

Reliability and Validity Testing of Research Instruments

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Abstract: The aims of this paper are to determine the validity and reliability of research instruments. Four sets of research instruments were developed in this study. The first instrument, The Utility of Bank Loan (UBL) was essential to find out the benefits of Bank Loan towards the MSMEs. The second instrument, Utilization (UT) was vital to see the utilization of Bank loan among the entrepreneurs. Third and Fourth instruments Financial Performance (FP) and Capital Formation (CF) were essential to observe their financial performance as well as capital formation in the Business. EFA and CFA have been used to validating the Utility of Bank loan which is consist of five dimensions. Seven experts in the building construction subject examined the content validity of UT, FP, and CF. The value of reliability was based on Cronbach Alpha with appropriate value ranges. Judge agreement can be calculated as percent-agreement. Percent-agreement statistics can be calculated and explained easily. In result, EFA and CFA confirmed the five factors in adapted the Utility of Bank Loan scale – labeled Availability (AVL), Accessibility (ACC), Expected Reliance (ER), Facilities (F) and Terms and Conditions (TC) - which were subsequently corroborated by confirmatory factor analysis. The scale responses about Utility of Bank Loan had convergent and discriminant validity. On the basis of experts, UT, FP, and CF had the content validity. With this, the research instruments had the reliability.

Keywords: Validity and Reliability, Utility of Bank Loan, Utilization, Financial Performance, Capital Formation.

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Introduction

MSME sector has been considered as a vibrant and dynamic sector in industrial scenario of India and the sector acts as an engine for economic growth of the country by means of its contribution towards employment generation, export earning, generating favourable balance of payment (BOP), production and assisting in satisfying the requirements of medium and large scale industries.

In recent times, PSBs have not been confined to a mere extension of finance to small enterprises but have shown genuine concern for their development. They have entered the challenging field of promoting new small-scale entrepreneurs presently. Entrepreneurs Development program (EDP) may be considered to be an activity in this respect. Banks are playing a major role in financing MSMEs in India. Nearly 82% of total MSME financing occurs through banks. In addition to them, the major share of PSBs is 57%. This is clear that most common source of finance for SMEs is bank financing. There are numerous banks that help in assisting the SMEs for financing.

Utility of Bank Loan (UBL), Utilization (UT), Financial Performance, Capital Formation (CF)

Relationship quality is an extended issue of relationship marketing (Alwie and Bojei, 2010). Though relationship quality originates from service quality paradigm, the concept of relationship quality has been understood as the quality of relationship (Lehtinen and Jarvelin, 1995). It is a lending practice that involves the granting of credit if close ties exist between firms and banks (Stein, Memmel and Schmieder, 2008). Previous studies have emphasized different relationship contextual settings (Holmlund, 2007). Ndubisi and Wah (2004) had examined the relationship between the banks and their customers but not specific to the lending relationship between the banks and their specific borrowers' segment (MSME borrowers). Though quantitative credit scoring methods have been introduced, relationship-based marketing paradigm still has theoretical relevance as credit evaluation still involve discreet human interactions and contacts. It will remain an integral part of credit risk management processes (Moller and Wilson, 1995). As lending relationship quality aspects have been sidelined by previous researchers, this study will fill the void by identifying factors of Utility of Bank Loan that presume to influence the

Utilization of loan fund in their Business and to develop a new Utility of Bank Loan uniquely designed to assess lending relationship quality for the MSME Sectors. Hence in this study, the new measuring instrument will be empirically tested for multidimensionality and validity by employing both exploratory and confirmatory factor analysis. Also, the validity of the scale of Utilization, Financial Performance, and Capital Formation will be tested through Content analysis. The proposed five factors of UBL namely Availability (AVL), Accessibility (ACC), Expected Reliance (ER), Facilities (F) and Terms and Conditions (TC) committed as Independent Variables. Utilization of loan fund (UT) committed as Mediating Variable. Financial Performance (FP) and Capital Formation (CF) committed as Dependent Variables.

Research Objectives

The objectives of the study are as follows:

- i) To analyse the construct validity of Utility of Bank Loan instrument;
- ii) To analyse the content validity used in percent-agreement validity for Utilization, Financial Performance, and Capital Formation instruments;
- iii) To analyse the reliability of the Utility of Bank Loan, Utilization, Financial Performance and Capital Formation instruments.

Methodology and discussions

The aim of this research was to develop new instruments UBL, UT, FP and CF by employing both qualitative-quantitative methods. It has become a dynamic measuring instrument which would be used to assess the quality of a relationship between the banks and their MSME borrowers in the context of lending quality.

Target population, sample respondents and sample size

Two districts namely East Medinipur and West Medinipur located in the state of West Bengal has been selected for the present study from which the sample respondents were generated. 5973 MSMEs are registered at DIC (Districts Industries Centre) throughout these two districts. A sample size of 360 was drawn using Cochran's Formula. During the structured one to one interviews, the selected sampled respondents were asked to describe various aspects related to the loan service as well as their utilization of loan fund, financial performance and capital

formation in the respective business. The researcher was able to collect 267 responses out of 360 respondents. Roscoe (1975) proposes based on the rule of thumb, a sample size larger than thirty (30) and less than five hundred (500) are appropriate for most research (Sekaran, 2010, pp 296).

Sampling design and Instruments design

The researcher has collected the up-to-date list of MSME borrowers of East and West Medinipur who are registered at District Industries Centre (DIC) between the years 2010-11 to 2014-15.

To draw the estimated sample size, at first Stratified survey method was used. In the selected two districts, each is divided into four sub-divisions. In every sub-division, four Blocks were chosen where MSMEs are highly existent in large numbers. After that using simple random table, 45 entrepreneurs were selected from each block. Then total 360 samples were selected.

In order to collect the response on the factors of the utility of Bank loan that has an impact on the financial performance of the MSMEs, a survey method was conducted with a self-structured questionnaire. The aim of the questionnaire was to investigate the role of UBL in a business, how much the entrepreneurs are satisfied with their loan, how much they are able to utilize the loan fund and to create the capital for present and future business and also with this how much they have improved their Business performance.

Factor Analysis

Exploratory Factor Analysis (EFA) was used to identify the dimensional structure of factors contributing to the utility of loan in the MSME business borrowers' segment by employing exploratory and confirmatory to assess the dimensionality of the utility of loan. One critical assumption underlying the appropriateness of factor analysis was to ensure that the data matrix has sufficient correlations to justify its applications. Factor analysis has involved three critical steps as follows:- (i) The first step has involved the visual examination of the correlations to identify those data matrix that was statistically significant. (ii) The second step has involved the assessment of the overall significance of correlation matrix by using Bartlett test of sphericity. The desired correlation must be at $p < 0.01$ among at least some of the variables. This was to assess whether the data were suitable for factor analysis and (iii) The final step of the factor analysis has involved the measuring of sampling adequacy by using Kaiser-Meyer-Olkin (KMO) technique to quantify the degree of inter-correlations among the variables which could be

identified by an appropriate index (Kaiser, 1970) ; (above 0.9 = marvelous); (between 0.80 to 0.89 = meritorious); (between 0.70 to 0.79 = middling) ; (between 0.60 to 0.69 = mediocre); (between 0.50 to 0.59 = acceptable); and (less than 0.50 = unacceptable).

Table 1: Correlation among the dimensions of Utility of Bank Loan

| | Availability | Accessibility | Expected Reliance | Facilities | Terms & Conditions |
|--------------------|----------------|----------------|-------------------|----------------|--------------------|
| Availability | 1 | | | | |
| Accessibility | .244** .000 | 1 | | | |
| Expected Reliance | .295** .000 | .385** .000 | 1 | | |
| Facilities | .403** .000 | .388** .000 | .229** .000 | 1 | |
| Terms & Conditions | .222** .000 | .489** .000 | .413** .000 | .273** .000 | 1 |

** . Correlation is significant at the 0.01 level (2-tailed).

The above table shows that the correlation values are within .218 to .489 and all the correlations are significant at the 0.01 level. Therefore, hence the first assumption was fulfilled to do factor analysis.

Table 2: KMO and Bartlett's Test

| | |
|--|----------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | .864 |
| Bartlett's Test of Approx. Chi-Square | 2738.496 |
| Sphericity df | 231 |
| Sig. | .000 |

The above table shows that the overall significance of correlation matrix by using Bartlett test of sphericity is .000 which meets the desired value. And the KMO is above 0.80 means the sample adequacy is meritorious. As all the three assumptions have been fulfilled in this analysis,

therefore, the data were suitable for factor analysis. the correlation values are within .218 to .489 and all the correlations are significant at the 0.01 level. Therefore, hence the first assumption was fulfilled to do factor analysis.

Exploratory factor Analysis involves two major steps as follows:- (i) All the proposed items of the questionnaire have been subjected to factor analysis by employing the maximum likelihood procedure that was followed by a Promax rotation. This was done to determine which items/variables were included in the factor loadings. A variable indicates factor loading greater than 0.5 was included otherwise excluded (Hair et al., 1995). Factors whose Eigenvalues of greater than 1.0 were retained in the factor loading (ii) The next step was to assess the communality of each variable in order to decide which item loadings were worth considering in explaining the factors. The variable's communality, which represents the amount of variance accounted for by the factor solution for each variable were assessed to ensure an acceptable level of explanations. If the communalities in the variables were below 0.30, they were considered too low for having sufficient explanation.

Table No 3: Communalities and Total Variance Explained

| Factor | Communalities Extractions | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings ^a |
|--------|---------------------------|---------------------|---------------|--------------|-------------------------------------|---------------|--------------|--|
| | | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total |
| | | | | | | | | |
| 1 | .628 | 6.755 | 30.706 | 30.706 | 6.317 | 28.715 | 28.715 | 4.683 |
| 2 | .455 | 2.763 | 12.559 | 43.266 | 2.336 | 10.619 | 39.334 | 3.830 |
| 3 | .605 | 2.053 | 9.332 | 52.598 | 1.632 | 7.419 | 46.753 | 3.734 |
| 4 | .566 | 1.488 | 6.763 | 59.361 | 1.063 | 4.832 | 51.585 | 3.724 |
| 5 | .543 | 1.431 | 6.506 | 65.867 | 1.001 | 4.551 | 56.136 | 3.945 |
| 6 | .552 | .736 | 3.347 | 69.214 | | | | |
| 7 | .526 | .712 | 3.235 | 72.449 | | | | |
| 8 | .616 | .655 | 2.976 | 75.425 | | | | |
| 9 | .562 | .594 | 2.699 | 78.124 | | | | |

| | | | | | | | |
|----|------|------|-------|---------|--|--|--|
| 10 | .728 | .549 | 2.497 | 80.621 | | | |
| 11 | .628 | .503 | 2.287 | 82.907 | | | |
| 12 | .397 | .472 | 2.143 | 85.051 | | | |
| 13 | .464 | .448 | 2.035 | 87.086 | | | |
| 14 | .718 | .415 | 1.888 | 88.974 | | | |
| 15 | .548 | .412 | 1.872 | 90.846 | | | |
| 16 | .540 | .348 | 1.580 | 92.426 | | | |
| 17 | .483 | .343 | 1.561 | 93.987 | | | |
| 18 | .639 | .312 | 1.416 | 95.404 | | | |
| 19 | .525 | .286 | 1.301 | 96.704 | | | |
| 20 | .392 | .275 | 1.249 | 97.953 | | | |
| 21 | .606 | .246 | 1.118 | 99.071 | | | |
| 22 | .631 | .204 | .929 | 100.000 | | | |

Extraction Method: Maximum Likelihood.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Table No 4: Pattern Matrix^a

| | Factor | | | | |
|------|-------------|-------------|-------------|-------|-------|
| | 1 | 2 | 3 | 4 | 5 |
| ACC1 | .017 | .859 | -.061 | -.118 | -.036 |
| ACC2 | -.081 | .647 | -.027 | .043 | .126 |
| ACC3 | -.028 | .751 | -.057 | .117 | -.034 |
| ACC4 | .094 | .741 | .035 | -.080 | .006 |
| ACC5 | -.022 | .653 | .123 | .108 | -.057 |
| AVL1 | .721 | -.018 | .009 | .097 | -.044 |
| AVL2 | .728 | .001 | .115 | -.110 | -.032 |
| AVL3 | .757 | .036 | -.047 | .055 | .020 |
| AVL4 | .719 | -.002 | .056 | .038 | -.019 |
| AVL5 | .846 | -.027 | -.093 | -.021 | .100 |
| ER1 | .031 | -.045 | .803 | .048 | -.052 |
| ER2 | -.044 | -.051 | .613 | .012 | .097 |

| | | | | | |
|--------|-------|-------|-------------|-------------|-------------|
| ER3 | .031 | .023 | .650 | .030 | .000 |
| ER4 | .013 | .054 | .827 | -.086 | .033 |
| FandF1 | .040 | -.053 | .015 | .761 | -.073 |
| FandF2 | .022 | .012 | -.078 | .715 | .067 |
| FandF3 | -.068 | .075 | .135 | .635 | .013 |
| FandF4 | .034 | .006 | -.041 | .787 | .014 |
| TC1 | -.048 | -.050 | .043 | .028 | .733 |
| TC2 | .056 | .035 | .078 | -.031 | .552 |
| TC3 | -.021 | -.049 | .030 | .048 | .771 |
| TC4 | .066 | .079 | -.064 | -.048 | .777 |

Extraction Method: Maximum Likelihood.

Rotation Method: Promax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

The above EFA result in table no 3 and 4 revealed the five dimensions as factors having Eigenvalue greater than 1 with 65.867 % of total variance which is satisfactory suggested by the different researcher (Salta and Tzougraki, 2004: 47%; Spinner and Fraser, 2005: 42%). The factor loading of each item or variable was greater than 0.5.

Confirmatory Factor Analysis:

Exploratory factor analysis is a useful preliminary technique for developing the survey instrument (questionnaire) but a subsequent confirmatory factor analysis is necessary to refine the resulting instrument for unidimensionality.

Now, the Confirmative factor analysis was used to compare the factors emerging from the EFA in an attempt to validate the factor structure of **Utility of Loan fund**.

All the unobserved variables (latent variables) used were obtained from exploratory factor analysis. The CFA shows the interrelationship between the indicators and the unobserved variables. All the indicator variables have a standardized regression weight either above 0.7 or very close to 0.7. By convention, these regression weights have to be 0.7 or higher. To establish the CFA model, the model fit and validity are explained below:

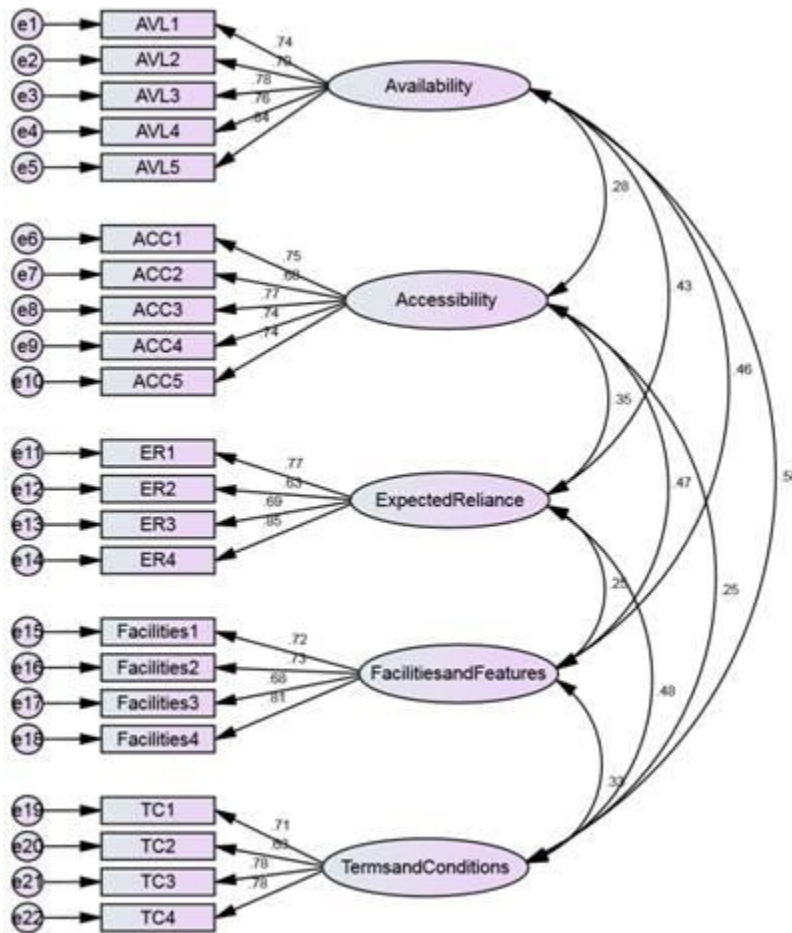


Figure 1: The Measurement Model

Table No.4.5.2: Model fit indices

| Measure | Estimate | Threshold | Interpretation |
|---------|----------|-----------------|----------------|
| CMIN | 322.921 | -- | -- |
| DF | 199 | -- | -- |
| CMIN/DF | 1.623 | Between 1 and 3 | Excellent |
| CFI | 0.952 | >0.95 | Excellent |
| SRMR | 0.047 | <0.08 | Excellent |
| RMSEA | 0.048 | <0.06 | Excellent |
| PClose | 0.599 | >0.05 | Excellent |

The resulting Model fit indices of measurement model as shown in the above Table No 5. The estimated value of CMIN/DF (1.623), CFI (0.952), SRMR (0.047), RMSEA (0.048) and P Close

(0.599) are excellent which meets the cut-off criteria and it was a perfect fit for the CFA model according to Hu and Bentler (1999) and Gaskin, J. & Lim, J. (2016).

Table No 6: Model Validity

| | CR | AVE | MSV | ASV |
|----------------------|-------|-------|-------|-------|
| Availability | 0.876 | 0.585 | 0.338 | 0.202 |
| Accessibility | 0.855 | 0.541 | 0.222 | 0.120 |
| Expected Reliance | 0.826 | 0.546 | 0.235 | 0.151 |
| Facilities | 0.825 | 0.542 | 0.222 | 0.151 |
| Terms and Conditions | 0.819 | 0.532 | 0.338 | 0.187 |

Convergent Validity

To establish convergent validity, the above table shows that the Composite Reliability (CR) score was greater than 0.70 of all the constructs and the Average Variance Explained (AVE) was greater than 0.50.

And CR was greater than AVE in the entire latent variable. Therefore, these meet the threshold suggested by Gaskin, J. & Lim, J. (2016). The above two criteria have confirmed the convergent validity.

Discriminant validity

To establish discriminant Validity, the table shows that MSV is less than AVE in case of all the factors. And MSV is greater than ASV, Hence, these two criteria support the discriminant validity.

Content Validity

Content validity is the extent to which the questions on the instrument and the scores from these questions represent all possible questions that could be asked about the content or skill (Creswell, 2005). It ensures that the questionnaire includes an adequate set of items that tap the

Concept. There is no statistical test to determine whether a measure adequately covers a content area, content validity usually depends on the judgment of experts in the field. The present study used content validity to examine the information regarding UT, FP, and CF. Five experts employed as assessors to determined the content construct of UT, FP and CF. Assessor response can be calculated as percent-agreement. Percent-agreement statistics can be easily calculated and explained. The simple table of percent-agreement proposed by Abu Bakar and Bhasah (2008), MM Mahamad et al., (2015) was used to determine the assessor scores as shown in Table 7. Three scales were used to evaluate the constructs: scale 1 represents items are unsuitable for measurement; scale 2 represents items can be measured; and scale 3 represents items should be improved.

Table 7: Percent Agreement of Utilization, Financial Performance and Capital Formation

| Items | E1 | | | E2 | | | E3 | | | E4 | | | E5 | | | Percent Agreement |
|------------------------------------|----|---|---|----|---|---|----|---|---|----|---|---|----|---|---|-------------------|
| | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | |
| Utilization Scale | | | | | | | | | | | | | | | | |
| UT1 | | √ | | | √ | | | √ | | | √ | | | √ | | 80 |
| UT2 | | √ | | | √ | | | √ | | | √ | | | √ | | 100 |
| UT3 | | √ | | | √ | | | √ | | | √ | | | √ | | 100 |
| UT4 | | √ | | | √ | | | | √ | | √ | | | | √ | 60 |
| UT5 | | | √ | | √ | | | √ | | | √ | | | √ | | 80 |
| UT6 | | | √ | | | √ | | √ | | | √ | | | √ | | 60 |
| UT7 | | √ | | | √ | | | | √ | | √ | | | √ | | 80 |
| Financial Performance Scale | | | | | | | | | | | | | | | | |
| FP1 | | √ | | | √ | | | √ | | | √ | | | √ | | 100 |
| FP2 | | √ | | | √ | | | √ | | | √ | | | √ | | 100 |
| FP3 | | √ | | | √ | | | √ | | | √ | | | √ | | 100 |
| Capital Formation Scale | | | | | | | | | | | | | | | | |
| CF1 | | √ | | | | √ | | | √ | | √ | | | √ | | 60 |
| CF2 | | | √ | | √ | | | √ | | | √ | | | √ | | 80 |

| | | | | | | | | | | | | | | | | |
|-----|--|---|--|--|---|---|--|---|--|--|---|--|--|---|---|-----|
| CF3 | | √ | | | √ | | | √ | | | √ | | | √ | | 100 |
| CF4 | | √ | | | | √ | | √ | | | √ | | | √ | | 80 |
| CF5 | | √ | | | √ | | | √ | | | √ | | | | √ | 80 |
| CF6 | | √ | | | √ | | | √ | | | √ | | | √ | | 100 |

From the above percent agreement table, we have seen that the assessor score was greater than 50 % for all each item. The experts agreed that the scales of UT, FP and CF can be measured with the respective items.

Reliability

The most popular test of inter-item consistency reliability is Cronbach's Coefficient Alpha (Cronbach's alpha: Cronbach, 1946) which is used for multipoint scaled items. The higher the coefficients, the better the measuring instrument. In this study, the researcher has calculated the alpha value for different dimensions as well as overall reliability statistics.

Table 8: Summary of Reliability

| Questionnaire | Items | Inter-item consistency (using Cronbach's Alpha) |
|-----------------------------|-----------|---|
| Availability | 5 | .854 |
| Accessibility | 5 | .874 |
| Expected Reliance | 4 | .822 |
| Facilities & Features | 4 | .823 |
| Terms & Conditions | 4 | .812 |
| Utility of Bank Loan | 22 | .891 |
| Utilizations | 7 | .801 |
| Capital Formation | 6 | .762 |
| Financial Performance | 3 | .808 |
| Overall Instruments | 39 | .945 |

The above table of reliability statistics (Table7) informs us about the value of the coefficient of Cronbach for the research scale is 0.945=94.5%. This gets over the percent of 90%, which is an

excellent value for the internal consequence of the overall instrument. With this, we have checked the Cronbach alpha value of each scale namely UBL, UT, FP, and CF was above 70 %. And checked the alpha value of the five constructs of UBL was above 80% which implies a great internal consistency of items in the constructs being assessed. To check the reliability, an alpha value greater than 0.60 is accepted and closer to 1 is highly desirable.

Conclusion

Therefore, a model of five factors has created after the examination of the validity and reliability of the entrepreneurs' satisfaction towards Utility of Bank Loan Scale (UBL). The UBL Scale constitutes of a 22 item questionnaire and is an instrument used for measuring satisfactions towards UBL scale and its impact on their business. In conclusion, the findings satisfied the research design for examining the suitability of items in research instruments that fit the model. Also, the content validity result supports the three scales to measure utilization, financial performance, and capital formation. Consequently, according to the obtained result of reliability, all the factors of Utility of Bank Loan, Utility of Bank Loan, Utilization, Financial Performance and Capital Formation are highly reliable. This instrument is thought to be useful for the studies to be conducted on the lending relation between Financial Institution and MSMEs borrowers.

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