

Developing Smart City 5.0 Framework to Produce Competency

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Abstract - Smart cities are essential things that must be applied in the face of globalization and competition. In smart city 5.0, three important things discussed are human resource development, smart marketing, and information technology. These three things cannot be separated from each other because they are related. Furthermore, the smart city 5.0 article is a development from the previous article, namely smart city 1.0-3.0. Smart City 5.0 provides four important formulas for developing a smart city and a framework to guide its implementation. The four formulas and the resulting framework will develop in the next article, namely intelligent intelligence. It will continue to make prototypes and smart city intelligence applications. The result of this article is a framework that is a concept and strategy in developing a smart region that is part of a smart city. This article is still under development and research will continue. Furthermore, the development of this research will certainly require several more stages in reaching the top of the research, namely a big picture of a smart city and performance measurement for each process contained in a smart city. Therefore, it takes the right steps and formulas to produce a smart city 5.0 framework

Keywords - Smart city, Human resource, Marketing, Technology, Innovation

1. INTRODUCTION

A smart regional is part of a smart city. Regional development is a factor in building a smart city. Each area that has potential should develop by building the uniqueness that exists in each region. Regional development certainly requires three important things, namely human resources, infrastructure, and technology. These three things have a tremendous influence on the development of a region. Therefore, developing each region requires appropriate stages and formulas so that development costs incurred will be right on target. The development process must divide into three time periods: short one-two years, medium three years, and long term five-ten years. This article is a development of the article smart city 3.0: the concept and strategy of smart regional (smart city) development in facing the globalization of version 3.0 using the PDCA & usepdsa method. Previously, we have researched smart cities, and the two articles are smart city 1.0 and 2.0: The Future of IS / IT Strategic Planning In WCC, Australia, and the Wollongong City Council's journal analysis using 7s Of Galliers and Sutherland Methods [1][2]. In the article (smart city5.0), we use a formula: $E = K.MC^2$, which is a useful method for developing an area where E-energy (value) of a company; K- knowledge, C-computer & communication (C1- computer technology; C2-communication technology). This formula is then developed into four formulas for developing smart city 5.0: $SC = HR.M.T^2$; $T = I.D.M^2$; $HR = MT.K.C^2$; $M = D.P.B^2$. These four formulas will explain in more detail in the next section. Furthermore, this formula will break down by producing several

useful formulas for human resource development, marketing, and technology. The result of this journal is to produce three special HR formulas; regional marketing; technology, which will then produce version 5.0 of a smart regional (smart city) framework. This process of research can describe as follows:

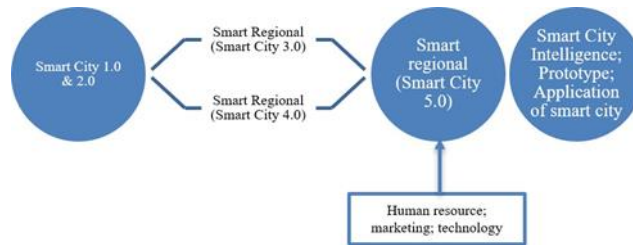


Figure 1. Smart Regional Development Process (Smart City) From Version 1.0 to smart city intelligence

Figure 1 explains that the first stage to stage four has complete, and in stages 1-4, there is a big picture of a concept regarding the smart city and smart regional. In smart city 5.0, a useful formula will be created to detail the next version's stages. The last stage will focus on developing smart city intelligence concepts (the final concept for a smart city), prototype, and complete application for a smart city. The result of the smart city 5.0 article is a framework that is perfect than before, and this is the last framework and one that refines before going to the final stage.

2. RESEARCH METHOD

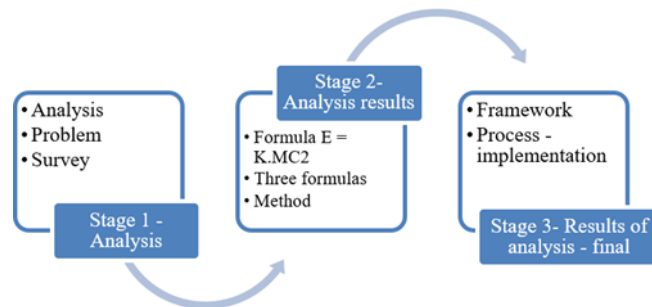


Figure 2. Research Process and Results

Figure 2 explains the first stage is to analyze the problem by conducting a survey. The number of correspondents is 70 people. Then from the survey, problems will be found. We found methods and formulas and innovation to solve human resource problems, regional marketing, and technology in the second stage. The final stage is to produce a smart regional framework 2020-2025.

The survey includes several questions: (1) Do you have the existing human resources in your area of sufficient quality to face globalization and intense competition? (1- no; 2- quite ready; 3- not willing to answer; 4- ready, but requires mentoring and facilitation assistance; 5- very ready). (2) Has your area, especially local marketing, been done very well to become a tourist site that can benefit the community? (1- no; 2- little done; 3- not willing to answer; 4- still needs more facilities and marketing; 5- has done very well). (3) Has the existing technology

in your area been beneficial for all facilities to support a region's progress? (1- no; 2-little technology applied; 3-do did not want to answer; 4-there is a technology that supports but requires reliable human resources; 5-is available and balanced between technology and the availability of human resources).

The method used is the formula $E = K.MC2$ (Christian et al., 2018). E is the strength of the company/organization/institution. It can say that the strength of a region. K is knowledge, where the readiness of human resources includes the competencies that a region must-have. C- technology, where the power of technology can help a region become an area that can compete in globalization.

3. RESULTS AND DISCUSSION

A. Stage 1: Survey Results

Question 1: Do you have the existing human resources in your area of sufficient quality to face globalization and today's intense competition?

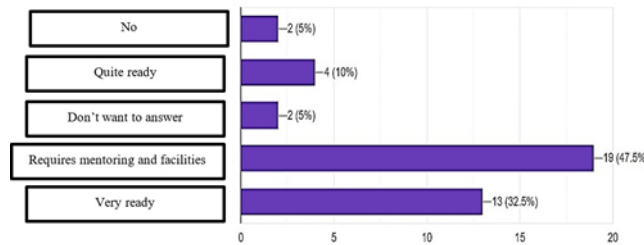


Figure 3. Survey Results for Question 1

Figure 3 explains nineteen people (47.5%) said that their area's human resources are ready but need mentoring to develop their competence to be higher. Thirteen people (32.5%) said that their human resources were very ready; two didn't want to answer; four people said quite ready; one person answered not ready. So, it can conclude that points 4 and 5 have a slight difference and can be said to need guidance or people who can mentor the human resources to improve their quality to be higher.

Question 2: Has the local marketing been done in your area, especially well, so that your area can become a tourist spot that can benefit the community?

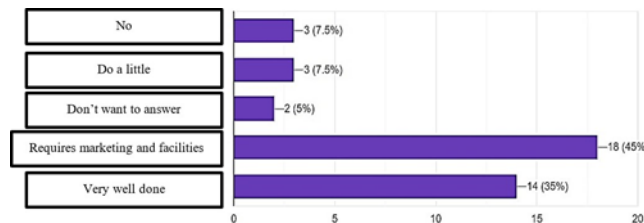


Figure 4. Survey Result for Question 2

Figure 4 explains that eighteen people (45%) said they still need facilities and infrastructure to help market tourist attractions. Fourteen people (35%) said their area's tourist attractions had adequate and supporting facilities and infrastructure to market their area and tourist

attractions. Two people did not want to answer. Three people said there were few facilities and infrastructure to help them market their area; three answered no. It can conclude, still requires supporting facilities and infrastructure to assist regional marketing and tourist attractions.

Question 3: Is existing technology in your area beneficial to all facilities in the region to support a region’s progress?

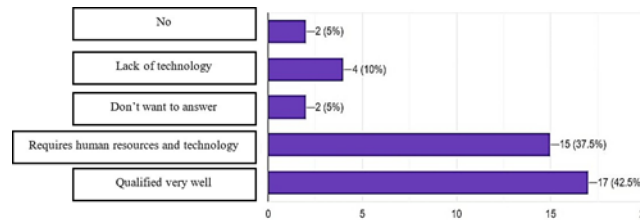


Figure 5. Survey Result for Question 3

Figure 5 explains seventeen people (42.4%) said that their area has technology that can help them develop their area; fifteen people (37.5%) said they had the technology but needed reliable human resources to operate it. Two people didn't want to answer; four people responded that they only have old technology, and it's not updated yet; one person answers no.

B. Stage 2: Implementation of the formula $E = K.MC^2 - SC = HR.M.T^2$ (3 formulas (innovation) - $HR = MT.C^2$; $M = D.P.B^2$; $T = I.DM^2$)

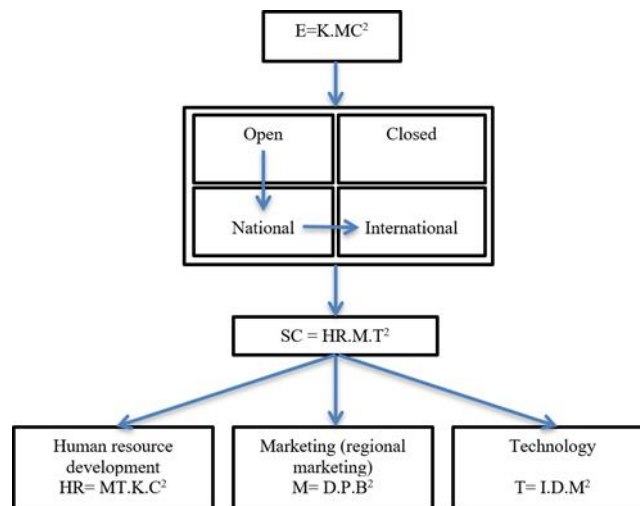


Figure 6. Smart Regional (smart city) version 5.0 formula

Figure 6 explains the formula $E = K.MC^2$, where each region must be able to have a high value to increase its development (E). requires knowledge that needs to be improved to be able to support smart regional (K); marketing that is more aggressive and requires technological support - human resources and adequate infrastructure (MC^2). Moreover, figure 6 shows four

positions that the region has, namely, the open type leading to national and international, and the closed type [3], [4]. In the closed type, this is an area that is still inaccessible or difficult to reach because of its location. Areas with a location like this need more attention. Because if the area has natural resources that can be used as tourist attractions and generate income/profits for the regions. The location should manage by looking at the location structure and human resource needs and what infrastructure needs to map to reach the location. Of course, the comfort and security level need to consider [5], [6]. Therefore, it is necessary to map areas that are still difficult to reach but have tourism potential that can generate profits. These areas already have tourist attractions, human resources, infrastructure, and technology to support development in the open type. Still, here, we need to pay attention to one thing: not stopping at what already exists. It means that areas that have invited many tourists need to maintain quality and maintenance in human resources, regional marketing, and technology. Suppose there are processes or things such as the level of cleanliness-comfort and safety. In that case, it is necessary to follow up to maintain the quality level that achieves immediately. The key is practical and systematic maintenance and management so that quality remains at the highest value [7]–[9]. Furthermore, for areas that still need human resource assistance, these human resources' quality must be improved first in terms of competence and ability to adopt the technology. It requires people who can provide mentoring to people in these areas to increase human resources quality. It is very necessary because the quality of education is one of the factors in facing the current era of globalization and competition between countries in increasing their income so that it can channel to the welfare of the wider community [10]–[12]. Therefore, the regions with the best title nationally must upgrade to become an international brand. A real example is Bali, which already has an international brand. The way is to do detailed mapping of the areas that already have the best in their respective regions. - Each of them can improve as a national brand and an example for other regions. It is necessary to pay attention to the local community's level of culture and customs to create a family atmosphere when implementing it [13]. From this explanation, to increase the development of these areas, three formulas were created, including:

$SC = HR.M.T2$, where: SC (smart city); HR (human resource); M (marketing); T (technology- T1- technology level 1; T2- technology premium). This formula is a development and innovation from $E = K.MC2$. Here we see the human resource, marketing, technology side are the three strength factors that must develop so that regions can grow significantly and generate benefits for the country. This formula can classify into three more formulas, including:

(1) $HR = MT.K.C2$, where: HR (human resource); MT (mentoring); K (knowledge); C2 (Competency- C1- competency with high quality; C2- competency with low quality)

This formula shows three essential things and two important sub-sections, where a region must already have reliable human resources. First, competency with high quality means that there must be a mapping of areas that already have reliable human resources. These areas must maintain quality by providing special mentoring [14]. Furthermore, the mapping must carry out for areas that still lack human resources to be inventoried with details, what human resource needs are of urgency for the area and how to solve human resource problems [15].

(2) $M = D.P.B2$, where: M (marketing); D (differentiation); P (positioning); B2 (Brand- B1- brand national level; B2- brand international level).

In the marketing formula, it is necessary to map each region's differentiation, meaning that areas already at the best level at the national level need to be managed very well and need to be improved. Still, here a detailed mapping is required, starting from where the region's

matters are to invite many tourists. And how the area can be successful at the national level is necessary so that the area can become an example for other regions and motivate other regions to develop, such as areas that already have a level national [16][9]. For areas that already have an international level, consistent maintenance needs to survive. It can be improved in customer relationship management to face tourism competition [17], [18].

(3) $T = I.D.M2$, where: T (technology); I (integrated); D (data); M2 (maintenance – M1-maintenance with high quality; M2- maintenance with low quality).

In the technology sector, special mapping must carry out. This mapping includes which areas have sufficient technology to advance their regions and need technical assistance to develop and face globalization. Regions must be able to integrate data, for example, population mortality data. It is necessary to find out the exact population size. It is very important because the population can determine the demographic bonus of an area. Regions that still do not have advanced data need assistance to update their technology immediately and what technology needs are urgent [19].

After we discuss these three formulas, then these three formulas are generated a framework.

Stage 3: Smart regional (smart city) framework 2020- 2025

In stage 3, after going through the formula innovation stage, a framework is produced:

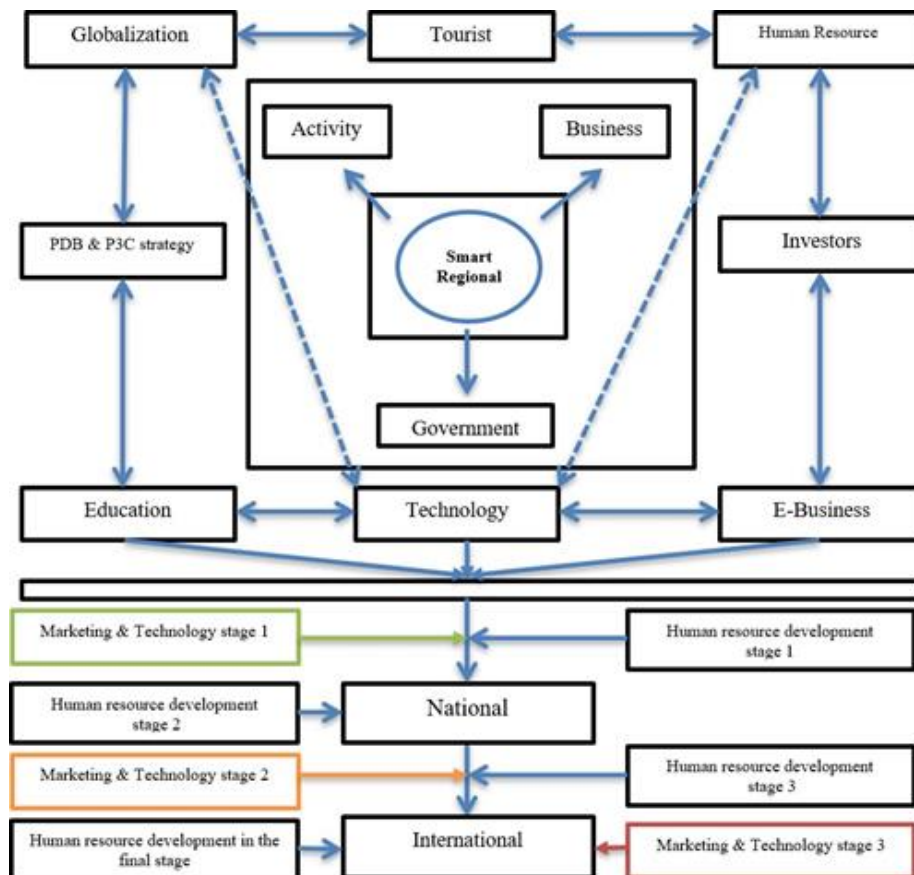


Figure 7. Framework smart regional (smart city) 2020-2025

Figure 7 explains that there are stages that must pass in building a smart regional. In the middle position, a smart regional must fully support three essential things: government regulations that are standardized and legal and can implement; activities that include the level of comfort and safety of an area; and a business or economic process area. The improvement process starts with the quality of human resources and education connected to investors and tourists. After that, it continues to the e-business, technology, globalization, GDP, and P3C strategy. At this stage, it has been explained in smart city versions 3.0 and 4.0. The focus of the explanation in Figure 7 is to describe the stages of human resource development, stage 1-final stage, which includes two important contexts, namely national and international.

This staged process can use the P3C (Mapping- Management-Change-Control) concept. The process is as follows:

In Figure 7, it can see that stage 1. Human resource development shows the process towards national level strength, meaning that an area leads to human resources with basic qualities that must possess in the face of globalization, such as speaking English, understanding the technology, and adopting technological changes. If the area is closed to such change matters, then stage 1 cannot be carried out. The next process is stage 2 human resource development, which means that human resources that can be improved must be further enhanced by providing special assistance and mentoring to increase their competence. Moreover, the existing competence is not only based on the word "sufficient," but the word "More," this means that the mentor serves to provide general experiences that human resources in the area must-have. Of course, the "context" and "content" of the mentoring must consider [8], [14], [20].

After a significant increase has occurred, the human resource development process stage 3, and human resources' quality is already in a national position. To reach the national level requires cooperation with foreign countries in terms of increasing competence and education. Where universities and schools must be fluent in English, starting from elementary school grades, 1-6 can be used 50% of English as the language of instruction in every school - in each region, but 50% means that the exam may be in English. Next, at the middle school level and general level school (SMP/ SMU). All the languages of instruction use English along with the tests. It can improve the quality of human resources in the face of the competitive era of globalization. Even though this concept discusses, it requires a more in-depth study and significant consideration because mapping must be done in advance for each region to determine the level of capability and availability of human resources in that area, as explained in the above formula. In the final process of developing human resources in the final stage, regions collaborate with foreign countries to develop human resources. If necessary, several regions/locations can be set together from the business side to get significant income in developing their regions. It can save the state budget because the regions have collaborated with the private sector. It is a concept and needs a more in-depth study for this [21]–[23].

If using the P3C strategy, the first thing is the mapping of human resources in each region, which functions to find out who has high ability and competence. With this unique mapping of human resources, it will know with certainty that the area's capacity can develop rapidly, or is still further guidance is needed to develop. Next, if the human resource mapping carries out, the management of what is already known, with a mentoring system or any management deemed capable of improving it. The next stage and this are not easy, change, meaning that there must be a change in culture and habits. It is complicated to develop an area if there is no change in culture and habits. It includes the community. It hopes that it will no longer fail to understand technology (clueless). But the community must be able to use it very easily [24], [25], changes to receive new knowledge that can develop the area; the habit of two-way discussion in implementing something. The reality in seeing something and logical [26], [27];

have high competence in communicating to achieve those good things in the future. There are still many habits and cultural changes to implement this framework [28].

4. CONCLUSION

After conducting analysis and discussion, it can conclude as follows:

1. This Smart City version 5.0 produces four essential formulas, among others: $HR = MT.K.C2$; $M = D.P.B2$; $T = I.D.M2$, where this formula focuses on human resources, regional marketing, and technology.
2. This formula produces a framework called the smart regional framework 2020-2025. This framework has a function so that each region can have a blueprint in developing its region in a structured and consistent manner
3. Increasing human resources needs to be considered very well because this is the core force of regional progress in facing today's global competition

As for some suggestions for further development of this research, among others:

1. This research can apply by preparing reliable human resources in advance so that there will be a balance between the implementation of technology and the availability of human resources who have reliable competence.
2. The quality of education in each area needs to be improved, with the availability of high-quality teachers, such as English language skills, experience in projects, having practical skills - which means being able to create innovations, be it ideas or create products/services that have a positive contribution to public.

REFERENCES

- [1] I. Gamayanto, Analysis of {Wollongong} city council using 7s ' s of galliers and {Sutherland} methods. *Comptech Journal*, 205, 205–213, 2017.
- [2] I. Gamayanto, Analysis of Wollongong City Council Using 7S ' S of Galliers and Sutherland Methods. *Comptech Journal*, 205, 205–213, 2017.
- [3] H. Chourabi, J. R. Gil-garcia, T. A. Pardo, H. J. Scholl, S. Walker, and K. Nahon, *Understanding Smart Cities: A n Integrative Framework*. Hawaii International Conference on System Sciences Understanding, 2012.
- [4] M. Thite, "Smart cities : Implications of urban planning for human resource development, Human Resource Development International Smart cities : implications of urban planning for human resource development," *Hum. Resour. Dev. Int.*, 2011.
- [5] S. R. Torbatjoo, "Impact of human resources measures on organizational ambidexterity of smart city projects," *Int. J. Hum. Cap. Urban Manag.*, vol. 3, no. 4, 2018.
- [6] S. Joss et al., "The Smart City as Global Discourse : Storylines and Critical Junctures across 27 cities," *J. Urban Technol.*, vol. 26, no. 1, 2018.
- [7] H. Xu and X. Geng, smart cities People-Centric Service Intelligence for Smart Cities. 135–152, 2019.
- [8] M. Armstrong and D. Brown, *Strategic Human Resource Management: Back to the future? A literature review* Chartered Institute of Personnel and Development (CIPD). Berger, R, 2019.

- [9] R. Kitchin, P. Cardullo, and C. Di Felicianantonio, *Citizenship, Justice, and the Right to the Smart City*. Citizenship, Justice, and the Right to the Smart City. {KPMG}, 2015.
- [10] N. W. Deriani and T. M. Kusuma, "The level of adoption of E-commerce by small-medium scale industries," *Int. J. Hum. Cap. Urban Manag.*, vol. 4, no. 2, 2019.
- [11] D. Acemoglu and J. A. Robinson, "Rents and economic development: the perspective of Why Nations Fail," *Public Choice*, vol. 181, no. 1, 2019.
- [12] M. Mirzapour, S. S. Toutian, A. Mehrara, and S. Khorrampour, "The strategic role of human resource management in crisis management considering the mediating role of organizational culture," *Int. J. Hum. Cap. Urban Manag.*, vol. 4, no. 1, 2019.
- [13] L. Lalicic and I. Önder, "Residents' involvement in urban tourism planning: Opportunities from a smart city perspective," *Sustain.*, vol. 10, no. 6, 2018.
- [14] H. W. Lee, J. Pak, S. Kim, and L. Z. Li, "Effects of Human Resource Management Systems on Employee Proactivity and Group Innovation," *J. Manage.*, vol. 45, no. 2, 2019.
- [15] I. Gamayanto, "Pengembangan Mentoring Management Dalam Menghasilkan High Quality Human Resource Di Tingkat Universitas Dalam Menghadapi Masyarakat Ekonomi Asean (Mea) Dengan Menggunakan Konsep Kiyosaki Dan Blanchard Abcd Trust Methods-Hsova," *J. Manaj.*, vol. 13, no. 2, pp. 158–178, 2016.
- [16] D. Acemoglu and J. A. Robinson, "Rents and economic development: the perspective of {Why} {Nations} {Fail}," *Public Choice*, vol. 2, no. 1, 2017.
- [17] K. Kashima and Y. Morita, "Conceptualizing Smart Tourism of Japan: A Case Study Of Smart Tourism Design on China And Thailand," *Int. J. Manag. Appl. Sci.*, vol. 3, no. 3, 2017.
- [18] A. JASROTIA and A. GANGOTIA, "Smart Cities To Smart Tourism Destinations: a Review Paper," *J. Tour. Intell. Smartness*, vol. 1, no. 1, 2018.
- [19] I. Bureau and T., "Hong Kong Smart City Blueprint," in *Smart City Consortium*, 2017.
- [20] F. A. Joshua, "Assessment of the Role and Functions of Human Resources Department in Small and Medium Scale Enterprise Companies in Ile – Ife," *Osun. J. Hum. Resour. Manag.*, vol. 7, no. 2, 2019.
- [21] D. L. Deadrick and D. L. Stone, "Human resource management: Past, present, and future," *Hum. Resour. Manag. Rev.*, vol. 24, no. 3, 2014.
- [22] T. G. W. University, *GW Human Resources Strategic Plan 2017-2021*. GW Human Resources Strategic Plan 2017-2021.
- [23] L. Zhang, X. Guo, Z. Lei, and M. K. Lim, "Social network analysis of sustainable human resource management from the employee training perspective," *Sustain.*, vol. 11, no. 2, 2019.
- [24] K. S. Kim and T. H. Shin, "Additive effects of performance- and commitment-oriented human resource management systems on organizational outcomes," *Sustain.*, vol. 11, no. 6, 2019.
- [25] M. T. Latkovikj and M. B. Popovska, *Competency Framework for Human Resource (Issue December 2015)*. 2019.
- [26] A. Sinclair and P. White, *A Strategic role for HR: is it a competence issue? Taxation in Australia*. 16, 2015.
- [27] S. Long, C. F. C., C. A. G., U., O. Kowang, and T., "The Relationship between HR Competencies and Organizational Performance in the Banking Sector in Nigeria," *Int. J. Hum. Resour. Stud.*, vol. 8, no. 217., 2018.
- [28] M. Peris-ortiz and D. R. Bennett, *Sustainable Smart Cities*. Springer, January, 2017.