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Design of Value-Performance Measurement System (V-PMS) for Work from Home (WFH) Performance

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Abstract. This study aims to create a PMS that can be used by companies running WFH. The COVID-19 pandemic has forced people to change their work patterns. The experience of a new work pattern, namely work from home (WFH) experienced by employees and entrepreneurs during the Covid-19 pandemic, will lead to several advantages and disadvantages. The things that become advantages will be maintained by the company because they provide good benefits, while the things that are less are minimized. Companies that run WFH need a performance measurement system (PMS) so that the company's performance remains good and even increases. For this reason, a breakthrough is needed in the manufacture of this new PMS. The research methodology combines case studies with grounded theory. The company/organization was established to provide added value to all stakeholders to obtain satisfaction. However, some of these stakeholders are often forgotten and only prioritize shareholders or investors. So, this problem often arises, and the company does not last long.

Keywords: *Performance Measurement System (PMS); work from home (WFH); value; value-added; stakeholder.*

1 Introduction

The Corona Virus (Covid-19) pandemic that occurred at the end of 2019 began to emerge from Wuhan, China, which spread throughout the world and Indonesia was also inseparable from its impact. Covid-19 is categorized as a very aggressive virus and is easily transmitted from person to person by droplets. The use of masks, social distancing, washing hands more frequently with soap, and cleaning the environment with disinfectants are believed to be effective in preventing the transmission of Covid-19. People are increasingly taking extra cleanliness, both personal and environmental hygiene.

Covid-19 is forcing the world to pause and rethink human sustainability due to the sheer number of deaths. The fact that health is no longer just an individual problem because it is a pandemic, its impact is global, so it is necessary to create the fourth pillar of global sustainability [1].

Covid-19 has changed the way people live. With the rules imposed by the government, companies are forced to run work from home (WFH) for their employees. Initially, WFH activities were carried out forcibly because they were not used to it. Meetings, communications, reports, and work directions are finally done remotely. But on the other hand, there are opportunities that are open, by using the WFH work pattern there are savings such as electricity savings in the office due to inactivity, transportation costs from home to office, business travel costs, and branch monitors are replaced with remote meetings. This shifting trend is also enabling companies to rethink their expensive office space.

WFH has a good impact on the environment, fewer traffic jams because employees no longer need to travel from home to office and vice versa. With WFH, the employees have more time to gather with families, monitor children's development, and take up personal hobbies. Hence, it is expected the level of happiness will be higher.

In a normal situation, there are two main problems that often occur in a company, the non-measurable values of the company which are actually important, and the violation of the expected values during the implementation of achieving company targets. This situation could be worse during WFH, in which the company has less control over the employees, especially towards company values. Thus the work culture that has been built so far will disappear. For this reason, even though during WFH, employees must maintain a work culture by emphasizing the values that exist in the company. This value is very important because it is the basis for making decisions in the company.

The good things that came up during WFH in this pandemic period will inspire some companies to be maintained in normal times (post-pandemic). The work pattern that was originally Work from Office will be changed to Work from Home or a combination of both (hybrid work strategy). It is even predicted that this remote work method will become a long-term trend. This changing work pattern demands a change in the evaluation and monitoring of employee performance that helps create a healthy work climate.

2 Literature Review

A Performance Measurements System (PMS) is defined as a system for collecting information, analyzing, and providing reports related to the performance of a company or organization down to the individual level of its workers [2]. PMS can also be defined as the future focus of the organization by evaluating the results that the company or organization provides for customers and stakeholders [3]. A PMS is also used to evaluate past operational activities related to company efficiency and effectiveness [4].

The objectives of performance measurement are [5] to know the level of achievement of organizational goals; provide employee learning tools; improve the performance of subsequent periods; give systematic consideration in making decisions, giving awards, and punishment; motivate employees and create public accountability.

To measure performance, we need a framework which is a decision-making process with reciprocal learning methods that help to manage, control, plan and carry out various activities carried out within the company.

For organizations and companies to achieve superior performance, tools are needed to regulate them. However, in this case, most of the existing performance measurement systems are based on office work, such as The Balanced Scorecard (BSC) [6][7], Integrated Performance Measurement System (IPMS) [8], The Performance Prism [9], Knowledge-Based Performance Measurement System (KBPMS) [10][11][12], Sustainability Balanced Scorecards (SBSC) [13][14][15], and so on. Meanwhile, WFH requires measuring in its own way so that it's expected to produce the best performance and even more so than working from the office.

3 Methodology

This research will be carried out using a case study approach by making close and in-depth observations about organizations or companies that run work from home for their employees. The case studies will be highlight almost any individual, group in the organization that can affect the company's performance. A case study may include several observations over a period within the same organization [16].

There are at least four types of case study designs that have been carried out, namely:

1. a. Case study design published by Kathleen M. Eisenhardt (1991) states that a good theory is basically the result of a rigorous methodology and comparative logic of many cases [17].
2. b. Case study design published by Robert K. Yin (2018) about the difference between single and multiple case studies [18].
3. c. The case study design by Robert E. Stake (1995) deals with the social construction of reality [19].
4. d. The case study design conducted by Michael Burawoy (2009) was used to identify anomalies [20].

Each of these case study designs has unique ontological and epistemological assumptions that distinguish one another. Although different, these case study designs can be combined to achieve research objectives.

Before running a case study, first, determine what will be studied as known as case selection. In case of selection, it is necessary to be unusual, interesting, and specifically able to reveal the required information. Case selection in a way that is all-represented is rarely rich in information and opens new insights [21].

In this research, case studies will be conducted on three different types of companies/organizations with the criteria of carrying out work from home (WFH) for their employees. The companies/organizations are profit, non-profit, and start-up. The existence of three different types of organizations/companies can enrich the research results. It is expected that the resulting PMS design can be used for all types of companies/organizations.

Grounded theory will be used in this research, which begins with collecting qualitative data. Furthermore, coding will be done briefly to simplify grouping into several categories, from the previous data obtained. The categories obtained can be arranged into a new hypothesis or theory [22] [23] [24]. Grounded theory is different from traditional research which starts from a theoretical framework, is developed into a hypothesis, and then validated with the collected data [25].

This study will use a combination of case study methods and the grounded theory used. In collecting data using case studies, while compiling the results of case studies into a new PMS using a grounded theory approach. By using these two approaches, a better PMS design can be made by combining several case studies of companies that run work from home into one new PMS with grounded theory.

4 Findings and Discussion

This study aims to create a PMS that can be used by companies/organizations that run work from home for their employees. During this COVID-19 pandemic, many companies/organizations run the WFH program. Even some companies have stated that they will run this program forever even though the covid-19 pandemic is over.

4.1 V-PMS stages

Based on the literature, structured stages will be arranged to facilitate the development of PMS. There are nine stages that must be passed as shown in Figure 1.

Stage 1. Analysis External Driver

In this first stage, the company first analyzes the external drivers that can affect the company's current performance and is expected to affect it in the future. To facilitate this analysis, PESTEL tools can be used which consist of political, economic, social, technological, environmental, and legal [26].

Stage 2. Stakeholder and Competition

In this second stage, the company must be able to identify all stakeholders and competition. Stakeholders will be separated between internal and external stakeholders. Internal stakeholders are stakeholders who are in direct contact with the company and can make changes to company policies directly. Meanwhile, external stakeholders are those who are not directly related to the company.

In addition to stakeholders, the company will experience competition in running a business. There are those who compete directly, but some are indirect. The ones that compete directly are our existing competitors who are competing with our company. However, there are those that compete indirectly, namely new entrants, substitute products, power suppliers, and power buyers [27]. If we are not vigilant and anticipate in our business strategy, this threat will damage our company's business and can even make the company bankrupt.

Stage 3. Organization Strategic

At this stage, the company will determine the strategic organization that is the direction of the company. First, determine the vision. After the vision is formulated, a mission is determined that will make the vision a reality. Finally, determine the company's values that will color the company's work culture.

Stage 4. Value Added for Stakeholder

Determine value added for the company's internal and external stakeholders. The company was established to fulfil all stakeholder interests. Once we identify all the stakeholders, then the company must know the satisfaction of each.

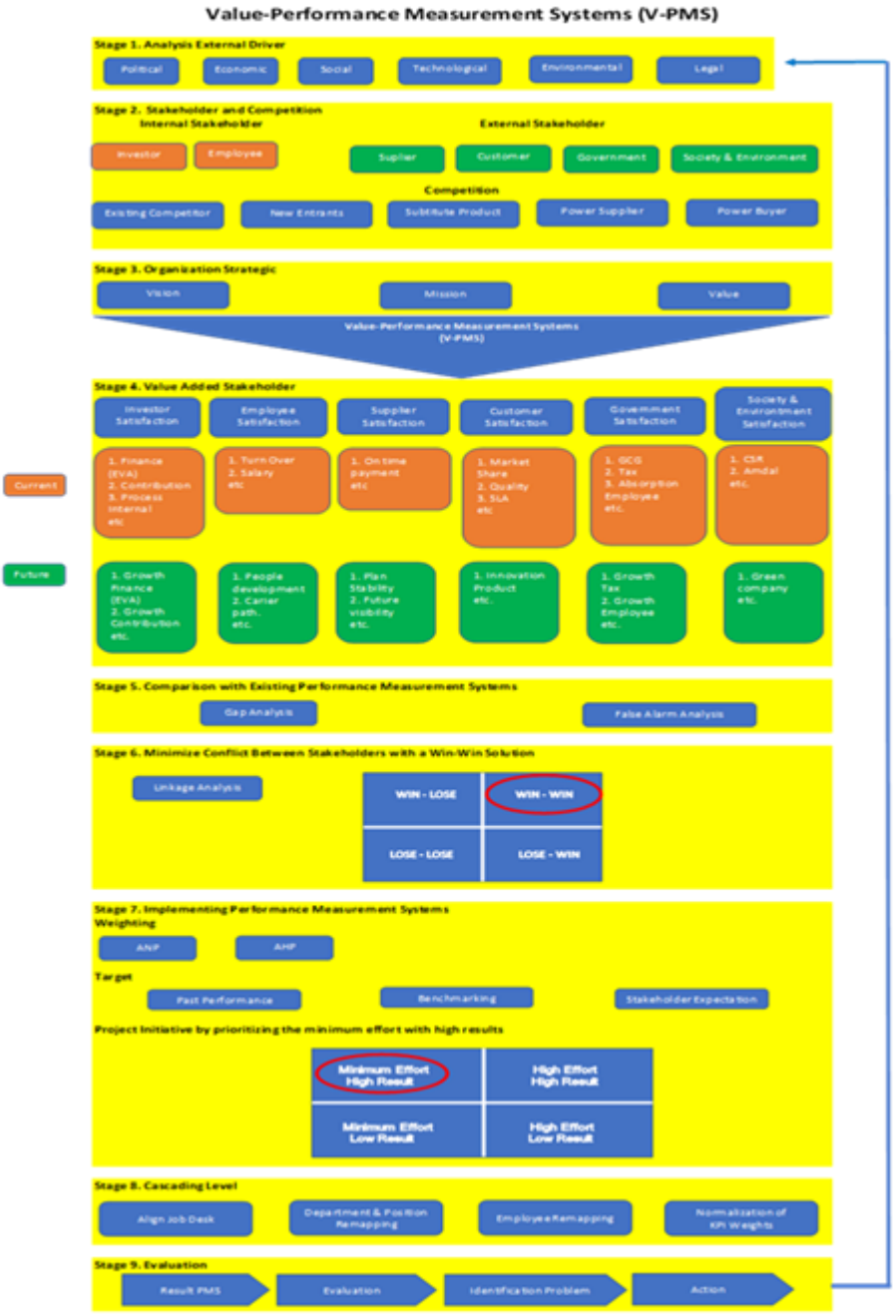

Figure 1 Stages developing model V-PMS.

Shareholders and employees are included in the category of internal stakeholders. Shareholders expect large returns which are usually assessed by Economic Value Added (EVA). To find out detailed measures, companies usually make derivative measures such as Net Income, Net Operating Profit After Tax (NOPAT), Earnings Before Interest and Taxes (EBIT), Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA). The company even creates a more detailed measure so that it can find out the causes in more detail if a problem occurs (not achieving the desired target). Meanwhile, employees will receive salaries and bonuses according to their respective performance. The company provides training and activities to appreciate employee performance. However, there are still many companies that consider employees are not part of the stakeholders so that they only get minimal added value from the company. Without more attention from the company, it will be able to result in employees switching companies if there are alternatives that offer jobs with better benefits, resulting in high employee turnover.

Stage 5. Comparison with Existing Performance Measurement Systems

At this stage, we will compare the Key Performance Indicator (KPI) results obtained during interviews with existing KPIs in the company. However, if the company is first established and does not have a KPI, you can directly analyze the relationship between the KPIs of each stakeholder. Comparisons with existing KPIs will certainly make a difference. Therefore, when the interview was finished, a questionnaire was carried out to confirm these differences.

Gap analysis is a way to detect KPIs that are considered important by stakeholders but in the previous KPIs they had not been included or had been included but were not a priority, so they were ignored. If you find this KPI, it must be included and increased its weight so that it becomes a concern.

False alarm analysis is a way to detect KPIs that are not considered important by stakeholders but are a serious concern for the company. So, the company made extraordinary efforts, but the results were not felt by the stakeholders. KPIs like this can be deleted because many KPIs will result in employees not being focused on their work. To find out gaps and false alarms, a questionnaire was carried out to stakeholder representatives.

Stage 6. Minimize Conflict Between Stakeholders with a Win-Win Solution

Linkage analysis is to analyze the relationship between KPIs to the satisfaction of stakeholders. When doing this analysis, it will find three kinds of relationships, namely mutually supportive, disconnected, and mutually contradictory. For KPIs that support each other, it needs to be a concern, because if it is implemented

properly, it will have a broad impact because it is related to other KPIs. Meanwhile, for those that are not related, KPI will run independently of each other. Meanwhile, the contradictory KPI will be a problem that must be resolved.

In a company, dealing with conflicting KPIs will create problems. When one of the KPIs runs well, it will have the opposite effect on the other KPIs. Thus we need a win-win solution between the two stakeholders. Furthermore, the results of the decision will be an important note for company managers in carrying out this KPI. To make a win-win solution, it's needed to think out of the box to find the best solution.

Stage 7. Implementing Performance Measurement Systems

At this stage, there are 3 parts that must be done, namely weighting, targets, and project initiatives.

a. Weighting

At this stage, we create weights for each KPI. In making this weighting, we will use the analytical hierarchy process (AHP) and the analytical network process (ANP) tools. Thurstone (1927) first introduced the pairwise comparison technique [28], which was later improved by Saaty (1978) formulate AHP and ANP [29][30][31][32][33][34][35][36][37][38][39] to make a comparison of two variables using the specified criteria. By using ANP/AHP tool, we will get the weight of each indicator based on the criteria agreed by the stakeholder representatives.

b. Target

The things that need to be considered in determining the target, there are past performance, benchmarking, and stakeholder expectations. In seeing the past performance, it can be seen from the previous month, the previous year, or the previous 3 years. This depends on the policies of each company. In addition to past performance and benchmarking, stakeholder expectations must also be considered. Because the main goal is to achieve stakeholder satisfaction.

The combination of previous achievements, benchmarking, and stakeholder expectations can be used as wise targets that meet the SMART elements (specific, measurable, achievable, relevant, and time-based).

c. Project Initiative

Project initiatives need to be carried out if the existing performance with the target to be achieved there is a very large gap and it is expected that there will be a significant increase in the achievement of KPI results. If there are several project initiatives that must be carried out, it is necessary to select the one with the least effort with a high yield which is a priority so that the achievement of company KPIs can gradually increase significantly.

Stage 8. Cascading Level

Performance Measurement Systems (PMS) that have been formed at the corporate level need to be broken down to the lowest employee level, then all employees have their own KPIs. It is expected that they have a sense of belonging to the company, thus can improve company performance altogether. There are 4 stages in cascading this level, namely job desk alignment, department & position remapping, employee remapping, and employee KPI normalization.

a. Align Job Desk

Job desk alignment is needed especially if there are gaps and false alarms during the previous analysis. If there is a gap, then there is a KPI that has never been done before, so when this new KPI is created it is necessary to adjust the job desk even if there is no department that represents this KPI, it is necessary to create a new department to run the KPI. Conversely, if a false alarm is found, this KPI is no longer needed so that by removing this KPI, the related job desk will also be lost. Even the departments related to this KPI can also be eliminated because their KPIs are no longer relevant.

b. Department & Position Remapping

As a result of aligning the job desk with the new KPI, department & position remapping is necessary. There will be departments and positions that are lost or added so that adjustments need to be made.

c. Employee Remapping

With changes in the department, it is necessary to adjust the number of employees and head positions. It can be added or decreased according to needs. They can also be transferred to new positions needed to support new KPIs.

d. Normalization of KPI Employee

Due to changes in KPIs, it is necessary to adjust the weight of each according to the KPI in the corporate known as normalization. It aims to adjust the KPI of each employee with the corporate KPI so that the total KPI of each employee remains 100% even though what the employee does in total is only 20% of the corporate KPI. For example, corporate KPI Net Income is 15% and market share is 5%, employees with these two KPIs have a net income weight of 75% and a market share of 25%. So that the total employee KPI is 100%.

Stage 9. Evaluation

After the KPI is implemented, it is necessary to periodically evaluate it so that we can find out that the KPI is still relevant. If there are problems or the targets are not achieved, we will identify the main causes. By knowing the main cause, we can take corrective action. If improvements have been made as above, but stakeholder satisfaction has not been achieved, it is necessary to look back at performance measurement systems (PMS) from the initial process of being formed.

4.2 Expert System (ES)

Expert systems are computer programming using artificial intelligence (AI) algorithms that can think like humans based on certain skills. The first expert system uses a knowledge-based architecture which consists of two things, namely a knowledge base and an inference engine [40].

The facts that have occurred are represented in a variable called the knowledge base. Expert systems use concepts from object-oriented programming that work with queries and declare object values. While the inference engine performs automatic reasoning that evaluates the current state of the knowledge base so that new knowledge is obtained that is more precise and efficient. The inference engine can also explain, make decisions and provide information for users [41]

This expert system will be able to assist in implementation in complex companies or organizations. If processed manually, it will be very difficult for users, especially when cascading KPIs from the top management to the lowest level. With this expert system, monitoring performance can be seen in real-time so that actions/corrections can be taken faster if performance does not reach the target. With this expert system technology, the value-performance measurement system (V-PMS) can be applied more easily and in real-time.

4.3 Reliability and Validity Tests

To maintain the validity of the construct remains valid is to refer to the literature review. The action is to make sure the right concept is defined correctly. While external validity is the extent to which this study can be generalized to other cases [42]. Generalizations again depend heavily on the experience and diversity of the participants. The more varied the firm, the more likely he or she will answer the question to generalize the answers [43].

In terms of the validity of this study, the selection of research onion is carefully thought. Thus, the selection of each layer is appropriate with the basic thinking and purpose of this study [44]. This research is also valid because triangulation activities are also carried out, such as a double-checking model by conducting a case study at 3 different companies/organizations [45].

Reliability is an appropriate replication, meaning that if this study and methodology are carried out in a different time, region and paradigm, it remains consistent [46]. To support reliability, this study will use Pearson Correlation Coefficient to measure the power and linearity of variables. This study should also internally consistent on which there are no repetitive questions are created to measure the same concepts. Correlation can be used to check the relations of one question to another. One way to verify this is by using the measurement of coefficient alpha (α-coefficient) of Cronbach [47]. This study targeted that the average value of the correlation requirement is lower than 0.70 to be considered as highly reliable [48].

5 Conclusion

The experience of a new work pattern, namely work from home (WFH) experienced by employees and employers during the Covid-19 pandemic, gives advantages and disadvantages. The things that become advantages will be maintained by the company because they provide good benefits, while things that are less will be minimized by creating a performance measurement system. This new framework facilitates the assessment and supervisory process of work. Thus, the company will be able to get more benefits with efficiency and employees will not be aggrieved because all work will be assessed fairly. It is expected that a combination of WFH and ways of measuring their performance make a positive contribution.

Companies that run WFH need performance measurement systems (PMS) to maintain company performance to stay good and even improve very well and keep company values well maintained. It needs a breakthrough in making this new PMS. This study aims to create PMS that can be used by many companies

running WFH. It is expected, even though during WFH, employees must maintain a work culture by emphasizing the values that exist in the company.

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References

[1] Hakovirta, M. & Denuwara, N., *How COVID-19 redefines the concept of sustainability*, In Sustainability (Switzerland), **12**(9), 2020. https://doi.org/10.3390/su12093727

[2] Behn, R.D., *Why Measure Performance? Different Purposes Require Different Measures*. Public Administration Review, **63**(5), pp. 586–606, 2003. https://doi.org/10.1111/1540-6210.00322

[3] Moullin, M., *Performance measurement definitions: Linking performance measurement and organisational excellence*. International Journal of Health Care Quality Assurance, **20**(3), pp. 181–183, 2007. https://doi.org/10.1108/09526860710743327

[4] Neely, A., Mills, J., Platts, K., Richards, H., Gregory, M., Bourne, M. & Kennerley, M., *Performance measurement system design: developing and testing a process-based approach*. International Journal of Operations & Production Management, **20**(10), pp. 1119–1145, 2000. https://doi.org/10.1108/01443570010343708

[5] Mahmudi. 2010. Manajemen Kinerja Sektor Publik. Yogyakarta: UPP STIMYKPN.

[6] Kaplan, R. S. & Norton, D. P., The Balanced Scorecard--measures that drive performance. Harvard Business Review., 1992.

[7] Kaplan, Robert S., & Norton, D.P., *Linking the Balanced Scorecard to Strategy*. California Management Review, **39**(1), pp. 53–79, 1996. https://doi.org/10.2307/41165876

[8] Bititci, U. S., Carrie, A. S. & McDevitt, L., *Integrated performance measurement systems: A development guide*. International Journal of Operations and Production Management, **17**(5), pp. 522–534, 1997. https://doi.org/10.1108/01443579710167230

[9] Neely, A.D., Adams, C. & Kennerley, M., *The Performance Prism: The Scorecard for Measuring and Managing Stakeholder Relationships*, Financial Times/Prentice Hall, London., 2002.

[10] Wibisono, D., *A knowledge-based approach in the design of performance measurement systems in the manufacturing environment*. PhD Dissertation. University of Bradford, the United Kingdom., 2003.

[11] Khurshid Khan, M. & Wibisono, D., *A hybrid knowledge-based performance measurement system.* Business Process Management Journal, **14**(2), pp. 129–146, 2008. https://doi.org/10.1108/14637150810864899
[12] Wibisono, D. & Khan, M. K., *The conceptual framework of a knowledge-based performance managemet system*. Gadjah Mada International Journal of Business, 2010. https://doi.org/10.22146/gamaijb.5506
[13] Möller, A. & Schaltegger, S., The Sustainability Balanced Scorecard as a framework for eco-efficiency analysis. Journal of Industrial Ecology, **9**(4), pp. 73–83, 2005. https://doi.org/10.1162/108819805775247927
[14] Butler, J., Henderson, S. C. & Raiborn, C., *Sustainability and The Balanced Scorecard: Integrating Green Measures into Business Reporting*. Management Accounting Quarterly, 2011.
[15] Alewine, H. C., & Stone, D. N., *How does environmental accounting information influence attention and investment*, International Journal of Accounting and Information Management, **21**(1), pp. 22–52, 2013. https://doi.org/10.1108/18347641311299731
[16] Barbara, G., *Paradigms and Sandcastles. Ann Arbor, MI: University of Michigan Press*. pp. 117, 2003. doi:10.3998/mpub.11910. ISBN 978-0-472-09835-4
[17] Eisenhardt, Kathleen M., *Better Stories and Better Constructs: The Case for Rigor and Comparative Logic*. The Academy of Management Review. **16**(3), pp. 620–627, 1991. doi:10.5465/amr.1991.4279496. JSTOR 258921.
[18] Yin, Robert K., Case Study Research: Design and Methods (6th ed.). Thousand Oaks, CA: SAGE Publications. ISBN 978-1-5063-3616-9.
[19] Stake, Robert E., *The Art of Case Study Research. Thousand Oaks*, CA: SAGE Publications. pp. 99–102, 1995. ISBN 978-0-8039-5767-1.
[20] Burawoy, Michael, *The Extended Case Method: Four Countries*, Four Decades, Four Great Transformations, and One Theoretical Tradition. Berkeley: University of California Press., 2009. ISBN 978-0-520-94338-4.
[21] Seawright, Jason; Gerring, John, *Case Selection Techniques in Case Study Research: A Menu of Qualitative and Quantitative Options*, Political Research Quarterly, 2014. doi:10.4135/9781473915480.n31, ISBN 978-1-4462-7448-4
[22] Martin, P.Y. & Turner, B.A., *Grounded Theory and Organizational Research*, The Journal of Applied Behavioral Science, **22**(2), pp. 141, 1986.
[23] Strauss, A. & Corbin, J., *Grounded Theory Methodology: An Overview. In N. Denzin & Y. Lincoln Handbook of Qualitative Research*. 1st ed., pp. 273–284, 1994.

[24] Faggiolani, C., *Perceived Identity: Applying Grounded Theory in Libraries*. JLIS.it. University of Florence. **2**(1), 2011. doi:10.4403/jlis.it-4592. Retrieved 29 June 2013.
[25] Allan, G., *A Critique of Using Grounded Theory as a Research Method*, Electronic Journal of Business Research Methods, **2**(1), pp. 1-10, 2003.
[26] Nandonde, Felix Adamu, A PESTLE analysis of international retailing in the East African Community". Global Business and Organizational Excellence., **38**(4), pp. 54–61, 2019. doi:10.1002/JOE.21935. ISSN 1932-205
[27] Porter, Michael E., *How Competitive Forces Shape Strategy*, Harvard Business Review, **57**(2), pp. 137–145, 1979.
[28] Thurstone, L., *A law of comparative judgment*. Psychol Rev., **34**(4), pp. 273–286, 1927.
[29] Saaty, T.L., *Modeling unstructured decision problems-the theory of analytical hierarchies*. Math Comput Simulat, **20**, pp. 147–158, 1978.
[30] Saaty, T.L., Applications of analytical hierarchies. Math Comput Simulat, **21**, pp. 1–20, 1979.
[31] Saaty, T.L., The analytical hierarchy process. McGraw-Hill, New York, 1980.
[32] Saaty, T.L., How to make a decision: the analytic hierarchy process. Eur J Oper Res., **48**(1), pp. 9–26, 1990.
[33] Saaty, T.L., Some mathematical concepts of the analytic hierarchy process. Behaviormetrika, **29**, pp. 1–9, 1991.
[34] Saaty, T.L., How to make a decision: the analytic hierarchy process. Interfaces, **24**, pp. 19–43, 1994.
[35] Saaty, T.L., Decision making with dependence and feedback: the analytic network process. RWS Publications, Pittsburgh. 1998. ISBN 0-9620317-9-8
[36] Saaty, T.L., *Decision making with the analytic network process (ANP) and its "super decisions" software: the national missile defense (NMD) example*. In: ISAHP 2001 proceedings, Bern, Switzerland, 2–4 Aug 2001
[37] Saaty, T.L., (2001b) Deriving the AHP 1–9 scale from first principles. In: ISAHP 2001 proceedings, Bern, Switzerland
[38] Saaty, T.L., (2005) Theory and applications of the analytic network process: decision making with benefits, opportunities, costs and risks. RWS Publications, Pittsburgh. ISBN 1-888603-06-2
[39] Saaty, T.L., *The Analytic Network Process*. Iran J., Oper Res **1**(1), pp. 1–27, 2008.
[40] Smith, Reid (2013) (May 8, 1985). "Knowledge-Based Systems Concepts, Techniques, Examples" (PDF). Reid G. Smith. Retrieved 9 November 2013.
[41] Hayes-Roth, Frederick; Waterman, Donald; Lenat, Douglas (1983). Building Expert Systems. Addison-Wesley. ISBN 978-0-201-10686-2.

[42] Campbell, D.T. & Stanley, J.C., Experimental and quasi-experimental designs for research. Boston: Houghton Mifflin
[43] Ferguson, L. (2004). External validity, generalizability, and knowledge utilization. Journal of Nursing Scholarship, **36**(1), pp. 16-22, 1963. doi: http://dx.doi.org/10.1111/j.1547-5069.2004.04006.x
[44] Waterman, AS., *The humanistic psychology-positive psychology divide: Contrasts in philosophical foundations*. Am Psychol., **68**, pp. 124–33, 2013.
[45] Finfgeld & Connett D., Generalizability and transferability of meta-synthesis research findings. J Adv Nurs., **66**, pp. 246–54, 2010.
[46] Golafshani, N., *Understanding reliability and validity in qualitative research*. The Qualitative Report, **8**(4), pp. 597-607, 2003. Retrieved from https://nsuworks.nova.edu/tqr/vol8/iss4/6
[47] Hair Jr. & Joseph. F., Multivariate Data Analysis Seventh Edition. Pearson Education Limited: Edinburgh, England, 2014.
[48] Heale, R & Twycross, A., *Validity and reliability in quantitative studies `Evidence-Based Nursing*, **18**, pp. 66-67, 2015.