# Analysis Of Factors Influencing Quality Of Road Project (Case Study: Road Improvement Project of Linggang Melapeh Lama Village, Linggang Bigung District (Provincial Financial Help) in West Kutai Regency)

Rissa Oktavianti, Sutanto Hidayat, Bambang Wedyantadji

**Abstract:** The objectives of this research are: 1) to analyze factors influencing project quality in road improvement works; 2) to analyze the most dominant factors influencing project quality in road improvement works; 3) to analyze strategies that can be done to improve project quality in road improvement projects. This research uses descriptive method which is to know the factors that influence the Road Improvement Project Quality of Linggang Melapeh Lama Village, Linggang Bigung Disrict (Provincial Financial Help) in West Kutai Regency Budget Year of 2016. The method used for data collection is by using questionnaire. The results of this research are : 1) the factors that influence the project quality of Environmental Factor (X1) with the coefficient value β of 0,347 and Control Factor (X4) coefficient β of 0,369; 2) the most dominant factor influencing the Project Quality is Control Factor X4) with the coefficient value β of 0,369; 3) Strategies that can be done to improve the quality of the project on road improvement work is to understand the environmental conditions, socialization in the local environment, interact and involve the community, conduct more thorough surveys, supervise the material quality, supervision for each item of work with more thorough and routine in making a report or progress work.

**Index Terms:** Road Project, Transportation, Quality

## 1. INTRODUCTION

Road according to Law No. 38 of 2004 is land transport infrastructure covering all parts of the road, including auxiliary parts and equipment intended for traffic, located on the surface of the land and/or water, and on the surface of the water except the railroad, lorries, and cable road. Road is one of the important infrastructure in the national transportation system. The strategic benefits of roads are to increase domestic resources, increase the real sector by creating multiplier effects for the national economy and increasing large-scale employment, [1]. Road, as a land transportation capital, is a component of economy development dynamic trigger in general, spatial development in particular, and more specifically as a developer of the potential natural resources that have not emerged yet, or the sources of potential resources that will be explored or that have been exploited.


- *Rissa Oktavianti is currently pursuing master degree in Study Program of Civil Engineering, Concentration on Construction Management, National Institute of Technology Malang, Indonesia. E-mail: rissaoktavianti@gmail.com*
- *Sutanto Hidayat is a lecturer of Civil Engineering, Concentration on Construction Management, National Institute of Technology Malang, Indonesia. E-mail: sutantohidayat@yahoo.com*
- *Bambang Wedyatadji is a lecturer of Civil Engineering, Concentration on Construction Management, National Institute of Technology Malang, Indonesia. E-mail: labsipil@gmail.com*


As a connecting element, the road needs to emphasize revitalization data by focusing more on the effective potency [2]. Road pavement is a layer or road body that uses a special material which is a mixture of aggregates and binder materials used in the form of asphalt or cement. Road has a general requirement that is in terms of construction, it must be strong, durable and watertight, [3]. In terms of service, the road must have a flat surface, not slippery, geometric adequate, and economical as well as it is able to serve the load of traffic passing through the pavement. West Kutai Regency is one of the regencies in East Kalimantan Province, Indonesia. Moreover, Sendawar, as its capital city, is an expansion of Kutai Regency Region which has been established under the Law No. 47 of 1999. With an area of about 31,628.70 Km2. As the regency that is still doing regional expansion, absolutely it still does several development, especially the road as the main access in the improvement of accommodation, economy and culture. In this case, road construction is an important thing as a main supporter in economic activity, so in order to be able to meet the needs, the government and the private investors should be in cooperation in terms of construction of new roads and the construction or improvement of existing roads [4]. As mentioned above, road is the main supporter in the development of West Kutai Regency area, so the quality of the road construction should be able to provide comfort and safety for the road users. However, the reality reveals that there are still several road constructions that cannot provide the quality of road as expected. It happens because of many factors that influence the quality of the road improvement project. It causes road users unable to enjoy the comforts of driving, such as: the number of road damage, that according to the plan age, it should not have happened yet, the incompatibility of quality so that the work of the road must be repeated, and there are still many things that happen in many road works. The quality resulted in a work is usually not the same, but it is expected

to achieve the targeted quality results [5]. Quality comprises of a number of product features, both direct and attractive features that satisfy the customer's expectation, thereby it can provide satisfaction over the use of the product and free of defects or damage. In terms of construction services, it can be achieved with the support of quality components of work such as: capital, human resources, equipment resources, materials and experience in terms of construction services [6]. The deficiency of one of these components can certainly lead to results that are below the quality standards of the project; even though they are equipped with technical specifications as well as they complete standards that explain how the procedures for performing the work that can deliver results in accordance with the quality standards of a project [7]. In preliminary observations, there are several outcomes that suggest that the organizers and project executors are still weak and lack of experience in terms of conducting and implementing road projects. The weaknesses are in terms of human resources, insufficient equipment resources, lack of experienced experts, and lack of authorized capital, execution time that often exceeds the job completion targets, and many more. Based on the above background, then the research problems that can be stated in this research are: 1) what factors that influence the project quality of road improvement work in West Kutai area?; 2) what factors that dominantly influence the project quality of road improvement work in West Kutai area?; 3) what strategies that can be undertaken to improve the project quality of road improvement work in West Kutai area?. Based on the research problems, the objectives of this research are: 1) to analyze the factors influencing the project quality of road improvement work in West Kutai area; 2) to analyze the most dominant factor influencing the project quality of road improvement work in West Kutai area; 3) to analyze what strategies that can be undertaken to improve the project quality of road improvement work in West Kutai area.

## 2. RESEARCH METHOD

This research uses descriptive method which is to know the factors that influence the Quality of Road Improvement Project, [8]. The method used for data collection is by using a questionnaire [9]. The objectives of this research are to know factors influencing the Road Improvement Project Quality of Linggang Melapeh Lama Village, District (Provincial Financial Help) in West Kutai Regency, so it can determine what strategies and actions that should be taken to improve the quality of road improvement projects. The method data collection is done by using questionnaires given to respondents from the contractor, consultant, and Public Works Division of Regional Road Offices of West Kutai as Owner, in which the questionnaires given are intended to know the factors that influence the Road Improvement Project Quality of Linggang Melapeh Lama Village, District (Provincial Financial Help) in West Kutai Regency Budget Year of 2016. The number of population in this research is people who get involved in road improvement project in West Kutai Regency region as many as 45 people. Besides, owner population is of 20 people, service providers are of 15 people and supervisory consultants are of 10 people.

## 3 RESULT

### 3.1 Analysis of Factors Affecting Quality of Road Construction Project

Factor analysis is performed to obtain the appropriate variables which have a fairly high degree of dependence [10]. The indication of this level of linkage is seen from the value of KMO (Keizer Meyer Olkin) and MSA (Measures Sampling Adequacy) [11]. The variable with the lowest MSA value and less than 0,50 will be excluded or not included in the next phase of factor analysis.

### 3.2 Environmental Variable (X1)

To measure the influence of environmental factor on project quality, Environmental variable (X1) is measured by using 6 statement items: Value of Communality, Loading Factor, KMO, MSA, and Bartlett's Statistical Significance of the Environmental Variable indicator (X1). It can be seen that the value of MSA for X1.1, X1.2 and X1.6 is less than 0,5, so that in the next stage of analysis, those indicators are not included. In the result of phase II analysis, the MSA value is greater than 0,5, the KMO value of 0,551 is greater than 0,5 which indicates that the implementation of factor analysis model to the variables is quite good. While, Bartlett's Significance value of 0,043 is smaller than $\alpha$ (0.05) in which it indicates that the answers to the question of each indicator on the Environmental variable (X1) can be used for further analysis. Factor analysis with extraction method of Main Component Analysis raises the Eigen value > 1,0, where the influence of Environment (X1) towards Project Quality with the cumulative percentage rate is 49.450%. While, the rest of 79.360% is a mistake by other indicators that have not been detected in this study. In addition, the environmental variable (X1) has a value of Loading Factor above 0,5 for the indicators included in the factor analysis where the number of indicators analyzed initially is 6 then it became to 3 after factor analysis II is conducted which consist of Field Condition (X1. 3), Custom (X1.4), and Social (X1.5).

### 3.3 Planning Variable (X2)

Planning Variable (X2) is measured by using 6 statement items. In the result of phase I analysis, the MSA value is greater than 0,5, the KMO value of 0,841 is greater than 0,5 which indicates that the implementation of factor analysis model to these variables is very good. While, Bartlett's Significance value of 0.000 is smaller than $\alpha$ (0.05) in which it indicates that the answers of each indicator questions in the variable of Planning (X2) can be used for further analysis. Factor analysis with extraction method of Main Component Analysis raises Eigen value > 1.0, where the influence of Planning (X2) on the Road Improvement Project Quality of Linggang Melapeh Lama Village, District (Provincial Financial Help) in West Kutai Regency Budget Year of 2016 with cumulative percentage rate amounted to 65, 434%.While the rest of 34.566% is a mistake by other indicators that have not been detected in this study. Planning variable (X2) has a value of Loading Factors above 0.5 for the indicators included in the factor analysis are as much as 6 which consists of Hard Land (X2.1), Labile Land (X2.2), Design (X2. 3), Implementation Time (X2.4), Design Review (X2.5), and Technical Specification (X2.6).

### 3.4 Implementation Variale (X3)

The Implementation Variable (X3) is measured by using 6 statement items: Value Communality, Loading Factor, KMO, MSA, and Bartlett's Statistical Significance of the Implementation variable indicator (X3). It can be seen the value of Loading Factor for X3.3 and X3.5 is less than 0,5, so that in the next stage of analysi, the indicators are not included. In the result of phase II analysis, the MSA value is greater than 0,5, the KMO value of 0,717 is greater than 0,5 which indicate that the implementation of factor analysis model to the variables is very good. Beside, Bartlett's Significance value of 0.000 is smaller than $\alpha$ (0.05) in which it indicates the answers of each indicator questions on the Implementation variable (X3) can be used for further analysis. Factor analysis with extraction method of Main Component Analysis raises Eigen value > 1.0, where influence of Implementation (X3) to the Road Improvement Project Quality of Linggang Melapeh Lama Village, District (Provincial Financial Help) in West Kutai Regency Budget Year of 2016 with percentage of cumulative amounted to 60,536%. While the rest of 39,464% is a mistake by other indicators that have not been detected in this study. The implementation variable (X3) has a value of Loading Factor above 0.5 for the indicators included in the factor analysis where the number of indicators analyzed initially is 6 then it became 4 after after factor analysis II is conducted that consist of Work Method (X3.1), Manpower Plan Method (X3.2), Manpower, (X4) and Equipment (X3.6).

### 3.5 Control Variable (X4)

Control Variable (X4) is measured by using 3 statement items. In the results of the first phase analysis, the MSA value is greater than 0,5, the KMO value of 0.717 is greater than 0,5 which indicate that the implementation of the factor analysis model to the variables is good. While Bartlett's Significance value of 0.004 is less than $\alpha$ (0.05), in which it indicates that the answers to the questions of each indicator on the Control variable (X4) can be used for further analysis. Factor analysis with extraction method of Main Component Analysis raises Eigen value > 1.0, where influence of Control (X4) to the Road Improvement Project Quality of Linggang Melapeh Lama Village, District (Provincial Financial Help) in West Kutai Regency Budget Year of 2016 with percentage of cumulative amounted to 55.823%. While the rest of 44.177% is a mistake by other indicators that have not been detected in this study. Control variable (X4) has a value of Loading Factors above 0,5 for the indicators included in the factor analysis are 3 consisting of Survey (X4.1), Material (X4.2) and Work (X4.3) .

### 3.6 Human Resources Variable (X5)

Human Resources Variable (X5) is measured by using 4 statement items. In the results of the first phase of analysis of MSA value is greater than 0.5, KMO value of 0.678 greater than 0.5 where it indicates that the implementation of factor analysis model of these variables is good. In addition, Bartlett's Significance value of 0.000 is smaller than $\alpha$ (0.05) where it indicates that the answers of each indicator questions in Human Resources variable (X5) can be used for further analysis. Factor analysis with extraction method of Main Component Analysis raises Eigen value > 1.0, where the influence of Human Resources (X5) on the Road Improvement Project Quality of Linggang Melapeh Lama Village, District (Provincial Financial Help) in West Kutai Regency Budget Year of 2016 with level of the cumulative percentage of 61.416%. While the rest of 38,584% is a mistake by other indicators that have not been detected in this study. Human Resources variable (X5) has a value of Loading Factors above 0,5 for the indicators included in the factor analysis are 4 which consist of Experience (X5.1), Education (X5.2), Age (X5. 3) and Responsibility (X5.4).

### 3.7 Material Variable (X6)

Material Variable (X6) is measured by using 9 statement items. In the first phase or factor analysis, the value of Communality, Loading Factor, KMO, MSA and Bartlett's Statistical Significance are from the Implementation variable indicators (X3). It can be seen that the value of MSA for X6.6 and X6.8 is less than 0,5, so that in the next stage of the analysis, the indicators are not included. In the second phase, Communality, Loading Factor, KMO, MSA, and Bartlett's Statistical Significance are from the Implementation variable indicator (X3). It can be seen that the value of Loading Factor for X6.7 and X6.9 is less than 0,5, so that in the next stage of analysis, the indicators are not included. In the third stage analysis, value of MSA is greater than 0.5, KMO value of 0.717 which is greater than 0.5, where it shows that the implementation of factor analysis model of these variables is very good. While, Bartlett's Significance value of 0.000 is smaller than $\alpha$ (0.05) which indicates that the answers of each indicator questions on Material variable (X6) can be used for further analysis. Factor analysis with extraction method of Main Component Analysis raises Eigen value > 1.0, where the influence of Material (X6) on the Road Improvement Project Quality of Linggang Melapeh Lama Village, District (Provincial Financial Help) in West Kutai Regency Budget Year of 2016 with cumulative percentage rate of 61.260%. While the rest of 38.740% is a mistake by other indicators that have not been detected in this study. Material variable (X6) has a value of Loading Factor above 0.5 for the indicators included in the factor analysis where the number of indicators analyzed initially is 9 then it became 5 after 3 stages of analysis are conducted which consist of of Material Requirement (X6.1), Material Specification (X6.2), Laboratory Test (X6.3), Mixed Volume (X6.4) and Material Availability (X6.5).

### 3.8 Financial Variable (X7)

Financial Variable (X7) is measured by using 2 statement items. In the results of the first phase of analysis, MSA value is greater than 0.5, the value of KMO of 0.500 which is greater than 0.5, in which it indicates that the use of factor analysis model of these variables is good enough. While, Bartlett's Signal significance value of 0.003 smaller than $\alpha$ (0.05) in which it indicates the answers of each indicator questions on Finance variable (X7) can be used for further analysis. Factor analysis with extraction method of Main Component Analysis raises Eigen valu e> 1.0, where the influence of Finance (X7) on the Road Improvement Project Quality of Linggang Melapeh Lama Village, District (Provincial Financial Help) in West Kutai Regency Budget Year of 2016 with cumulative percentage rate equal to 71,565%. While the rest of 28.435% is a

mistake by other indicators that have not been detected in this study. Finance variable (X7) has a value of Loading Factors above 0.5 for the indicators included in the factor analysis are of 2 which consist of Mobilization (X7.1) and Wages (X7.2).

### 3.9 Project Quality Variable (Y)

Project Quality Variable (Y) is measured by using 3 statement items. In the results of the first phase of analysis, MSA value is greater than 0.5, KMO value of 0.500 which is greater than 0.5m where it indicates that the use of factor analysis model of these variables is good enough. Besides, Bartlett's Significance value of 0.000 is smaller than $\alpha$ (0.05), in which it indicates that the answers of each indicator questions on Project Quality variable (Y) can be used for further analysis. Factor analysis with extraction method of Main Component Analysis raises Eigen value > 1.0, where the influence of Project Quality on the Road Improvement Project Quality of Linggang Melapeh Lama Village, District (Provincial Financial Help) in West Kutai Regency Budget Year of 2016 with 63.575% of cumulative percentage rate. While the rest of 36.425% is a mistake by other indicators that have not been detected in this study. Project Quality variable (Y) has a value of Loading Factors above 0.5 for the indicators included in the factor analysis are 3 which consist of Age (Y1.1), Convenience (Y1.2), and Implementation Period (Y1. 3). From the results of factor extraction done on Factor Loading of each item of the above variables which are Environmental Variable (X1), Planning (X2), Implementation (X3), Control (X4), Human Resources (X5), Material (X6), Finance (X7) and Project Quality (Y), it can be summarized as follows: Environmental Variable (X1) consists of manifest variables namely: Field Condition (X1.3), Custom (X1.4), and Social (X1.5). Planning Variable (X2) consisst of manifest variables namely: Hard Land (X2.1), Labile Land (X2.2), Design (X2.3), Implementation Time (X2.4), Design Review (X2.5 ), and Technical Specification (X2.6). Implementation variable (X3) consists of manifest variables namely: Work Method (X3.1), Manpower Plan Method (X3.2), Manpower (X4), and Equipment (X3.6). Control Variable (X4) consists of manifest variables namely: Survey (X4.1), Material (X4.2), and Work (X4.3). Human Resources Variable (X5) consists of manifest variables namely: Experience (X5.1), Education (X5.2), Age (X5.3) and Responsibility (X5.4). Material Variable (X6) consists of manifest variables namely: Material (X6.1), Material Specification (X6.2), Laboratory Test (X6.3), Mixed Volume (X6.4) and Material Availability (X6.5). Financial Variable (X7) consists of manifest variables: Mobilization (X7.1) and Wages (X7.2). Project Quality Variable (Y) consists of manifest variables: Age (Y1.1), Convenience (Y1.2), and Implementation Period (Y1.3).

### 3.10 Analysis Result of Multiple Linear Regression

Multiple regression analysis is conducted to know the factors that could influence the Project Quality. In data processing of multiple regression analysis, several stages are conducted to find the relationship between independent and dependent variables [12]. The results of the analysis can be seen in the summary analysis as follows:

***TABLE 1.*** *SUMMARY OF REGRESSION ANALYSIS RESULT*

| Variables | Standard of $\beta$ Coefficient | $t_{count}$ | *p-value* | Information |
|---|---|---|---|---|
| Environment (X1) | -0.347 | -2.222 | 0.032 | Significant |
| Planning (X2) | 0.118 | 0.708 | 0.483 | Not Significant |
| Implementation (X3) | -0.181 | -1.238 | 0.223 | Not Significant |
| Control (X4) | 0.369 | 2.346 | 0.024 | Significant |
| Human Resources (X5) | -0.064 | -0.399 | 0.692 | Not Significant |
| Material (X6) | -0.060 | -0.385 | 0.703 | Not Significant |
| Finance(X7) | 0.160 | 1.078 | 0.288 | Not Significant |
| $\alpha$ = | | 0.05 | | |
| $R^2$ = | | 0.260 | | |
| R = | | 0.510 | | |
| F-count = | | 1.857 | | |
| F-table (0.05,43) = | | 0.294 | | |
| p-value = | | 0.105 | | |
| t-table (0.05,43) = | | 1.659 | | |

Based on the summary in the table above, it shows that not all independent variables significantly influence. The variables that have significant value (influence the quality of the project) are Environment (X1) and Control (X4). While the independent variables that do not have significant value (influential but not significant to the quality of the project) are Planning (X2), Implementation (X3), Human Resources (X5), Material (X6) and Finance (X7). Interpretation of the regression model obtained by the following table 4:17 is as follows:

$$Y = -0.347\ X1 + 0.118\ X2 - 0.181\ X3 + 0.369\ X4 - 0.064\ X5 - 0.060\ X6 + 0.160\ X7 + \varepsilon$$

The value of R2 is the coefficient of determination to measure the extent of the regression model's ability to

explain the diversity of the dependent variable (Y) that is 0,260, which explains the variable diversity of the remaining 26% (74%) resulted from other variables. The R value shows the degree of correlation between the independent variable and the dependent variable of 0,510.

### 3.11 Strategy as Efforts to Improve Project Quality

Based on the results of analysis by using linear regression method, it is found that environmental factor and control factor are some factors that have a significant influence on the quality of a work project. The factors that influence significantly can be explained as follows:

1. Environmental Factor is the reduction result of manifest variables consisting of: Rainfall (X1.1), Hot Weather (X1.2), Field Condition (X1.3), Custom (X1.4), Social (X1. 5), and Load (X1.6)
2. Control Factor is the reduction result of manifest variables consisting of: Survey (X4.1), Material (X4.2), and Work (X4.3).

### 3.12 Strategies Used on Environmental Factor

Standardized coefficient values β of Environmental factor of 0.347 indicate that environmental factor influences the quality of the project, as for any indicator that has an influence on the quality of the project can be seen based on the results of communality that has the highest value, namely: Field Condition (X1.3), Custom (X1.4 ) and Social (X1.5).

### 3.13 Strategy Used on Control Factor

Standardized coefficient β of Control factor of 0,369 indicates that Control factor is the most dominant factor influencing the quality of the project, as for any indicators that have an influence on the quality of the project can be seen based on communal results that have the highest value in table 4.8 comprising of: Survey (X4.1), Material (X4.2), and Work (X4.3).

***TABLE 2:*** *OVERCOMING STRATEGIES*

| Factors | Problems | Strategies |
|---|---|---|
| Environment | Field Condition (X1.3) | Knowing site condition that will have road improvement project, such as field condition, access of transportation both for material and for equipment, and others. |
| | Custom (X1.4) | Having an approach or an environmental socialization in the area that will have project work. |
| | Social (X1.5) | Making an interaction by involving local community in some parts of project realization. |
| Control | Survey (X4.1) | Conducting a field survey more carefully in order to be able to know the constraints that may hamper the work. |
| | Material (X4.2) | Conducting material quality control (*Quality Control*). |
| | Work (X4.3) | - Controlling every work item to make sure that all kind of activities is in accordance with provision.<br>- Making a routine report og work activity development so that the problems that barely occur can be prevented immediately. |

## 4. Conclusion

Based on the results of research and discussion that have been explained previously, it can be concluded that:

1. Factors that influence the project quality based on the results of the analysis conducted are the factors that significantly influence are:
   a. Environmental Factor (X1) with coefficient value β of 0,347. The coefficient value of the negative sign indicates the worse the condition of the work environment, the more influencing on the quality of the project.
   b. Control Factor (X4) coefficient β is 0,369. Coefficient marked positive indicates that the better the control performed on each item of work, the better improvement of the quality of the project.
2. The most dominant factor influencing the Road Improvement Project Quality of Linggang Melapeh Lama Village, District (Provincial Financial Help) in West Kutai Regency is Control Factor (X4) with coefficient value β is 0,369.
3. Strategies that can be done to improve the project quality on road improvement work are:
   a. Understanding the local environmental conditions before realizing the work;
   b. Approaching or having socialization with the local environment;
   c. Interacting and involving the local community in implementing some parts of work;
   d. Conducting a more thorough survey of field conditions in order to anticipate problems immediately;
   e. Supervising material quality (Quality Control);
   f. Monitoring each work item more thoroughly and routinely in making reports or progress of work.

## 5. Suggestion

It needs supervision and control of work in accordance with Implementation Operation Standard (SOP). The Supervisory Consultant should understand the working procedures and contract documents and routinely provide and conduct continuous employment evaluations to the owner. Consultants need to improve supervision on the work of contractors either in terms of implementation

method, provision or procurement of materials and specifications in order to avoid work deviation.

## References

[1] Flyvbjerg, B. (2013). From Nobel prize to project management: getting risks right. arXiv preprint arXiv:1302.3642.

[2] Gollin, D., & Rogerson, R. (2010). Agriculture, roads, and economic development in Uganda (No. w15863). National Bureau of Economic Research.

[3] Schwaber, K. (2004). Agile project management with Scrum. Microsoft press.

[4] Tiwana, A. (2000). The knowledge management toolkit: practical techniques for building a knowledge management system. Prentice Hall PTR.

[5] Schwalbe, K. (2015). Information technology project management. Cengage Learning.

[6] Gasperz. V. 2008, Total Quality Manajement. Jakarta: Penerbit PT Gramedia Puataka Utama

[7] Hewlett, S. A. (2008). Off-ramps and on-ramps: Keeping talented women on the road to success. Human Resource Management International Digest, 16(2).

[8] Liamputtong, P. (2013). Qualitative research methods.

[9] Arikunto, S.2003, Manajemen Penelitian PT Rineka Cipta. Jakarta

[10] Taylor, S. J., Bogdan, R., & DeVault, M. (2015). Introduction to qualitative research methods: A guidebook and resource. John Wiley & Sons.

[11] Hill, B. D. (2011). Sequential Kaiser-meyer-olkin Procedure as an Alternative for Determining the Number of Factors in Common-factor Analysis: a Monte Carlo Simulation (Doctoral dissertation, Oklahoma State University).

[12] Creswell, J. W., & Clark, V. L. P. (2007). Designing and conducting mixed methods research.