways, activities investigate, statistical surveying and motivational research are essential and their outcomes help with taking business choices. Research is similarly critical for social researchers in concentrate social connections and in looking for answers to different social issues. It gives scholarly fulfilment of knowing things for information. It likewise has the down to earth utility for the social researcher to pick up learning in order to have the capacity to improve or in a more proficient way.

### **2.3 Impact of Research in Economic Development in respect to Establishment of Research, New Inventions, Increase Gross National Profit and Impact on Country's Human Capital**

#### **2.3.1 Establishment of Research**

Kwack and Yang [24] broke down Korean development encounter from neoclassical development point of view. Yearly information for the period 1971-2002 was utilized for this reason. Speculation rate, R&D, Education and size of government developed as real determinants of long-run financial development in Korea.

The Study gave confirmation to endogenous development hypothesis. The examination demonstrated that open and family unit's consumption on instruction and Research venture are significant supporters of development and enhancing nature of work. Higher reliance proportion of young and more established individuals antagonistically influenced Korean development rate. Change of political, social and social establishments was prescribed to accomplish long-run managed monetary development rate.

#### **2.3.2 New Inventions**

The Research and development uses might be considered as an interest in new innovations, and information base, which can be then, changed into more effective creation techniques for accessible assets. Should the more elevated amount of Research and development consumptions succeed, the larger amount of development rates may be normal. In light of the overflow impacts, the active advantages of new thoughts may not precisely pay back to the general population who really improve them, and this circumstance focuses to the way that private segment will be socially more averse to lead Research exercises on ideal level, giving that no political intercession is accessible. With a specific end goal to empower the Research exercises of private part, this condition may genuine some public mediations, for example, backhanded measures like expense motivating forces and insurance of protected innovation rights, and in addition giving direct help, for example, supply and fund accommodations (OECD, [25])

Grossman [26] built up a model to discover the commitment of Research endowments and openly gave science instruction to financial development. The examination presumed that Research sponsorships may not contribute monetary development and open welfare and the inter-temporal learning overflows are the externalities of Firms use on Research. The sponsorships to Research increment salary disparity.

As state funded instruction adds to monetary development more proficiently than Research sponsorships, in this manner, it was proposed to create Research through advance government funded training of researchers and other talented people.

#### **2.3.3 Increase Gross National Profit**

Khan and Khattak [27] took a shot at the part of human asset administration in financial aggressiveness in South Asian economies with exceptional reference to Pakistan. It was watched that Pakistan profited not the brilliant open doors made by globalized world. Powerless aptitude base is one of the main considerations fending off Pakistan of taking preferences from worldwide markets. The investigation proposed change in ability base, extension of instruction and preparing, and advancement of Research for better monetary outcomes. Fundamental instruction is critical to for human asset improvement in Pakistan. It was additionally recommended to quicken the labour fare to diminish neediness and enhance macroeconomic pointers.

Falk [5] built up a dynamic observational model to know criticalness of Research interest in long run monetary development of OECD nations utilizing board informational index. The investigation gave another confirmation to Research-monetary development relationship. The outcomes were determined through GMM (summed up strategy for moments). The think about explored whether higher Research venture push financial development keeping speculation proportion, mechanical Research force and human capital steady. Five yearly and ten yearly midpoints were utilized. Higher Research speculation was discovered decidedly identified with GDP development in working age populaces. The outcomes were vigorous in both 5-year and 10-year cases.

Goel, et al [28] planned the patterns in different segments of and its commitment to economic development in USA by utilizing broken-down information of 50 years. Shockingly, USA experienced decrease in safeguard Research costs and government Research consumption. The nongovernment Research financing extended pointedly amid the period. Strikingly, the estimation demonstrated solid relationship of monetary development to government Research use instead of non-elected Research expenses. The economic development portrayed solid relationship to guard research rather than non-government research. The investigation proposed significant push up in protection Research and non-government Research in USA for economic development.

#### **2.3.4 Impact on Country's Human Capital**

Kuoet al [29] analysed the impacts of information capital and innovation overflow on territorial financial development in China. The outcomes demonstrated that Research, capital and innovation import contribute altogether too monetary development in China. Flexibility of Research to economic development was as substantial as of innovation demonstrating same commitment to financial development of China. An investigation proposes the presence of Research overflow and global learning overflows. Assessment impetuses, money related help and Research gifts can be useful instruments to energize look into exercises and advancement in economy. Likewise, arrangements which energize interest in instruction and employment preparing were suggested for China. Human capital collection and Research Development are unquestionably two of the most imperative motors of development and, for some odd reason, over the most recent couple of years just couple of endeavours have been made keeping in mind the end goal to coordinate them inside a bound together and homogeneous system. In any case, in these papers abilities amassing occurs through learningbydoing and at work preparing in the generation movement instead of a different development (or training) part. Grossman and Helpman [30] additionally indigenise both human capital and specialized change.

### **3 Methods and Methodology**

#### **3.1 Research Goal**

In the present extreme aggressive air of economic process, the countries are dynamically turning their face to in the present intense aggressive atmosphere of globalization, the nations are progressively turning their face to in the present extreme focused atmosphere of globalization, the nations are progressively turning their face to innovative work exercises keeping in mind the end goal to save and fortify their aggressive edges all through the globe. Since, there is most likely that any expansion in innovative work exercises causes an outstanding ascent in efficiency.

**Table 1: Data Collection** (Source: [31])

Dependent Variables	Variables		
Log (GDP)	Log(employee)	Log (patient)	Log (RD)
Coefficients	0.5070 (2.7531)	-0.2134 -2.3134	0.0148 2.1175
R <sup>2</sup>	0.85	Adjusted R <sup>2</sup>	0.78
F-statistic	51.59		
DW-Stat.	1.77		

Table 1 Presents the Panel Regression comes to fruition. In perspective of backslide comes to fruition the illustrative vitality of the model is extremely basic ( $R^2=0.85$ ) and there is no autocorrelation ( $DW=1.77$ ). As demonstrated by this model the coefficient of delegate is sure and essential at the 1% level. Of course, the coefficient of Research and improvement theory is sure and critical at the 5% level. Additionally, the coefficient of the amount of patent is negative and gigantic at the 5% level. The outcome demonstrated that there is a strong association between the number of R&D agents and GDP. Be that as it may, there is a frail association between's R&D endeavours and GDP. When we looked coefficient of number of licenses there is a negative association among GDP and number of licenses. Every research has its own method, all the method is tending towards increase in production in all manufacturing industry [32-34]

### 3.2 Analysis and Results

These results from the data cumulated over the years for a developing country, Turkey. In this exploration in which the connection between R&D uses and financial development is investigated, as a matter of first importance the stationary of arrangement incorporated into the examinations is tried. From the above Table 1, under Significance at 1% level \*\* Significance at 5% level

### 4 Conclusion

Research is, subsequently, a unique commitment to the current load of learning making for its progression. It is the quest for truth with the assistance of study, perception, examination and test. To put it plainly, the look for learning through goal and orderly strategy for discovering answer for an issue is inquire about. The deliberate approach concerning speculation and the definition of a hypothesis is likewise investigated.

The surveys of hypothetical and exact examinations important to the part of Research in financial development of nations around the globe concur on the huge part of various frame research in efficiency or monetary development. Along these lines, it can be presumed that the creating nations should focus on research to accomplish the supported monetary development. Research centres in developed nations are at the highest point of the scholarly pecking order and are fundamental to the accomplishment of any advanced learning-based economy. Every single developed nation requires these establishments to take an interest in the globalized condition of advanced education. In this manner, understanding the attributes of the exploration college and building the foundations and the scholarly condition required for fruitful research colleges is a best need."

## References

- [1] Frantzen D., Philips C. (2000). R&D. Human Capital and International Technology Spillovers: A CrossCountry Analysis. *The Scandinavian Journal of Economics*, 102 (1), 57-75. DOI: 10.1111/14679442.00184.
- [2] Czarl J, Evenson, R.E. (2007). Economic Growth, International Technological Spillovers and Public Policy: Theory and Empirical Evidence from Asia. Yale University, Economic Growth Center, Discussion Paper No. 777.
- [3] Charles G, Engelbrecht, H.J. (2000). International R &D spillovers, human capital and productivity in OECD economies: An empirical investigation, *European Economic Review*, 41,1479-1488.
- [4] Jones C.I., Williams, J.C. (1999). Too Much of a Good Thing? The Economics of Investment in R&D.
- [5] Falk, M. (2007). R&D spending in the high-tech sector and economic growth. *Research in Economics*, Vol. 61, pp. 140–147. <http://dx.doi.org/10.1016/j.rie.2007.05.002>
- [6] Nadiri, M.I., Kim, S. (1996). International R&D Spillovers, Trade and Productivity in Major OECD Countries.
- [7] Nunes, P.M., Serrasqueiro, Z., Leitao, J. (2012). Is there a linear relationship between R&D intensity and growth? Empirical evidence of non-high-tech vs high-tech SMEs. *Research Policy* 41, 36-53
- [8] Coe F, Chou, Y. K. (2002). The Australian Growth Experience (1960-2000), R & D based, Human Capital-Based or Just Steady State Growth? Research Paper No. 855, ISSN 0819-2642, Department of Economics, University of Melbourne. <http://econpapers.repec.org/RePEc:mlb:wpaper:85>
- [9] Horowitz, I. (1967). The Relationship Between Interstate Variations in the Growth of R&D and Economic Activity. *IEEE Transactions of Engineering Management*, EM-14, No.3.
- [10] Kim, L.W. (2011). The Economic Growth Effect of R&D Activity in Korea. *Korea and the World Economy*, 12(1), 25-44.
- [11] Funke, M., Niebuhr, A. (2000). Spatial R&D Spillovers and Economic Growth-Evidence from West Germany. *Hamburgisches Welt-Wirtschafts-Archiv* Discussion Paper 98.
- [12] Sadraoui, T., Ali, T.B., Deguchi, B. (2014). Economic Growth and International R&D Cooperation:
- [13] Ulku, H. (2004). P.S. (2000). R&D, Innovation, and Economic Growth: An Empirical Analysis. IMF Working Paper, WP/04/185.
- [14] Altın, O., Kaya, A. (2009). Türkiye'de Ar-Ge Harcamaları ve Ekonomik Büyüme Arasındaki İlişkinin Analizi. *Ege Akademik Bakış* 9(1), 251259.
- [15] Korkmaz, S. (2010). Türkiye'de Ar-Ge Yatırımları ve Ekonomik Büyüme Arasındaki İlişkinin Varlığı. *İktisat ve Finans*, 21(245), 123-137.
- [16] Şimşek, M., Behdioğlu, S. (2006). Araştırma-geliştirme (AR-GE) faaliyetlerinin Türkiye OECD ülkelerindeki kümeleme analizi ile incelenmesi ve ekonomik büyümeye katkıları. *İktisat İşletme ve Finans* 21(245), 123-137.
- [17] Taban, S., Şengür, M. (2013). Türkiye'de Ar-Ge ve Ekonomik Büyüme. *AİBÜ Sosyal Bilimler Enstitüsü Dergisi*, 14(1), 355-376. *International Journal of Economics and Financial Issues*, Vol. 5, No. 1, 2015, pp.188-198
- [18] Gulmez, A., Yardimcioglu, F. (2012). OECD Ülkelerinde Ar-Ge Harcamaları ve Ekonomik Büyüme İlişkisi: Panel Eşbüütünleşme ve Panel Nedensellik Analizi (1990-2010). *Maliye Dergisi*, 163, 335-353.
- [19] Borensztein E, Gregorio, J. D., & Lee, J-W. 1998. How Does Foreign Direct Investment Affect Economic Growth. *Journal of International Economics*, 45, 115–135, DOI. 10.3386/w5057
- [20] Borro, J.Y., Chuang Y.C., Lai, W.W., Yang, M.C. (2012). OECD A dynamic general equilibrium model for public R&D investment in Taiwan. *Economic Modelling* 27, 171-183.
- [21] Jin, J. C., 2009. Economic research and economic growth: Evidence from East Asian economies, *Journal of Asian Journal of Policy Modeling*, 30, 237–250. <http://dx.doi.org/10.1016/j.jpolmod.2007.04.008>
- [22] Samimi, A.J., Alerasoul, S.M. (2009). R&D and Economic Growth: New Evidence from Some Developing Countries. *Australian Journal of Basic and Applied Sciences* 3(4), 3464-3469.

- [23] Kwack, S. U & Lee. Y. S . 2006. Analyzing the Korea's Growth Experience: The application of R&D and Human Capital Based Growth Models with Demography, National Public Expenditures on R&D. [http://ec.europa.eu/invest-inresearch/pdf/download\\_en/spa4\\_final\\_report\\_final.pdf](http://ec.europa.eu/invest-inresearch/pdf/download_en/spa4_final_report_final.pdf), (11.03.2014).
- [24] Grossmann, V. 2007. How to promote R&D-based growth? Public education expenditure on scientists and engineers versus R&D subsidies. *Journal of Macroeconomics*, 29, 891–911. <http://dx.doi.org/10.1016/j.jmacro.2006.01.001>.
- [25] Gerybadze, A. (2010). R&D Innovation and Growth: Performance of the World's Leading Technology Corporations. *Innovation and International Corporate Growth*. 7, 11-30.
- [26] Khan, J., and Khattak, N. U. R. 2013. The Significance of Research and Development for Economic Growth: The Case of Pakistan, *City University Research Journal*, pp.175-86.
- [27] Genç, M.C, Atasoy, Y. (2010). Ar-Ge Harcamaları ve Ekonomik Büyüme İlişkisi: Panel Veri Analizi
- [28] Goel, R. K., Payne J. E., & Ram.. 2008. R&D expenditures and U.S. economic growth: A disaggregated approach.
- [29] Kuo,C.C& Yang. C.H. 2008. Knowledge capital and spillover on regional economic growth: Evidence from China, *China Economic Review*, 19, 594–604. <http://dx.doi.org/10.1016/j.chieco.2008.06.004>
- [30] Grossman, G.M., & Helpman, E. 1989. Quality Ladders in the Theory of Growth. NBER Working Paper No. 3099 . <http://www.nber.org/papers/w3099>
- [31] Awokuse, T.O., (2003). Is the export-led growth hypothesis valid for Canada? *Canadian Journal of Economics*, 36, 126–136.
- [32] Salawu, E. Y., Okokpogie, I. P., Afolalu, S. A., Ajayi, O. O., & Azeta, J. (2018). Investigation of production output for improvement. *International Journal of Mechanical and Production Engineering Research and Development*, 8(1), 915-922.
- [33] Azeta, J., Okokpogie, K. O., Okokpogie, I. P., Osemwiegbe, O., & Chibuzor, A. (2016). A Plan for Igniting Nigeria's Industrial Revolution. *International Journal of Scientific & Engineering Research*, 7(11), 489.
- [34] Omoruyi, O. N., Omoruyi, M. G., Okokpogie, K. O., & Okokpogie, I. P. (2018). Electronic Fare Collection Systems in Public Transits: Issues, Challenges and Way-Forward. *COVENANT JOURNAL OF ENGINEERING TECHNOLOGY*, 2(1).