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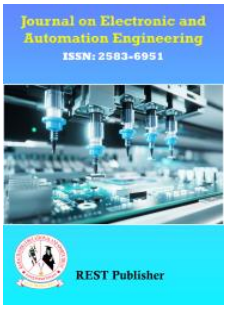

Information And Communication Technology Development in Emerging Countries

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Abstract: *"Information and Communication Technology (ICT) development in emerging countries has emerged as a catalyst for progress, offering immense opportunities for societal and economic growth. By embracing ICT, these countries are bridging the digital divide, connecting remote communities, and empowering their citizens with access to information and services." ICT development in emerging countries not only drives innovation and economic competitiveness but also enhances education, healthcare, and governance systems. This introduction highlights the transformative power of ICT in shaping the development trajectory of emerging countries, fostering a more connected and inclusive future "The research significance of Information and Communication Technology (ICT) development in emerging countries lies in understanding its impact on socioeconomic development, digital inclusion, and innovation." By studying ICT in emerging countries, researchers can identify effective strategies, policies, and interventions that promote sustainable growth, empower communities, and address unique challenges faced by these nations. "The weighted sum method is a mathematical approach that assigns specific weights to different variables and calculates their aggregated sum to make decisions or evaluate alternatives." Austria, Canada, Czech Republic, Germany, Denmark, Spain, Finland Countries, Internet access, Access to computers from home, goods Exports, employment, investment, valueadded. From the results it is seen that Germany stands on the table top by securing the 1st rank which was acquired by using WSM method. The first ranking is obtained by having the lowest preference score.*

Keywords: *Information, communication, technology, industrialized nations, Investment.*

1. INTRODUCTION

" It's challenging to describe what a "smart city" is.It is open to a wide range of interpretation, just like most concepts related to the effects of information technology (IT).The idea of using research and cutting-edge technology to explore new frontiers in science, industry, and commerce is inextricably linked to that of the knowledge-based economy. The definition of a smart city or region in this paper is one that makes use of ICT (information and communication technology) opportunities to advance its prosperity and influence[1]. The positive effect of ICT investment on the growth of the gross domestic product (GDP) is backed by convincing evidence, according to OECD (2003The results of such studies for individual countries are compiled by OECD (2003) and reproduced in Table 1. From this table, it is safe to conclude that ICT investment has significantly contributed to the growth of GDP in OECD countries. Moreover, such contribution h as accounted for between 0.3 and 1.3 percentage points of growth in GDP over the 1995-2001 period[2]." "Thirring (1958) is at least one source of research on the connection between information technology and energy consumption, but the field did not really take off until the early 1980s (e.g., Walker, 1985, 1986).1 Following two oil price shocks in the 1970s, there was widespread interest in how to minimise energy use in countries by increasing the use of information technology (IT).2 One strategy for promoting economic growth that uses less energy and more efficiency is information technology[3]. The rapid spread of information and communication technology (ICT) over the past few decades has dramatically changed the globe into a society centred around information".. Because of technological innovations like fixed-line telephones, mobile devices, the Internet, and broadband, people, businesses, and governments now have far better access to knowledge, expertise, and insight than they did in the past in terms of volume, scope, and speed. "The widespread use of ICT has greatly increased demand and

encouraged investment across all economic sectors (Jorgenson and Stiroh 1999; Vu 2011; Lee et al. 2012; Grimes et al. 2012; Pradhan et al. 2015). It has additionally substantially enhanced the efficiency of the allocation of resources and dramatically decreased production costs.[4]. In order to give IT assistance to 440 districts, the Indian government launched DISNIC about fifteen years ago through the National Informatics Centre. Land record computerization was also started. a few districtsThe rural development ministry and NIC worked together to create software for planning and monitoring of IRDP under a different scheme named CRISP (Ministry of Agriculture, 1987). Because it will take a lot of work to change the bureaucratic culture, CRISP and DISNIC have had little effect on administration. IT may be used to devolve planning, integrate branches, and lighten workloads, but it cannot be the only vehicle for change[5]". The integration of knowledge management and information and communication technology have a lot of potential to advance the development process (Okpaku, 2003). Information and communication technology is having a significant impact on a wide range of companies and sectors, which has an impact on the general economic development of many civilizations. The ensuing ramifications significantly contributed to the transformation of these industries and had an impact on how emerging countries' economies developed.[6]. "Information and communication technology (ICT) has been embraced by public organisations all over globe from the 1990s." This came about as a result of efforts made by some government agencies to address problems with the storage and processing of enormous amounts of data as well as the regulation of the public and private sectors while carrying out essential responsibilities. E-government adoption has grown in most nations, however the success rate of implementation and use differs from one nation to the next. When compared to industrialised nations, nations that are developing generally lag behind in the success of e-government implementation (Ifinedo, 2011).[7]. According to the UNDP and the US Census Bureau, the global populace has surpassed six billion people, with more than 4.7 billion of them living in developing nations (UNDP, 2000). Finding methods to increase the effectiveness and calibre of health care delivery systems in emerging nations is necessary due to the growing population. Both in industrialised and developing nations, information and communication technology (ICT) has been highlighted as a means of enhancing the quality of health care delivery systems and the effectiveness of health professionals.[9]. Information and communication technologies (ICT) have rapidly proliferated in developing nations over the past ten years, creating a rare opportunity for knowledge transfer through private as well as government systems of data. Mobile phone coverage has significantly expanded during the past ten years throughout Africa, Asia, and Latin America. In sub-Saharan Africa, Asia, and Latin America, respectively 60, 67, and 77 percent of the populace, have access to mobile phone coverage as of 2009[10]. "Marker-assist selection (MAS) is the picking of particular variants for features influenced by a small number of loci. Marker-assisted backcrossing (MABC) is the transfer of a small number of loci from one genetic background to another, including transgenes. More recently, marker-assisted recurrent selection (MARS) has been used to identify and select multiple genomic regions involving multiple genes[2]." Its scope includes any digital devices that transform information (text, voice, motion, etc.) into digital form, including video, audio, cameras, and other electronic devices (Moursund & Bielefeldt, 1999). The ability and attitude of instructors towards the use of contemporary technologies in teaching and learning play a significant influence in the success of ICT integration in the educational system. In order to successfully use ICT in their education, instructors of all levels—experienced, freshly qualified, and student—need to have the confidence to do so (Kyriakidou, Chrisostomou, & Bank, 2000)[12]. "All of these methods, with the exception of GWS, which is still in the exploratory phase for plants, are widely and successfully used in the private sector [3-5] but less so in the public sector, despite some limited use in cutting-edge institutions [6,7] [11]. Information and communications technologies are computer-based tools that people utilise to assist with the information and communication processing requirements of an organisation." Any academic setting has to have a robust library. It is expected to serve as a hub for education, research, and study by providing accessible information resources. Academic libraries are now striving to retain their status as the principal repository for research in the face of evolving digital technologies. Digital technology has completely changed how customers seek for and access data, as well as how it is packaged, processed, stored, and disseminated. Instead of just offering print services like collection development, recording and sorting, movement and reference assistance, current knowledge, specific distribution, and other bibliographic services, academic libraries now place a greater emphasis on multidisciplinary ideas, systems programmes, hardware, as well as electronic communication technological and engineering topics[13]. Singapore has seen unprecedented economic success since achieving independence from Britain in 1965 owing to its acceptance of global trends and aggressive seizing of opportunities brought about by developing technology. During the preceding 45 years (1965–2010), Singapore underwent a transformation from a developing nation to an affluent first-world nation, with a per capita GDP growth rate of more than 6% yearly on average. 1 In order to attain and sustain this success, Singapore's development strategy and policy have made the usage of ICT a key emphasis and consideration. Looking into the contributions of ICT to Singapore's growth may provide lessons and suggestions for policy for efforts to embrace ICT to boost economic growth[15].

2. MATERIALS AND METHOD

Austria: " Austria is a landlocked country in Central Europe known for its stunning Alpine landscapes, rich cultural heritage, and historical cities like Vienna. It is renowned for its music, art, architecture, and winter sports.''
Canada: "Canada is a vast country in North America known for its diverse landscapes, including pristine forests, breathtaking mountains, and picturesque coastlines. It is celebrated for its multiculturalism, quality of life, and natural beauty."
Czech Republic: "The Czech Republic is a landlocked country in Central Europe." It is famous for its historical architecture, medieval castles, charming towns, and vibrant capital city, Prague. The country also has a rich cultural heritage and a love for beer.
Germany: Germany is a country in Central Europe renowned for its strong economy, precision engineering, and rich cultural history. It is known for its picturesque landscapes, historical landmarks, and contributions to science, philosophy, and the arts.
Denmark: "Denmark, located in Northern Europe, is known for its high standard of living, progressive social policies, and bicycle-friendly cities." It boasts beautiful coastlines, historical sites, and a strong focus on sustainability and renewable energy.
Spain: Spain, located in southwestern Europe, is renowned for its vibrant culture, stunning beaches, and rich historical heritage. It offers diverse landscapes, including the beautiful Mediterranean coastline, bustling cities like Barcelona and Madrid, and historic landmarks like the Alhambra and Sagrada Familia.
Finland: Finland, situated in Northern Europe, is known for its stunning natural landscapes, including lakes, forests, and the Northern Lights. It is recognized for its high-quality education system, innovative technology companies, and sauna culture.
Countries: Countries are geopolitical entities characterized by distinct borders, governments, and cultures. They play a vital role in shaping the global landscape, fostering international relations, and serving as platforms for social, economic, and political development.
Internet access: Internet access refers to the ability of individuals and communities to connect to the internet, enabling them to access information, communicate, collaborate, and participate in the digital world, fostering social and economic opportunities.
Access to computers from home: Access to computers from home provides individuals with the means to engage in digital activities, such as education, work, communication, and entertainment. It enhances connectivity, learning, and participation in the digital society.
Goods Exports: Goods exports involve the sale and shipment of physical products from one country to another, contributing to economic growth, job creation, and international trade relationships.
Employment: Employment refers to the state of being engaged in paid work or occupation. It is essential for individuals' livelihoods, economic stability, and societal development, contributing to personal growth and overall well-being.
Investment: The term "investment" describes the distribution of resources, such as cash, time, or effort, with the hope of producing future gains or returns. It plays a crucial role in economic growth, innovation, and wealth creation.
Value added: Value added refers to the increase in worth or utility that a business or process contributes to a product or service. It represents the difference between the final output value and the cost of inputs used in its production.

Weighted sum method: Particularly in recent years, the weighted sum approach is frequently given just as a tool, and there is a wealth of literature detailing examples of uses. However, as applications are the main concern, only issues with two objective functions tend to be addressed. As an early instance of the new strategy, Koski and Silvennoinen (1987) minimise the volume and nodal displacement of a four-bar space truss while obtaining multiple Pareto optimal solutions with a systematic change in the weights. Kassaimah and others. (1995) employ the technique for the two-objective optimisation of laminated plates, maximising the critical buckling shear stress and minimising deflection. The approach is not analysed, nor is the expression of preferences taken into consideration, but the relevant responses are compared for a few alternative quite arbitrary weight values. According to Proos et al. (2001), the first mode of the natural frequency should be maximised while compliance should be minimised in order to get the best topology for two-dimensional plane stress problems. The weights are adjusted once again to depict the Pareto ideal set. In an optimization-based method to forecasting robotic motion, Saramago and Steffen (1998) used a weighted sum to integrate two objective functions; however, the weights have the same value and are thus meaningless [1]. The approach presented in this research, which might be used for many goals, successfully identifies a Pareto front for bi-objective optimisation. The weighted-sum technique, which finds Pareto optimum solutions one by one by methodically varying the weights among the objective functions, is a classic approach to multiobjective optimisation. Previous studies have demonstrated that this approach frequently yields answers that are ill-distributed along a Pareto front and that it fails to locate Pareto

optimum solutions in nonconvex areas. By providing extra inequality restrictions and modifying the weights adaptively rather than utilising a priori weight choices, the suggested adaptive weighted sum approach concentrates on understudied regions. It is demonstrated that the adaptive weighted sum approach produces uniformly distributed solutions, finds Pareto optimum solutions in non-convex regions, and disregards non-Pareto optimal solutions. This last problem, which is mostly caused by Normal Boundary Intersection's dependency on equality conditions, may be a weakness of the otherwise strong multiobjective method. "Two numerical examples and a simple structural optimisation problem serve as demonstrations of the possibilities of the resilient algorithm.[2] The Weighted Sum technique is a simple method, especially for single-dimensional problems. The option that meets the following phrase is the best one if there are m choices and n criteria: For i = m, A wsm = Max j i ai jwj (4.1), where A wsm is the best alternative's weighted sum method score, n is the number of choice criteria, ai j is the ith alternative's real value in terms of the jth criterion, and wj is the weight of importance of the jth criterion.. Each choice has a total value equal to the sum of the goods. When this strategy is used to solve multi-dimensional decision-making problems, difficulties combine. The additive utility assumption is broken by mixing multiple dimensions, and as a result, different units[3]." We suggest a weighted-sum technique in which each person is assessed by a weighted total of the mutation counts, with mutations categorised according to function (for example, gene). The weighted-sum technique differs from the CAST method [5,27] in that it weights the variations in a different way when calculating an individual's genetic burden. The weighted sum technique emphasises unusual mutations in the unaffected people by weighing the signals from each mutation, ensuring that frequent mutations do not fully dominate the test. When using the CAST approach, common variations have a significant influence on the group signal. If a group has a lot of these mutations, practically every member will carry one or more of them. The CMC technique [26] suggests using a threshold on the mutation frequencies in order to prevent this impact.. Such frequency thresholds have the downside that it might be challenging to choose them in a biologically appropriate fashion, and the choice of thresholds will affect the test's results. We incorporate mutations of all frequencies in the weighted-sum technique, but mutations are weighted based on how frequently they occur in unaffected people.[8] The well-known limitations of the weighted sum technique are (1) frequently the optimal solution distribution is not uniform, and (2) more critically, optimal solutions in non-convex areas are not recognised, as stated in a number of studies11,14,15.. The authors recently created the adaptive weighted sum (AWS) method16 to overcome these two issues. The optimization is only carried out in a newly specified feasible region where more investigation is required by adding extra inequality constraints to the conventional weighted sum approach. Multi objective optimization issues are effectively solved by the adaptive weighted sum (AWS) approach, which generates well-distributed solutions, locates Pareto optimum solutions in non-convex areas, and ignores non-Pareto optimal solutions.. However, the AWS approach was traditionally restricted to bi-objective optimisation issues. To distinguish it from the generalized multi objective adaptive weighted sum method discussed here, we shall refer to the prior approach as the "bi-objective adaptive weighted sum method".[9]. Analytical methods are used to determine the interference parameters in a diode version, among other things. assists in accurately and simply classifying how a solar module operates when exposed to radiation. sufficiently enough to the axes' junction points to get the necessary slope for the analytical computation of the parameters By using standard values for series and parallel resistance, the difficulty of gathering numerical data components is reducedWe took into consideration the Weighted Sum-Rate Maximisation (WSR Max) problem when considering multi-cell downlink in multi-entry single output (MISO) systems. This hassle is actually NP-tough. WSR Max built a department-based answer machine, and a binding strategy was presented to address the issue with quality certification. There have been efficient bounding techniques that are entirely conic optimised. By making the decrease sure better, the suggested algorithm's convergence rate may be extended dramatically. By lower-back replacing the suggested set of rules into any community design technique based on WSR Max, performance benchmarks for many network design challenges may be obtained.. The suggested transceivers are constructed inside the weighted MMSE feel with carefully selected MSE weights in order to maximise the weighted total charge with less computing complexity and fewer feedback assets. The Weighted Sum Method (WSM) was employed in this study to rank the data, and it is the best option. Alternative and Short-distance The answer that is the farthest away from the original solution is chosen, although the comparison of these distances is unimportant. Typical curves A1, A2, A3, and A4. Irradiance C1, temperature C2, current (A) C3, and voltage (V) C4 evaluation parameters Use As a result, attention deficiency is evident as a trait. The characteristic Curves A4 has the lowest rank, whereas Curves A2 has the highest rating.[10] "A widely used, well-known, and easily implemented subjective multi-criteria decision-making method is the Weighted Sum Method (WSM), which is descended from the MADM methods and is also known as Factor Rating [13], Simple Scoring Method, or Simple Additive Weighting (SAW) [14]. [13–16] It is also known as Factor Rating, Simple Scoring Method, and Simple Additive Weighting. WSM is advised among MADMs for practitioners with limited mathematical understanding [17]. This strategy, according to Kumar and Suresh [18], consists of decision-making practises and methodologies where each choice must be given a score based on a pertinent criterion, with each criterion being valued according to relevance. The systematic application entails locating the numerous levels of various criteria, awarding suitable scores for each level, and determining the highest scores for all criteriaThe process of shortlisting or screening the

criteria necessitates merging and linking the data in order to generate a recommendation or ranking, taking into account the range of qualities, the values, and needs related with a particular component [11]". Numerous studies have utilised the WSM to determine values by multiplying the sums of the attribute value weights by the corresponding applicable weights [19,20]. Each selection criterion for the alternatives in WSM has an associated score, and the weight of each criterion is taken into consideration prior to the weighted total. Because of this, critics of the MADM methodology criticise it for integrating several sources of information, missing a method for establishing attribute weights, and having a problem with the production of misleading dependent information between the attributes [12]. This research is significant since it pinpoints the best carbonation parameters to apply when using the linear weighted sum technique to improve the properties of RCA. The carbonation and pretreatment periods were drastically reduced, which is appealing to the building industry. This study also demonstrated how ready-mixed concrete batching plant effluent with a high calcium content might be utilised to improve RCA's properties. This study[13] found a similar correlation between the mechanical, toughness, and durability properties of concrete built with carbonated RCA and ordinary coarse aggregates.

3. RESULT AND DISCUSSION

TABLE 1. Information And Communication Technology Development in Emerging Countries

Countries	Internet access	Access to computers from home	Goods exports	Investment	Value added	Employment
Austria	93.153	85.373	6112	12.287	3.784	2.936
Canada	94.2	84.1	10249	17.018	5.1	2.605
Czech Republic	95.509	88.6	3247	18.507	7.447	5.363
Germany	91.408	92.866	61850	12.69	5.139	3.941
Denmark	95.156	93.137	3680	24.574	5.208	4.437
Spain	96.085	78.385	3609	13.763	4.563	2.656
Finland	97.586	93.497	2899	15.52	6.427	6.427

Table 1 shows information and communication technology development in emerging countries using the analysis method in WSM Alternative: From the table we can observe that Finland has the highest internet access, access to computers from home and employment and Germany has the lowest internet access but Germany has the highest goods exports and Finland has the least goods exports. Denmark has the highest investment value. Czech republic has the more value added and Spain has the least value added.

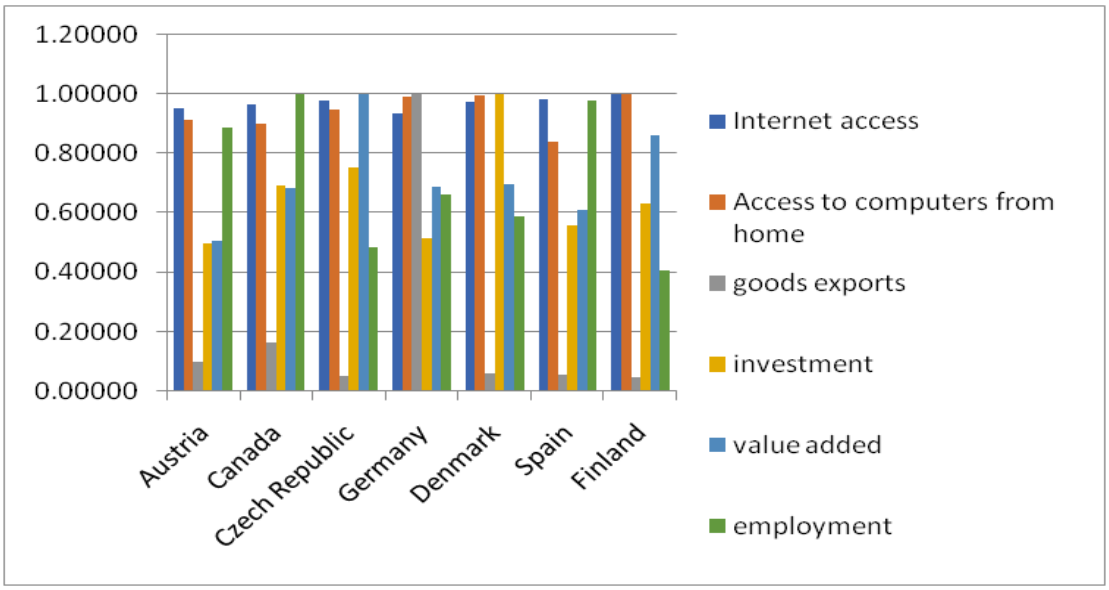

FIGURE 1. ICT development in emerging countries

Figure 1 shows that the Finland has the high percentage of internet access, access to computers from home, and value added. And Canada is the leading goods exporter and it also has the highest employment rate. Denmark has the highest investment value.

TABLE 2. Normalized data

	Internet access	**Access to computers From home**	**Goods exports**	**Investment**	**Value added**	**Employment**
Austria	0.95458	0.91311	0.09882	0.50002	0.50812	0.88726
Canada	0.96531	0.89949	0.16571	0.69255	0.68484	1.00000
Czech Republic	0.97872	0.94762	0.05250	0.75311	1.00000	0.48574
Germany	0.93670	0.99324	1.00000	0.51642	0.69008	0.66100
Denmark	0.97510	0.99615	0.05950	1.00000	0.69934	0.58711
Spain	0.98462	0.83837	0.05835	0.56009	0.61273	0.98080
Finland	1.00000	1.00000	0.04687	0.63156	0.86303	0.40532

Table 2 shows the normalized data for alternative: The data provided represents various indicators for different countries. It shows Austria, Canada, and Czech Republic have high internet access and computer availability, while Germany, Denmark, and Spain perform well in terms of exports and employment. Finland stands out with high values in all categories except for goods exports, indicating strong overall performance.

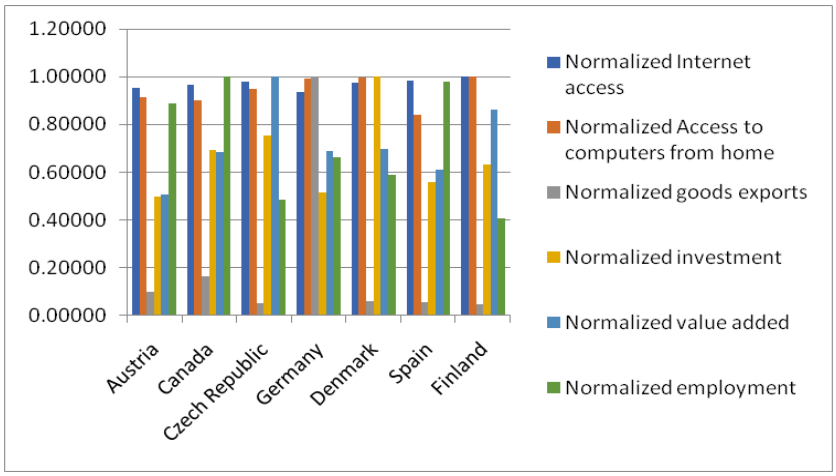

FIGURE 2. Shows the normalized data for alternative here Germany

TABLE 3. Weightages

	Internet access	**Access to computers from home**	**Goods exports**	**Investment**	**Value added**	**Employment**
Austria	0.17	0.17	0.17	0.17	0.17	0.17
Canada	0.17	0.17	0.17	0.17	0.17	0.17
Czech Republic	0.17	0.17	0.17	0.17	0.17	0.17
Germany	0.17	0.17	0.17	0.17	0.17	0.17
Denmark	0.17	0.17	0.17	0.17	0.17	0.17
Spain	0.17	0.17	0.17	0.17	0.17	0.17
Finland	0.17	0.17	0.17	0.17	0.17	0.17

Table 3 shows the Weightages used for the analysis. We take same weights for all parameters for the analysis

TABLE 4. Weighted Normalized Decision Matrix

	Internet access	**Access to computers from home**	**Goods exports**	**Investment**	**Value added**	**Employment**
Austria	0.15846	0.15158	0.01640	0.08300	0.08435	0.14729
Canada	0.16024	0.14932	0.02751	0.11496	0.11368	0.16600
Czech Republic	0.16247	0.15731	0.00871	0.12502	0.16600	0.08063
Germany	0.15549	0.16488	0.16600	0.08573	0.11455	0.10973
Denmark	0.16187	0.16536	0.00988	0.16600	0.11609	0.09746
Spain	0.16345	0.13917	0.00969	0.09297	0.10171	0.16281
Finland	0.16600	0.16600	0.00778	0.10484	0.14326	0.06728

Table 4 shows the weighted normalized decision matrix for alternative The data reveals a comparison of various indicators across different countries. It shows the levels of internet access, home computer availability, goods exports, investment, value added, and employment. Each country demonstrates different levels and rankings in these areas.

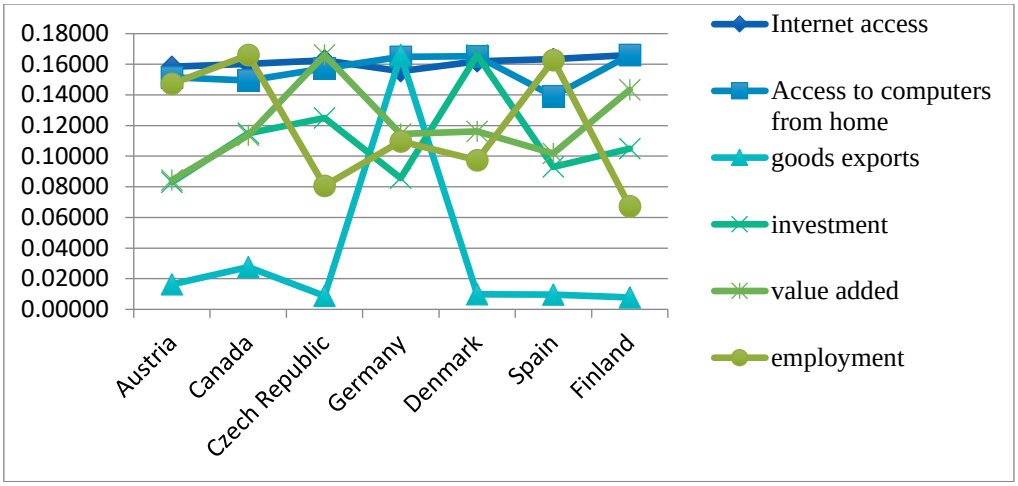

FIGURE 3. Weighted Normalized Decision Matrix

Figure 3 Shows the weighted normalized decision matrix for alternative here in this graph we can clearly see that germany stands on the top by maintaining its standads in almost all aspects followed by Canada and Denmark whereas Austria stands at the bottom because of its weak performance in some of the aspects.

TABLE 5. Preference score and Rank

countries	Preference Score	Rank
Austria	0.64108	7
Canada	0.73171	2
Czech Republic	0.70014	4
Germany	0.79637	1
Denmark	0.71665	3
Spain	0.66980	5
Finland	0.65517	6

Table 5 shows us the Ranks and preference score of the countries using the ICT, Austria stands 7th on the table, Canada stands on 2nd position in the table, Czech republic stands on 4th position in the table, Germany stands 1st on the table, Denmark stands on the 3rd position on the table, Spain stands on the 5th position in the table and Finland stands on the 6th position in the table and the final result is done by using WSM method.

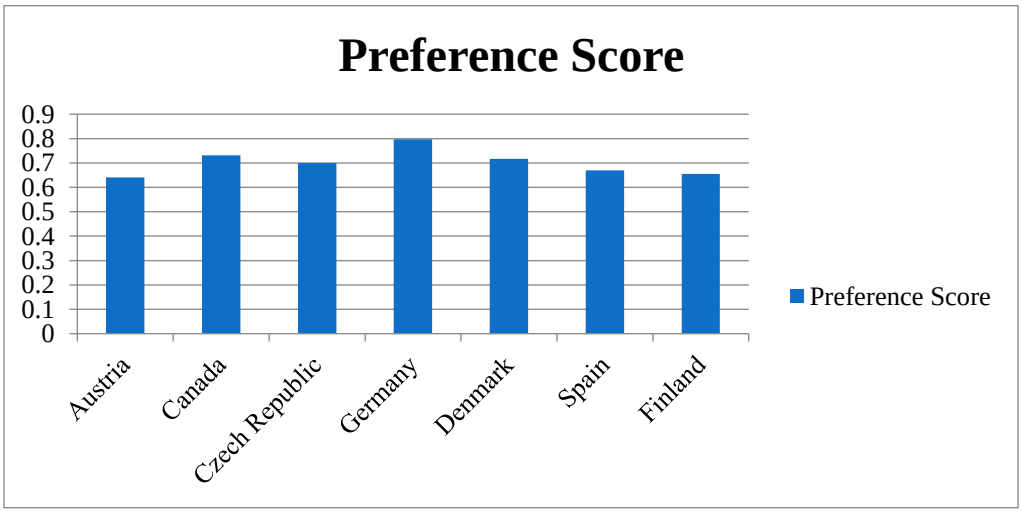

FIGURE 4. preference score

Figure 4 shows the preference score of the given countries in the different aspects according to my analysis by using WSM method. Germany stands on the top by having highest preference score followed by Canada and Denmark where Austria stands at the least.

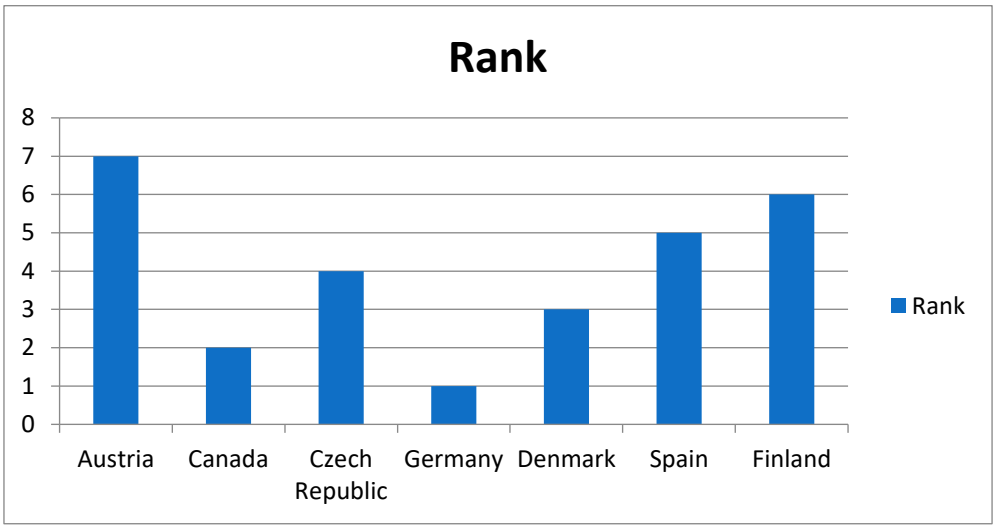

FIGURE 5. Rank

Figure 5 shows the rank on the basis of my analysis and the result is obtained by using the WSM method Germany stands on the top by securing 1st position on the table.

4. CONCLUSION

In conclusion, the development of Information and Communication Technology (ICT) in emerging countries has witnessed remarkable progress and has become a catalyst for economic and social transformation. Over the past years, emerging countries have recognized the pivotal role of ICT in driving growth, enhancing productivity, and improving the quality of life for their citizens .One significant outcome of ICT development in emerging countries is the expansion of digital connectivity. The establishment of robust telecommunications infrastructure, coupled with the proliferation of affordable smart phones and internet access, has enabled millions of people to connect to the digital world. This connectivity has opened up new opportunities in various sectors, including education, healthcare, agriculture, and entrepreneurship, empowering individuals and communities. Furthermore, ICT has facilitated the leapfrogging of traditional development stages in emerging countries. By adopting advanced technologies and innovative solutions, these nations have been able to overcome infrastructural limitations and bridge the digital divide. The use of mobile banking, e-commerce platforms, and digital payment systems has revolutionized financial inclusion, enabling individuals to access banking services and conduct transactions easily and securely. Moreover, ICT has played a vital role in education and skill development. Online learning platforms and digital resources have expanded educational access and provided opportunities for lifelong learning. The availability of digital tools and information has empowered individuals to acquire new skills, enhancing their employability and contributing to the development of a knowledge-based economy. However, challenges remain in ensuring equitable access to ICT resources and addressing issues of cyber security, data privacy, and digital literacy. Governments, private sector entities, and international organizations must collaborate to invest in infrastructure, develop relevant policies, and provide training programs to ensure that the benefits of ICT reach all segments of society. In conclusion, the development of ICT in emerging countries holds immense potential for economic growth, social progress, and inclusive development. By embracing technology and harnessing its transformative power, emerging countries can accelerate their journey towards sustainable development and create a better future for their citizens.

REFERENCES

[1]. Odendaal, Nancy. "Information and communication technology and local governance: Understanding the difference between cities in developed and emerging economies." *Computers, environment and urban systems* 27, no. 6 (2003): 585-607.

[2]. Yousefi, Ayoub. "The impact of information and communication technology on economic growth: evidence from developed and developing countries." *Economics of Innovation and New Technology* 20, no. 6 (2011): 581-596.

[3]. Sadorsky, Perry. "Information communication technology and electricity consumption in emerging economies." *Energy Policy* 48 (2012): 130-136.
[4]. Bahrini, Raéf, and Alaa A. Qaffas. "Impact of information and communication technology on economic growth: Evidence from developing countries." *Economies* 7, no. 1 (2019): 21.
[5]. Bhatnagar, Subhash. "Social implications of information and communication technology in developing countries: Lessons from Asian success stories." *The Electronic Journal of Information Systems in Developing Countries* 1, no. 1 (2000): 1-9.
[6]. Kamel, Sherif. "The use of information technology to transform the banking sector in developing nations." (2005): 305-312.
[7]. Liu, Shuhua Monica, and Qianli Yuan. "The evolution of information and communication technology in public administration." *Public Administration and Development* 35, no. 2 (2015): 140-151.
[8]. Hersh, William, Alvaro Margolis, Fernán Quirós, and Paula Otero. "Building a health informatics workforce in developing countries." *Health Affairs* 29, no. 2 (2010): 274-277.
[9]. Idowu, Bayo, Eyitope Ogunbodede, and Bimbo Idowu. "Information and communication technology in Nigeria the health sector experience." *Journal of Information Technology Impact* 3, no. 2 (2003): 69-76.
[10]. Aker, Jenny C. "Dial "A" for agriculture: a review of information and communication technologies for agricultural extension in developing countries." *Agricultural economics* 42, no. 6 (2011): 631-647.
[11]. Ribaut, J. M., M. C. De Vicente, and X. Delannay. "Molecular breeding in developing countries: challenges and perspectives." *Current opinion in plant biology* 13, no. 2 (2010): 213-218.
[12]. Yusuf, Modasiru O., and Modupe R. Balogun. "Student-teachers' competence and attitude towards Information and communication technology: A case study in a Nigerian University." *Contemporary educational technology* 2, no. 1 (2011): 18-36.
[13]. Anunobi, Chinwe V., and Ifeyinwa B. Okoye. "The role of academic libraries in universal access to print and electronic resources in the developing countries." *Library philosophy and practice* 5, no. 20 (2008): 1-5.
[14]. Sarkar, Sukanta. "The role of information and communication technology (ICT) in higher education for the 21st century." *Science* 1, no. 1 (2012): 30-41.
[15]. Pentland, Alex, Richard Fletcher, and Amir Hasson. "Daknet: Rethinking connectivity in developing nations." *Computer* 37, no. 1 (2004): 78-83.
[16]. Marler, R. Timothy, and Jasbir S. Arora. "The weighted sum method for multi-objective optimization: new insights." *Structural and multidisciplinary optimization* 41 (2010): 853-862.
[17]. Kim, Il Yong, and Oliver L. De Weck. "Adaptive weighted-sum method for bi-objective optimization: Pareto front generation." *Structural and multidisciplinary optimization* 29 (2005): 149-158.
[18]. San Cristóbal Mateo, José Ramón, and José Ramón San Cristóbal Mateo. "Weighted sum method and weighted product method." *Multi criteria analysis in the renewable energy industry* (2012): 19-22.
[19]. Kim, Il Yong, and O. L. De Weck. "Adaptive weighted sum method for multiobjective optimization: a new method for Pareto front generation." *Structural and multidisciplinary optimization* 31, no. 2 (2006): 105-116.
[20]. Stanimirovic, Ivan P., Milan Lj Zlatanovic, and Marko D. Petkovic. "On the linear weighted sum method for multi-objective optimization." *Facta Acta Univ* 26, no. 4 (2011): 49-63.
[21]. Wang, Rui, Zhongbao Zhou, Hisao Ishibuchi, Tianjun Liao, and Tao Zhang. "Localized weighted sum method for many-objective optimization." *IEEE Transactions on Evolutionary Computation* 22, no. 1 (2016): 3-18.
[22]. Stanujkic, Dragisa, and Edmundas Kazimieras Zavadskas. "A modified weighted sum method based on the decision-maker's preferred levels of performances." *Studies in Informatics and Control* 24, no. 4 (2015): 461-470.
[23]. Ryu, Jong-hyun, Sujin Kim, and Hong Wan. "Pareto front approximation with adaptive weighted sum method in multiobjective simulation optimization." In *Proceedings of the 2009 Winter Simulation Conference (WSC)*, pp. 623-633. IEEE, 2009.
[24]. Madsen, Bo Eskerod, and Sharon R. Browning. "A groupwise association test for rare mutations using a weighted sum statistic." *PLoS genetics* 5, no. 2 (2009): e1000384.
[25]. Weeraddana, Pradeep Chathuranga, Marian Codreanu, Matti Latva-aho, Anthony Ephremides, and Carlo Fischione. "Weighted sum-rate maximization in wireless networks: A review." *Foundations and Trends® in Networking* 6, no. 1–2 (2012): 1-163.