



A REVIEW ON THE INTERNAL CONSISTENCY OF A SCALE: THE EMPIRICAL EXAMPLE OF THE INFLUENCE OF HUMAN CAPITAL INVESTMENT ON MALCOM BALDRIDGE QUALITY PRINCIPLES IN TVET INSTITUTIONS

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Abstract

Today's education institutions are constantly striving to develop and enhance the quality of employees to achieve a competitive advantage in the education market. Investing in developing the human capital quality has become a vital part of the institution strategy in managing the resources. In conjunction with the government aims in enhancing the quality of education system the institution nowadays is striving to nurture the lecturer's capabilities towards the strategy. This paper aims to assess the internal consistency of data therefore; the further analysis procedure can be carried out systematically. For this purpose, the Cronbach's alpha coefficient is used in validating the adapted questionnaire. It is a necessary procedure for the pilot testing phase to measure the strength of consistency as it is a well-known and consistent method to measure the reliability of items in the instrument. As for the example of practical, the data derived from a study which was conducted to 345 lecturers from 9 polytechnic campuses in East Coast Malaysia (Kelantan, Terengganu and Pahang) was applied. The questionnaire consists of 63 questions with 7 scales that were used to identify the internal consistency. The preliminary analysis of the reliability analysis resulted in strong associations (greater than 0.6) for all variables. The finding obtained has proven that the research's instrument has high association of consistency to enhance the quality of the study.

Keywords: Human Capital Investment, TVET Institutions, Internal Consistency and Cronbach Alpha

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INTRODUCTION

One of the most wide data collection techniques used by the quantitative researcher to obtain data from the respondents is a survey questionnaire. Thus, it is important to measure the accuracy and consistency of feedback before pursuing the next level of analysis. This analysis phase is known as measuring the validity and reliability of instrument (Taherdoost & Group, 2017). From Pallant (2011) the researcher should ensure the degree to which the items that make up the scale 'hang together and identify either the items are measuring the same construct or not. In measuring the internal consistency of the construct, Cronbach's alpha coefficient is one of the common indicators used in the quantitative study. It is a crucial process for a researcher in choosing the instrument or considering in developing the new one to achieve the research objective as well as the quality of the instrument (Taber, 2018).

Said (2018) also agreed that the reliability test is one of the most significant components of test quality which it involved with the reproducibility, consistency, or an examinee's performance on the test. In other hand, Taherdoost & Group (2017) also explained for the exploratory phase the researcher also needs to check on the validity of instrument because for a test to be reliable, it also needs to be valid. The reason of measuring the validity of instrument is to confirm that the items are measure what is intended to be measured (Field, 2005). Therefore, measuring the validity and reliability is not an all or none issue but a matter of degree as it will determine how all factors on the test relate to all other factors and which factors should remain, revise or remove from the instrument.

LITERATURE REVIEW

Human Capital Investment

The human capital is apart of the key resource which helps the organization to compete intensely in their market (Sturman, Walsh, & Cheramie (2001);Barney (1991). In addition, they contribute not only in terms of manpower but idea, expertise, skill, knowledge, and ability to the organization. Moreover, organization nowadays value their employees not only from the basic qualification to hold a position but they being evaluated from the different perspectives such as knowledge, management skills and leadership abilities which they develop along with their service (Gardner, 2005). Additionally, the extension of the human capital is focusing on the degree to which an individual's knowledge, skills, and experience are so rare or unique they generate above-average organizational rents for the firm. This special characteristic can bring greater value to the organization's success in maintaining their competitive advantages in the industry towards the competitor (Barney, 1991).

Malcom Baldrige Quality Principles

Jankal & Jankalova (2017) discussed, a basic characteristic of a Business Excellence models is it focusing on processes and process approach purposely to support the organization improvement. The Baldrige Excellence Framework one of the business excellence model practice by the organization around the market. It was developed based on a set of core values and concepts for integrating key performance and operational requirements within a results-oriented framework that creates a basis for action, feedback, and ongoing success: This model concentrating on 7 categories of quality principles consists of leadership, strategy, customers, measurement, workforce, operations and results (Figure 1). The assessment of Baldrige criteria able to assist the organization to identify its strengths and opportunities for improvement, as well as prioritize its areas where improvement is

needed to attain sustainability in the future. Bailey (2015) elaborated the Baldrige Criteria for Performance Excellence are accepted around the world as the gold standard for organizational performance excellence. It has become a main body of principles to lead the result of performance improvement in an organization.

The Baldrige criteria is globally proven and validated by more than twenty-seven years of practice, expert review, and research used as a standard of measurement of the organization success. This approach was adapted in different types of industry such as manufacturers, businesses, health care, education, and non-profit organizations. The practice of this business model allows the organization to assess and improve their performance, becoming more sophisticated about how to align all their processes to achieve desired results. That is important not only to the success of manufacturing and service enterprises but also sectors such as health care and education which are vital to the future of the economy and the well-being of society. The Baldrige Award is given to only a few of the applicants because they meet the highest standards. But in a sense, every organization that uses the Baldrige Criteria for self-study and change can turn out to be a winner due to their increased ability to learn, adapt, innovate, and achieve excellence.



Figure 1: Malcom Baldrige Quality Principles

Internal Consistency

Green, Lissitz, & Mulaik, (1977) describe the internal consistency is necessary in measuring the research instrument and it shows the degree of interrelatedness between the items whereas homogeneity refers to the unidimensional of a set of items. Internal consistency is a necessary, but not sufficient, condition for homogeneity. Next Jain S. & Angural. V (2017) explained, Cronbach's alpha was familiarised by Kuder & Richardson (1937) for dichotomously score data (0 or 1) and then Cronbach (1951) has extended this analysis to account for any scoring method. Basically, the reliability of any measurement focusing on the extent to which it is a consistent measure of a concept and for this reason, Cronbach's alpha is one of the solutions for the researcher to assess the strength of consistency of the data. This a crucial part should be considered before the researcher nay proceed with the next level of analysis. The reliability concept is related to repeatability to ensure the analysis will produce a consistent result while validity is concentrating on the extent to which a measure what it is supposed to measure as stated in the research objectives. Both of this concept is important to help the researcher in obtaining an accurate later. Therefore, the internal consistency result must be reliable for it to be valid. While Heale & Twycross (2015), defined the validity concept as the extent to which a concept is accurately measured in a quantitative study and reliability as the extent to which a research instrument persistently has the same results if it is used in the same situation on repeated times.

Cortina (1993) claimed that the internal consistency evaluates the consistency of results across factors within a test. Therefore, Cronbach's alpha is the most used internal consistency measure, which is generally founded as the mean of all possible split-half coefficients. According to Bujang, Omar & Baharum (2018) the reason of assessing the internal consistency of data is to test on the reliability of the respondent's feedback on a research instrument (or domain of a questionnaire), an instrumentation or rating evaluated by subjects which will indicate the stability of the tools. For this reason, the Cronbach alpha is used to measure the consistency or reliability between several items, measurements or ratings. In addition, the Cronbach alpha also used to check on the stability of the instrument which measures the research variables. Cronbach's alpha shows the degree of internal consistency. It is a meaning of the number of factors in the scale and the degree of their inter-correlations. It ranges from zero to one exclusively, and it measures the proportion of variability that is shared among factors. The conceptual formula of Cronbach's Alpha is stated as:

$$\alpha = \frac{K r}{[1+(K-1)r]} \quad (1)$$

Where K is a number of factors and r is the average correlation among all factors (the mean of the K (K-1) /2 non-redundant correlation coefficients (i.e., the mean of an upper triangular, or lower triangular, correlation matrix).

However, despite this Panayides (2013) claimed the alpha value help the researcher in two main issue. First is that alpha is not an indication of the unidimensional of the scale since high alphas can be achieved with multidimensional scales, given enough item. The second higher value of Alpha is not always better because it could mean lengthy scales, parallel items, item redundancy or narrow coverage of the construct or construct underrepresentation. In addition, higher values may reflect a narrow coverage of the construct which exposes the precision of a large proportion of person measures.

Types of Reliability

Table 1 illustrated 2 categories of reliability consists of internal reliability and external reliability:

Table 1: Types of Reliability (Jain & Angural, 2017)

Category	Types of analysis	Description of analysis
Internal Reliability: It assesses the consistency of results across items within a test. By dividing into two parts it will show a similar result or not.	Average inter-item correlation	Mean of all correlation of a correlation construct
	Average item total correlation	Mean of total correlation of each item
	Split-half correlation	Correlation between split-half scores of a construct
	Cronbach's alpha	Correlation between all possible split-half scores of a construct
External Reliability: It refers to the extent to which a measure varies from one use to another. The analysis should show a same result time after by using the same test.	Test-retest reliability	Correlation between measures of one test at two different times.
	Parallel form reliability	Correlation between two tests at same point of time
	Inter-rator reliability	Correlation of results of different observer doing same test

A Low or High Value of Cronbach's Alpha (α)

One of the advantages of using the coefficient alpha is because the result is easy to interpret. To the degree coefficient alpha approaches 1.0, a scale demonstrates greater internal consistency. Even though the coefficient alpha may be an underestimate of reliability if assumptions are violated, it is simple and even desirable to include a caveat about alpha being an underestimate in that readers then understand that the true reliability might be greater (Yang & Green, 2011).

A low value of Cronbach's alpha will influence the validity of the data. This condition can happen because of the numbers of items are not enough or the items are partly correlated with each other or diversity in the construction of the instrument. Therefore the items need to be revised or removed as the items. But if the alpha value is too high it show that the items a redundant as they are measuring the same things but in a different items. The duration of conducting the test also can influence the value. One of the strategy in improving the alpha value is adding more related items to test the same concept (Jain & Angural, 2017).

The Minimum Sample Size in Calculating the Cronbach's Alpha

Yurdugül H (2008) recommend the sufficient sample size is 30 respondents on situation that the first (largest) eigenvalue obtained from Principal Component Analysis (PCA) of the sample data set is higher than 6.00. But, if that first eigenvalues are between 3.00 and 6.00, then required minimum sample size is 100. Supported by Conroy R (2016), a pilot testing required minimum of 30 respondents as the sample to measure the reliability using Cronbach's alpha by considering the scale items have strong correlations among the items.

The Rule of Thumb of Reliability

From Sideridis (2018) in validating the Cronbach's alpha, there are several conditions should be considered:

- i. The item scores should be on an interval level data with no restriction of range without having to implement the K-R 20 formula
- ii. The linearity and homoscedasticity of errors
- iii. Small amounts of measurement error and correction for attenuation of both variances and covariances
- iv. Same distributions between items
- v. Unidimensional
- vi. Absence of systematic sources of error
- vii. Independence of items in terms of content
- viii. Presence of equal factor loadings across indicators

Cited in Taherdoost & Group (2017), it suggested that in the pilot study phase the reliability result should be equal to or above 0.60 (Straub et al., 2004; Hinton et al., 2004) have suggested four cut-off points for reliability, which includes excellent reliability (0.90 and above), high reliability (0.70-0.90), moderate reliability (0.50-0.70) and low reliability (0.50 and below) (Hinton et al., 2004). It seems then that despite many authors following a rule-of-thumb that alpha should reach 0.70 for an instrument to have an acceptable level of self-consistency, there are limited grounds for adopting such a heuristic. The next rule-of-thumb cited in Said (2018) stated a value of Cronbach's alpha between 0.6 and 0.8 is acceptable (Wim et al, 2008). To measure the construct validity in an empirical approach the rule of thumb item-to-total correlations, and the inter-item correlations are adequate. Cohen (1988) states that if inter-item correlation lies within 0.10 and 0.29, then there is a weak correlation for both positive and negative values, and when inter-item correlation lies within 0.30 and 0.49 a medium correlation,

and lastly if the inter-item correlation is between 0.50 and 1.00 a strong correlation.

Moreover, Robinson (1991) recommends that, in an empirical approach and as a rule of thumb, if the score of the item-to-total correlations is more than 0.50 and the inter-item correlations exceeds 0.30, the construct validity is satisfied. Next discussed in Poythress, Douglas, Cruise, & Murrie (2006) to evaluate internal consistency reliability of a scale, Nunnally and Bernstein (1994, p. 265) suggested that a value of .70 or higher for Cronbach's alpha demonstrates satisfactory reliability. Moreover, it should not be assumed that a very high value of alpha is always a good thing (Taber, 2018).

Next is from Hair et al (2016), the value of the reliability analysis can be interpreted based on the strength using Rule of Thumb as shown in table 2:

Table 2: Strength of Association Determination

Alpha Coefficient Range	Strength of Association
< 0.6	Poor
0.6 to < 0.7	Moderate
0.7 to < 0.8	Good
0.8 to < 0.9	Very Good
0.9 >	Excellent

METHODOLOGY

The quantitative methodology was used to collect and analyse the data obtained from all the respondents. The researcher developed the questionnaire and finalized it before being distributed to the 9 TVET institutions in east coast Malaysia.

Population And Sampling

The total population for this research were 1408 of lecturers from the 9 TVET campuses in east coast Malaysia. The simple random sampling techniques were used to obtain the response from the respondents. Therefore, the numbers of sample required for this study are 317 respondents.

Research Instrument

A survey questionnaire with a total of 63 items with 8 sections was used as the main instrument in this study to analyse the relationship between the sustainability of human capital investment and the Malcom Baldrige Quality Principles. The questionnaires were distributed where all respondents were asked to read the statements given and choose their answers based on 7-Likert scale ranged from 1 (strongly disagree) to 7 (strongly agree). Next the data were gathered together to be analysed using Statistical Package for the Social Sciences (SPSS) version 21. The analysis includes both descriptive and inferential analysis. The researchers used descriptive analysis to analyse the frequency and percentage of the overall population in the demographic background.

Demographic Profiles

Table 3 illustrated the demographic characteristics of respondents:

Table 3: Demographic Profile

Demographic		N	%
Gender			
i.	Male	123	35.7%
ii.	Female	222	64.3%
	Total	345	100%
Campus			
i.	Kelantan-Politeknik Kota Bharu	92	26.7%
ii.	Kelantan-Politeknik Jeli	17	4.9%
iii.	Pahang – Politeknik Sultan Haji Ahmad Shah	85	24.6%
iv.	Pahang – Politeknik Metro Kuantan	11	3.2%
v.	Pahang – Politeknik Muadzam Shah	39	11.3%
vi.	Terengganu-Politeknik Sultan Mizan	59	17.2%
vii.	Terengganu-Besut	7	2.0%
viii.	Terengganu-Hulu Terengganu	16	4.6%
ix.	Terengganu-Politeknik Kuala Terengganu	19	5.5%
	Total	345	100%
Age			
x.	Below 30 years old	21	6.1%
xi.	31- 40 years old	191	55.4%
xii.	41 – 50 years old	89	25.8%
xiii.	51 – 60 years old	44	12.8%
	Total	345	100%
Job Status			
i.	Fulltime	338	98.0%
ii.	Part-time	6	1.7%
iii.	Contract	1	0.3%
	Total	104	100%
Highest Education Level			
i.	Doctorate PhD	12	3.5%
ii.	Master Degree	144	41.7%
iii.	Bachelor Degree	181	52.5%
iv.	Diploma	8	2.3%
	Total	345	100%

Table 3 represent the demographic profiles of the research respondents. From the overall population (n=345) based on gender, there are 222 female respondents with a percentage of 64.3% as compared to only 123 male respondents with 35.7%. The second item is assessing on the location of the TVET campuses. The highest respondents are from Politeknik Kota Bharu consists of 92 respondents with 26.7% from all respondents, followed by Politeknik Sultan Haji Ahmad Shah 84 respondents (24.6%), Politeknik Sultan Mizan 59 respondents (17.2%), Politeknik Muadzam Shah 39 respondents (11.3%), Politeknik Kuala Terengganu 19 respondents (5.5%), Politeknik Jeli 17 respondents (4.9%), Politeknik Hulu Terengganu 16 respondents (4.6%), next from politeknik Metro Kuantan 11 respondents (3.2%) and lastly from Politeknik Besut 7 respondents (2.0%). The item number 4 is assessing on the respondent's job status. Majority 338 respondents (98%) are fulltime worker and 6 of them consist of 1.7% are a part-time worker. Only a respondent contributes 0.3% of the respondent is a contract worker. The last item is to identify the highest education level of the respondent. Majority 181 respondents (52.5%) are

the bachelor's degree holder, 144 respondents (41.7%) are master degree holder, 12 of the respondents (3.5%) have obtain their PhD and only 8 respondents (2.3%) are the diploma holder.

Assessing the Missing Data

Table 4 shows the analysis of the missing values for the dataset. The result stated the 0 missing values for the count and percent. Therefore, it can be concluded that is no missing values for this dataset. The third option to check for the missing values is checking on the descriptive analysis of data. The result in Table 4 also shows that is no missing value for this data and further analysis can be conducted.

Table 4: Assessing the missing data

Constructs	Valid		Cases Missing		Total	
	N	Percent	N	Percent	N	Percent
Training	345	100.0%	0	0.0%	345	100.0%
Education	345	100.0%	0	0.0%	345	100.0%
Knowledge	345	100.0%	0	0.0%	345	100.0%
Skill	345	100.0%	0	0.0%	345	100.0%
Experience	345	100.0%	0	0.0%	345	100.0%
Ability	345	100.0%	0	0.0%	345	100.0%
Malcom Baldrige Quality Principles	345	100.0%	0	0.0%	345	100.0%

Reliability Analysis On Constructed Items

Table 5 shows the summary of reliability analysis for the research construct. The reliability method is used to identify the correlation value between scores for each item. By conducting this procedure, the items with high correlation values with the test index score have high reliability whereas items with low correlation values have low reliability and will be discarded from the test. This process is known as the internal consistency approach (Chan, 2006). Based on the given table, the Cronbach alpha value score is between 8.00-9.00, which indicated the very good association as ruled by (Hair et al, 2016).

Table 5: The summary of Reliability Analysis on Constructed Items

Section	Constructs	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No. of Items	Strength of association
C	Malcom Baldrige Quality Principles	.937	.939	11	Excellence
D	Training	.950	.950	8	Excellence
E	Education	.959	.959	8	Excellence
F	Knowledge Management	.957	.957	8	Excellence
G	Skill Development	.955	.955	6	Excellence
H	Experience	.967	.968	6	Excellence
I	Ability	.968	.968	6	Excellence

DISCUSSION

The result indicates good strength of association for the Cronbach's Alpha value for the 53 items as stated in Table 5. The strength of association result shows that the dependent variable is ranged as excellent and the independent variable is excellence. This result explained that the research instrument is acceptable and reliable in measuring the respond. Based on the provided rule-of-thumb most the reference agreed that 0.9 indicated high level of reliability. Therefore, it seems then that despite many authors following a rule-of-thumb that alpha should reach 0.70 for an instrument to have an acceptable level of self-consistency of the research instrument and this study successfully achieve the cut-off points of reliability.

CONCLUSION

This article provides a useful guideline in estimating the Cronbach's alpha. In measuring the internal consistency of the research instrument the Cronbach's alpha is commonly used as a method for evaluation reliability. In quantitative study it is a crucial issue for the researcher to determine the reliability and validity of an instrument. This process can help them to produce a good quality of study in achieving the research objective. But there are a few options in measuring the internal consistency which it depends on research instrument. Therefore, interpreting the result, the factors which influence the value should be kept in mind which may inflate or decrease the values of Cronbach's alpha.

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REFERENCES

- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17,99-120.
- Bartlett, M. S. (1954). A Note on The Multiplying Factors For Various Chi Square Approximation. *Journal of Royal Statistical Society*,16(Series B), 296-298.
- Bujang, M. A., Omar, E. D., & Baharum, N. A. (2018). Original Article A Review on Sample Size Determination for Cronbach ' s Alpha Test : A Simple Guide for Researchers, 25(6), 85–99.
- Boli, T. (2012). Journal of Engineering and Technological distinctive competencies and organizational learning : Effects on organizational innovation to improve firm performance, 29, 331–357.
- Chua, Y.P (2006a). Book 1 - *Research Methods and Statistic; Research Method* . Shah Alam, Malaysia:Mcgraw-Hill Education.
- Conroy, R. Sample size: a rough guide. Ethics (Medical Research) Committee; 2015. Retrieved from: http://www.beaumontethics.ie/docs/application/sample_sizecalculation.pdf.
- Ekambaram, A., Sørensen, A. Ø., Bull-berg, H., Nils, O. E., Ekambaram, A., Sørensen, Ø., ... Nils, O. E. (2018). ScienceDirect ScienceDirect The role of big data and knowledge management in improving The role of projects big data and and project-based knowledge management in improving organizations projects and

- project-based organizations. *Procedia Computer Science*, 138, 851–858.
- Field, A. 2000. *Discovering Statistics using SPSS for Windows*. London – Thousand Oaks – New Delhi: Sage publications.
- Field, A. P. 2005. *Discovering Statistics Using SPSS*, Sage Publications Inc. Gardner, T. M. 2002. In the trenches at the talent war: Competitive Interaction For Scarce Human Resources. *Human Resource Management*, 41, 225-237.
- Green, S. B., Lissitz, R. W., & Mulaik, S. A. (1977). Limitations of coefficient alpha as an index of test unidimensionality. *Educational and Psychological Measurement*, 37, 827-838.
- Hadi, N. U., Abdullah, N., Lumpur, U. K., & Ilham, S. (2016). An Easy Approach to Exploratory Factor Analysis : Marketing Perspective Noor Ul Hadi, (January). <https://doi.org/10.5901/jesr.2016.v6n1p215>
- Hair, Joseph F :, Celsi, mary;Money, Arthur; Samouel, Philip; and Page, Michael, "The Essentials of Business Research Method, 3rd Edition " (2016). 2016 Faculty Bookshelf.2.<http://digitalcommons.kennesaw.edu/facbooks2016/2>
- Hatch, N. W., & Dyer, J. H. (2004). Human Capital And Learning As A Source Of Sustainable Competitive Advantage. *Strategic Management Journal*, 25, 1155-1178.
- Hutcheson, G. D., and Sofroniou, N. (1999). *The Multivariate Social Scientist: An Introduction To Generalized Linear Models*. Sage Publications.
- Jankal, R., & Jankalová, M. (2017). The Importance of Process Approach in selected Business Excellence Models.
- Lai, Y., & Lin, F. (2012). The Effects of Knowledge Management and Technology Innovation on New Product Development Performance -An Empirical Study of Taiwanese Machine Tools Industry-. *Procedia - Social and Behavioral Sciences*, 40, 157–164. <https://doi.org/10.1016/j.sbspro.2012.03.176>
- Lrq, H. Q. G. (2015). Human resources management in the system of organizational knowledge management. *Procedia Manufacturing*, 3(Ahfe), 674–680. <https://doi.org/10.1016/j.promfg.2015.07.303>
- Masitah Z, Ibrahim S & Jibrail D, J (2017). An Exploratory Factor Analysis And Reliability Analysis For Green Affordable Housing Criteria Instrument, 11(4), 1-12.
- Moffett, S., Mcadam, R., & Parkinson, S. (2003). An empirical analysis of knowledge management applications, (August), 5–26. <https://doi.org/10.1108/13673270310485596>
- Jain.S & Angural. V (2017), Use Of Cronbach's Alpha In Dental Research I. N. (2017). ISSN No. 2394-3971 Case Report, 4(2394), 285–291.
- Pallant, J. (2011). *SPSS Survival Manual. A Step By Step Guide To Data Analysis Using SPSS*, 4th edition. Allen & Unwin, www.allenandunwin.com/spss.
- Panayides, P. (2013). Interpret With Caution. *Europe's Journal of Psychology Ejop.Psychopen.Eu | 1841-0413 Research*, 9(4), 21-32.
- Phudphad, K., Watanapa, B., Krathu, W., & Funilkul, S. (2017). ScienceDirect ScienceDirect Rankings of the security factors of human resources information system (HRIS) influencing the open climate of work : using analytic hierarchy process (AHP). *Procedia Computer Science*, 111(2015), 287–293. <https://doi.org/10.1016/j.procs.2017.06.065>
- Poythress, N. G., Douglas, K. S., Cruise, K., & Murrie, D. C. (2006). Internal Consistency Reliability of the Self-Report Antisocial Process Screening Device, 13(1), 107–113. <https://doi.org/10.1177/1073191105284279>
- Richard A. Johnson & Dean W. Wichern (2007). *Applied Multivariate Statistical Analysis* (6th Edition). USA: Pearson Education Publications
- Said. T (2018). “Statistical Analysis: Internal-Consistency Reliability And Construct Validity” 27–38. *European Centre for Research Training and Development UK*. 6(1), 27-38.
- Sharabati, A. A., & Hawajreh, K. M. (2012). The Impact of Organizational Information on Knowledge Management Practices, 3(24), 121–126.
- Shujahat, M., José, M., Hussain, S., Nawaz, F., Wang, M., & Umer, M. (2019). Translating the impact of knowledge management processes into knowledge-based innovation : The neglected and mediating role of knowledge-worker productivity. *Journal of Business Research*, 94, 442–450.
- Sideridis, G. (2018). Internal Consistency Reliability in Measurement : Aggregate and Multilevel Approaches Internal Consistency Reliability in Measurement, *Aggregate*, 17(1), 33-41.

- Sturman, M. C., Walsh, K., & Cheramie, R. A. (2001). The Value of Human Capital Specificity Versus Transferability, *34*(2), 290–316. <https://doi.org/10.1177/014920630731>
- Taber, K. S. (2018). The Use of Cronbach ' s Alpha When Developing and Reporting Research Instruments in Science Education, 1273–1296. <https://doi.org/10.1007/s11165-016-9602-2>
- Taherdoost, H., & Group, H. (2017). Validity and Reliability of the Research Instrument ; How to Test the Validation of a Questionnaire / Survey in a Research, (September). <https://doi.org/10.2139/ssrn.3205040>
- T. W. Schultz. (1961). 'Investment In Human Capital', vol.51, No.1 (Mar.), 1-17.
- Xu, J., Hou, Q., Niu, C., Wang, Y., & Xie, Y. (2018). ScienceDirect Process optimization of the University-Industry-Research collaborative innovation from the perspective of knowledge management. *Cognitive Systems Research*, 52, 995–1003.
- Yang, Y., & Green, S. B. (2011). Coefficient Alpha : A Reliability Coefficient for the 21st Century? <https://doi.org/10.1177/0734282911406668>
- Yurdugül H. (2008). Minimum sample size for Cronbach's coefficient alpha: a Monte Carlo study. *Hacettepe Egitim Dergisi*, 35, 397–405.