

Evaluation of Operational Efficiency of Fair Price Shops in Public Distribution System: An Empirical Study

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Abstract

Public Distribution System has been in existence since the pre-independence era and continues to function to date supplying essential commodities to citizens at affordable prices across the country. The essential commodities in the form of food grains are supplied with joint efforts of the Central and State Governments of various states through a network of fair price shops. The operational efficiency of these fair price shops is crucial in reaching out to genuine eligible beneficiaries. The main objective of this study is to evaluate the operational efficiency of Fair Price Shops in the State of Goa. The study aims to develop a model to measure the operational efficiency of fair price shops operating in the State of Goa from the perception of beneficiaries. The data is collected from 500 beneficiaries across all the 12 talukas from the State of Goa. The sample size is selected proportionately on the basis of the total number of beneficiaries in each taluka. The data is analysed through Confirmatory Factor Analysis and Structural Equation Modeling. The present study is needed to strengthen the efforts of the government in ensuring food and nutritional security for citizens. Since fair price shops are instrumental in the supply chain of the public distribution system, the study on the efficiency of operating fair price shops will wipe out anomalies from the system. The present study will identify and analyse the factors leading to the Operational Efficiency of fair price shops in the Public Distribution System. The model developed to measure operational efficiency will help in achieving the mission of the government to ensure the availability of food grains at the right time, in the right quality, in the right quantity, at the right price and at the right place to the right beneficiaries in the country.

Keywords: Food Security, National Food Security Act 2013, Operational Efficiency, Public Distribution System

1. Introduction

Business organisations in today's competitive business environment are striving for being efficient in all their operations in order to minimise costs and maximise profits. Optimal use of available resources is needed to eliminate any kind of wasteful activities prevalent in the business operating cycle. Manufacturing organisations, in particular, concentrate largely on

adopting techniques which reduce their storage costs for inventory and simultaneously ensure the availability of required material at all times for the smooth conduct of production activities. Business firms improve the quality of products, reduce operation costs and increase flexibility in their business by adopting Just-In-Time (JIT) techniques of inventory management (Mazanai, 2012). The practices of green supply chain management, JIT and total quality management

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positively influence the operational performance and business performance of firms (Agyabeng-Mensah *et al.*, 2020; Bortolotti *et al.*, 2013; Green & Inman, 2005; Huson & Nanda, 1995) just in time (JIT. Previous studies have also shown the effect of commitment to quality and an understanding of supply chain dynamics on the performance of firms (Kannan & Tan, 2005). For the business organisations, it is imperative to remain competitive by improving efficiencies in its day to day business operations (Kumar & Kushwaha, 2018).

The techniques of JIT can be implemented in India's public food supply chain to efficiently manage the activities carried out in the public distribution system. The Public Distribution System (PDS) in India is a system to provide food security to people, started in the pre-independence era and continued till date to provide subsidised monthly food grains to people across the country. Presently, the commodities such as rice, wheat and sugar are distributed through PDS. This distribution of commodities is carried out by the central government along with state governments through Fair Price Shops (FPSs). FPSs are the last point of contact for beneficiaries who access food grains on a monthly basis. The beneficiaries of PDS are mainly the people who possess a ration card.

The PDS has four major areas involving procurement, processing, storage and distribution (Chopra *et al.*, 2017). At these various stages of PDS operation, multiple stakeholders such as farmers, marketing federation, rice millers, civil supplies offices, Food Corporation of India, and fair price shop owners are involved in making the food grains available to the end beneficiaries.

The PDS has a major role in fighting hunger and malnutrition (George & McKay, 2019). However, PDS has played a limited role towards reducing child mortality and improving food security due to inefficiencies in its operations (George & McKay, 2019). The solution can be given to address food insecurity with policy reforms in PDS by removing operational inefficiencies.

There are times when the existence of issues such as corruption and malpractice of selling food grains in open markets by fair price shop dealers makes the whole system of food grain distribution an inefficient exercise (Gupta & Mishra, 2018). This is particularly done by fair price shop dealers in order to avoid their losses in day-to-day operations (Gupta & Mishra, 2018). Across all the States of India, around 67% of wheat is sold in open markets (Khera, 2011). Transferring the food grains to the open market is particularly due to the low commissions for the fair price shop owners (Khera, 2011). The fair price shops have become economically unviable forcing them to involve in issues of corruption-related activities for their survival (Khera, 2011). Moreover, the PDS suffers from problems of error of inclusion and error of exclusion (Panigrahi & Pathak, 2018).

It is important for fair price shops to make available the essential commodities at the right time, at the right place, at the right price, in the right quality and right quantity. This is the rationale of the current study. The main objective of this study is to evaluate the operational efficiency of Fair Price Shops in the State of Goa. The study aims to develop a model to measure the operational efficiency of fair price shops operating in the State of Goa from the perception of beneficiaries. The subsequent sections of this research paper cover the conceptual framework for the present study, hypothesis development, research methodology adopted to achieve the objectives of the study and discussion and analysis followed by conclusion and scope for future study.

2. Theoretical Framework and Hypothesis Development

The various dimensions of operational efficiency have been explored from available literature and developed hypotheses for the present research work. The conceptual framework developed for the present research work proposes that the various dimensions of operational efficiency directly influence the operational efficiency of fair price shops. The proposed model is provided in Figure 1.

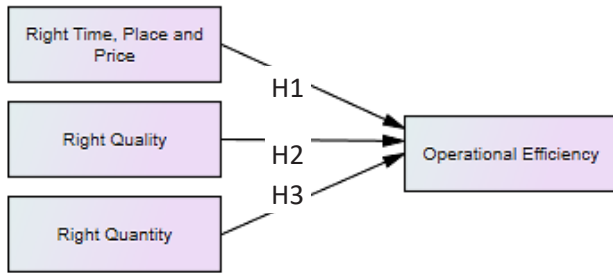


Figure 1. Proposed conceptual framework.

Source: Drawn by researcher

The detailed discussion on the dimensions considered for this research work is given in the following paragraphs.

2.1 Right Time, Right Place and Right Price

It is essential to supply the essential commodities on a timely basis in order to reap the intended benefits to the people. Adequate research has not been carried out to know whether the beneficiaries are satisfied with respect to food grains distributed from time to time (Gupta & Singh, 2016). Feedback needs to be obtained with regards to service extended at fair price shop to the beneficiaries (Gupta & Singh, 2016).

The commodities distributed through PDS need to be accessible conveniently at the right place. A convenient location helps beneficiaries to travel to the fair price shop with minimum time and cost. The fair price shops located within the village gram panchayat area make it easy for beneficiaries to travel to buy their monthly ration (Panigrahi & Pathak, 2018).

It is important to supply food grains at the right price in order to make the food grains affordable for all the beneficiaries. The state of Kashmir has been able to become a food surplus state as the food grains under PDS are available at a constant price to almost every household who has a ration card. Thus, the following hypothesis is framed.

H1 – There is a positive and significant relationship between food grains supplied at the right time, right place, right price and operational efficiency of FPS.

2.2 Right Quality

Some of the key areas of concern for stakeholders in PDS are flexibility, efficiency, responsiveness and food quality (Chopra *et al.*, 2017). These key areas are identified as key performance indicators in PDS. The food grains distributed through the network of fair price shop is not satisfactory both in terms of quality and quantity (Panigrahi & Pathak, 2018a). Thus, the following hypothesis is framed.

H2 – There is a positive and significant relationship between food grains supplied in the right quality and the operational efficiency of FPS.

2.3 Right Quantity

The quantum of food grains distributed under PDS in Uttar Pradesh are not adequate to meet the family requirements (Gupta & Singh, 2016). However, the access to food grains over the years has increased in the state of Uttar Pradesh thereby providing convenient accessibility to people to lift their ration (Gupta & Mishra, 2018). Thus, the following hypothesis is framed.

H3 – There is a positive and significant relationship between food grains supplied at the right quantity and operational efficiency of FPS.

2.4 Operational Efficiency

Managing the whole supply chain is a crucial area for any business concerns. The measurement of the performance of the supply chain is often a critical issue as the supply chain activities help in tracing the efficacy along the chain (Kumar & Kushwaha, 2018). Beneficiaries are satisfied with PDS only when the food grains are available at ration shops in all months, commodities are supplied with an accurate measurement, food grains are accessible at the right place, the distribution of goods is at the right time and the goods supplied are fit for consumption (Velmurugan & Lavanya, 2017). Hence, the present research aims to study the availability of food grains at the right time, in the right quality, in the right quantity, at the right price and at the right place to the right beneficiaries.

3. Methods

In order to study the above-stated objective, the following research methodology has been adopted and executed. The total number of 1328324 beneficiaries of PDS is considered as the Universe for this study. For the purpose of the study, the sample size of 500 beneficiaries of PDS in Goa has been selected and studied. The responses are collected from all the 12 talukas of the State of Goa based on the number of beneficiaries in each taluka. Non-Probability Convenient sampling method was adopted to locate the beneficiaries in various regions of Goa. The data collected from the respondents for the study is limited to the State of Goa only. The study is based on beneficiaries' feedback. The required and relevant data for the study is collected through both primary and secondary sources. A 19-item scale is used to measure the four constructs considered for the study. The variables selected for the study are adapted from previous studies (Chopra *et al.*, 2011; Gupta & Mishra, 2018; Gupta & Singh, 2016; Kumar & Kushwaha, 2018; Panigrahi & Pathak, 2018; Velmurugan & Lavanya, 2017). These statements used in the questionnaire are provided as Annexure-1 for the current research paper. In order to analyse the data, confirmatory factor analysis and structural equation modelling are used. The data is initially tested for reliability by calculating the Cronbach alpha value to check the internal consistency of the data. (Table 1). The secondary data has been collected from books, booklets, journals and mainly collected from the various online resources. The period of study is the period of survey, i.e., from 1st April 2022 to 15th November 2022. Confirmatory factor analysis is conducted in order to understand the nature of constructs used in the hypothesized measurement model. The confirmatory factor analysis is conducted by establishing convergent (Table 1) and discriminant validity (Table 2) in the current study. The convergent validity is tested in order to ensure that the items under each construct load significantly on the measured construct. The discriminant validity is tested in order to check that each construct in the model is of distinct nature from the other constructs in the model. After carrying out confirmatory factor analysis, the hypothesized model is tested through structural equation modelling (Figure 3) to test the hypotheses framed for the study.

4. Results and Discussion

The present study mainly focused on evaluating the Operational Efficiency of fair price shops in the Public Distribution System. The data collected from beneficiaries of PDS was analysed with respect to the opinion of people in relation to variables of Operational Efficiency of Fair Price Shops in the Public Distribution System. The results of the data analysis are as follows:

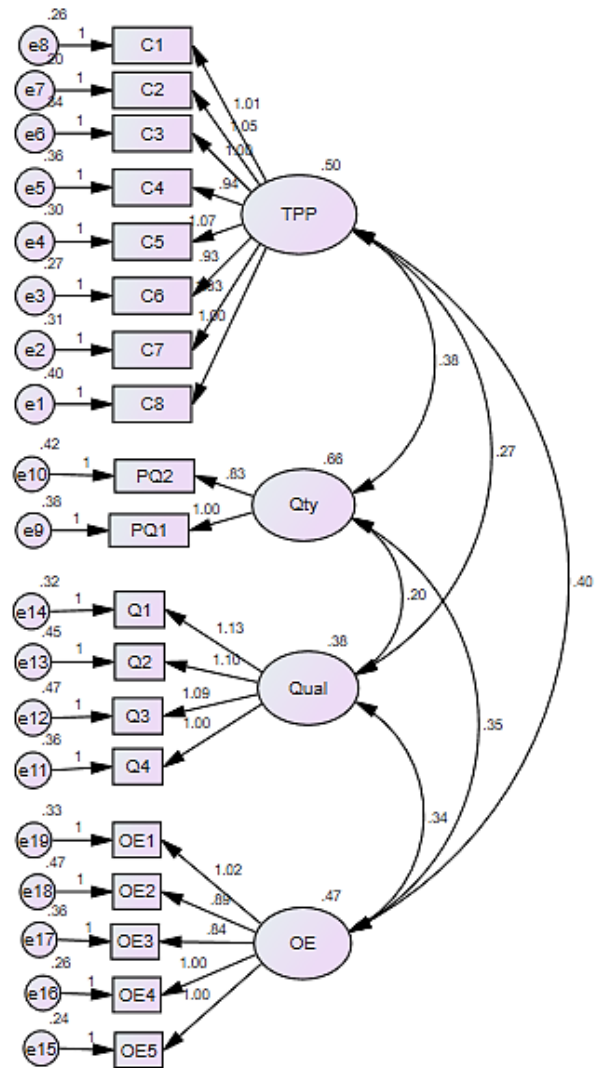


Figure 2. Analysis of the determinants of the effectiveness of supply of essential commodities through confirmatory factor analysis.

Source: Computed from Primary Data

The results of convergent validity and discriminant validity are within acceptable limits. The convergent

validity ensures that items in the scale load significantly on the measured construct. The discriminant validity signifies the distinct character of each construct in the model.

Table 1. Convergent validity for operational efficiency of fair price shops

| Variables and Items | Alpha Value | FL | AVE | CR |
|-----------------------------------------------------------------------------------------------------|-------------|------|-------------|-------------|
| Right Time, Place and Price | 0.92 | | 0.62 | 0.93 |
| C1 - I have access to the food grains as per my convenience. | | 0.81 | | |
| C2 - Fair price shop owner timely informs about the arrival of the food grains. | | 0.86 | | |
| C3 - The location of the fair price shop is convenient to me. | | 0.77 | | |
| C4 - There is manageable distance between the residence of beneficiaries and the fair price shop. | | 0.74 | | |
| C5 - The existing fair price shop is located by keeping in account the population in the vicinity. | | 0.81 | | |
| C6 - The essential commodities are distributed regularly on monthly basis. | | 0.79 | | |
| C7 - The prices charged are affordable and reasonable. | | 0.79 | | |
| C8 - The price charged to me for the food grains are revised from time to time. | | 0.74 | | |
| Right Quality | 0.82 | | 0.53 | 0.81 |
| Q1 - The allotted quality meets the dietary requirements of my family members. | | 0.78 | | |
| Q2 - The allotted commodities are reasonable on quality. | | 0.71 | | |
| Q3 - Fair price shop owner is committed to lift quality food grains from the State Level Godown. | | 0.7 | | |
| Q4 - There is an accurate allotment of food grains at the fair price shop with bio-metric machines. | | 0.72 | | |
| Right Quantity | 0.72 | | 0.58 | 0.73 |
| PQ1 - I am disbursed correct amount of allotted quota. | | 0.8 | | |
| PQ2 - The allotted quantity is sufficient to meet the requirements of my family. | | 0.72 | | |
| Operational Efficiency | 0.86 | | 0.56 | 0.87 |
| OE1 - Food grains through ration shops are regularly distributed on time. | | 0.77 | | |
| OE2 - Food grains supplied through ration shop are reasonably sufficient to my family. | | 0.66 | | |
| OE3 - Food grains supplied through ration shops are of reasonable quality. | | 0.7 | | |
| OE4 - The prices charged under public distribution system are affordable to me. | | 0.8 | | |
| OE5 - The fair price shop is located at convenient place in my locality. | | 0.81 | | |

Source: Computed from Primary Data

The reliability of the model is assessed with Cronbach alpha. All Cronbach alpha values are above 0.72. The Cronbach alpha values exceeding 0.7 are considered to be a good indicator of reliability (Henseler *et al.*, 2009; Nunnally, 1978). The Average variance extracted for all constructs is reported to be more than 0.5, and the value for the composite reliability is also higher than 0.7, which establishes convergent validity for the model (Kline, 2010).

Table 2. Discriminant validity for operational efficiency of fair price shops

| | Time | Qty | Qual | OE |
|------|--------------|--------------|--------------|--------------|
| Time | 0.790 | | | |
| Qty | 0.661 | 0.729 | | |
| Qual | 0.611 | 0.403 | 0.760 | |
| OE | 0.732 | 0.625 | 0.705 | 0.751 |

Source: Computed from Primary Data

Note: Qty - Right Quantity, Qual - Quality, OE - Operational Efficiency

The discriminant validity is established by comparing the squared AVE with correlation scores of estimates (Fornell & Larcker, 1981). Table 2 shows the squared values of AVE are higher than the values of inter-construct correlation. Hence, the proposed conceptual model is considered reliable and can be used for further analysis.

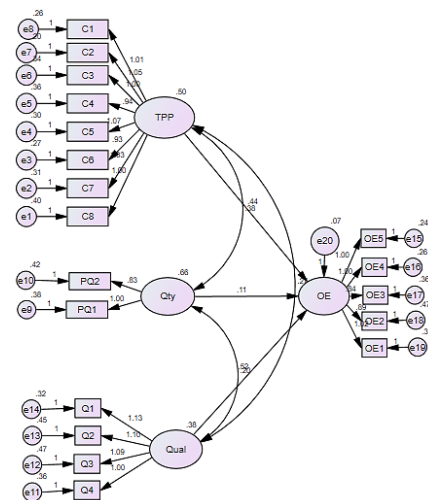


Figure 3. Analysis of operational efficiency of fair price shops through structural equation modelling.

Source: Computed from Primary Data

Note: TPP-Right Time, Right Place and Right Time, Qty - Right Quantity, Qual-Quality

The structural model as depicted in Figure 3 indicates adequate model fit as shown in Table 3 (GFI = 0.868, AGFI = 0.828, RMSEA = 0.08, CFI = 0.914, TLI = 0.899) (Hair *et al.*, 2010). The structural model indicates that all the three path coefficients are statistically significant (Table 4).

Table 3. Indicators of fit values for the model fit

| | |
|---------------------------|---------|
| χ^2 | 659.192 |
| D. F. | 146 |
| P-value | 0.000 |
| Normed χ^2 (CMIN/DF) | 4.515 |
| GFI | 0.868 |
| AGFI | 0.828 |
| RMSEA | 0.08 |
| CFI | 0.914 |
| TLI | 0.899 |

Table 4. Regression weights of SEM measurement model for assessing the influence of food grains supplied at the right time, right place, right price, right quantity and right quality for operational efficiency of fair price shops

| | Estimate | S.E. | C.R. | P | Label |
|--------------|----------|------|--------|------|--------|
| OE <--- TPP | .438 | .054 | 8.081 | *** | par_16 |
| OE <--- Qty | .114 | .041 | 2.793 | .005 | par_17 |
| OE <--- Qual | .523 | .053 | 9.844 | *** | par_18 |
| C8 <--- TPP | 1.000 | | | | |
| C7 <--- TPP | 1.031 | .057 | 18.191 | *** | par_1 |
| C6 <--- TPP | .931 | .052 | 18.051 | *** | par_2 |
| C5 <--- TPP | 1.066 | .057 | 18.593 | *** | par_3 |
| C4 <--- TPP | .942 | .056 | 16.969 | *** | par_4 |
| C3 <--- TPP | .996 | .057 | 17.580 | *** | par_5 |
| C2 <--- TPP | 1.052 | .053 | 19.802 | *** | par_6 |
| C1 <--- TPP | 1.014 | .054 | 18.747 | *** | par_7 |
| PQ1 <--- Qty | 1.000 | | | | |
| PQ2 <--- Qty | .829 | .069 | 12.065 | *** | par_8 |
| Q4 <--- Qual | 1.000 | | | | |
| Q3 <--- Qual | 1.087 | .076 | 14.218 | *** | par_9 |
| Q2 <--- Qual | 1.100 | .076 | 14.405 | *** | par_10 |
| Q1 <--- Qual | 1.135 | .073 | 15.579 | *** | par_11 |
| OE5 <--- OE | 1.000 | | | | |
| OE4 <--- OE | .995 | .049 | 20.175 | *** | par_12 |
| OE3 <--- OE | .843 | .050 | 16.759 | *** | par_13 |
| OE2 <--- OE | .887 | .056 | 15.762 | *** | par_14 |
| OE1 <--- OE | 1.019 | .053 | 19.179 | *** | par_15 |

Source: Computed from Primary Data

It can be observed from Table 4 that the p-value is less than 0.05, it is significant for all the exogenous

constructs; food grains supplied at the right time, right place, right price ($\beta=.438$, $p<0.01$), right quantity ($\beta=.114$, $p<0.01$) and right quality ($\beta=.523$, $p<0.01$) at 5% level of significance. Therefore the alternate hypothesis, H1, H2 and H3 that there is a positive and significant influence of food grains supplied at the right time, right place, right price, right quantity and right quality on the operational efficiency of fair price shops is accepted.

Hence, it can be stated that there is a statistically significant relationship among food grains supplied at the right time, right place, right price, right quantity and right quality on operational efficiency of fair price shops in PDS.

The present study involves three independent constructs which consist of food grains supplied at the right time, right place, right price, right quantity and right quality to the beneficiaries at fair price shops in the public distribution system. It is necessary to study the operational efficiency of fair price shops in the public distribution system in order to provide insights into the various dimensions which govern the public distribution system. The present study has made an attempt and developed a model to focus on the three main dimensions of operational efficiency of the public distribution system. The model developed in the current study can be helpful to the policy makers to maintain the public distribution system consumer-centric. The findings of the current study are supported by earlier studies (Alderman *et al.*, 2018; Chopra *et al.*, 2011; Dutta & Ramaswami, 2001; George & McKay, 2019; George, 1996) that operational efficiency has a significant relationship with identified dimensions of operational efficiency of fair price shops. The findings of the study are in line with the concept of operational efficiency explained as the delivery of goods or services in a quick manner, at affordable prices, with minimum defects, fresh and better quality and so on (Macaulay, 2016). It is of paramount importance to uphold the operational efficiency of PDS in order to fulfil the objective with which the PDS is being run across the country to provide food and nutritional security to the beneficiaries.

5. Conclusion and Implications of the Study

The study has developed a model for assessing the operational efficiency of fair price shops operating in the State of Goa. The efficiency of fair price shops is crucial for a vibrant public distribution system in a country. The study has identified that food grains supplied at the right time, right place, right price, right quantity and right quality have a significant impact on the operational efficiency of fair price shops.

The beneficiaries will be benefitted with the availability of food grains at the right time on a monthly basis at the ration shops. Consistent efforts are required to ensure that the food grains are accessible at the right place which is convenient to the beneficiaries. The prices charged for food grains distribution need to be affordable in order to assist ration cardholders in lifting their monthly quota of food grains. The recent decision of the central government to freely distribute 5 kg of food grains per person to Priority Household (PHH) beneficiaries and 35 kg per household to Antodaya Anna Yojana (AAY) beneficiaries for the year 2023 is a welcome move in the interest of beneficiaries. The quantity and quality of food grains distributed to ration cardholders significantly influence the operational efficiency of fair price shops. The food grains in the right quality and quantity ensures the right requirement for the fulfilment of basic need in the form of food by creating provision for much-required essential commodities.

These findings provide a guideline for government authorities to ensure that the public distribution system remains consumer-centric by focusing on the efficiency of fair price shops. An efficient public distribution system in the form of efficient fair price shops will ultimately benefit the ration card holders at large ensuring food and nutritional security.

The study findings are important to policymakers for bringing required reforms in the public distribution system. The reforms can be introduced in the areas of public distribution system which could enhance the operational efficiency of fair price shops in PDS.

The three dimensions which are identified in the study can be concentrated upon to provide a timely supply of food grains for each month without any instances of stock-outs at fair price shops which are the final points of logistics in the whole chain of the public distribution system. Moreover, the policymakers can take necessary steps to improve the quality of food grains distributed through the public distribution network.

6. Limitations and Future Scope of Research

The present study is only based on the responses obtained from beneficiaries of the public distribution system. The other stakeholder's role such as Fair Price Shop owners and Civil Supplies Inspectors are not been studied. The study is further confined to Goa State only. Future research in this area can be undertaken on supply chain management in public distribution systems involving areas of procurement of food grains, storage, transportation and distribution to end beneficiaries. The study can well be extended to examine the financial viability of operating a fair price shop. Moreover, a study can be undertaken to study the monitoring operations of public distribution systems by authorities.

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Annexure 1. Measurement Scales Used

| Construct and Statements | Type of Scale | Source |
|-----------------------------------------------------------------------------------------------------|---------------|--------|
| Construct-1: Right Time, Place and Price | | |
| C1 - I have access to the food grains as per my convenience. | | |
| C2 - Fair price shop owner timely informs about the arrival of the food grains. | | |
| C3 - The location of the fair price shop is convenient to me. | | |
| C4 - There is manageable distance between the residence of beneficiaries and the fair price shop. | | |
| C5 - The existing fair price shop is located by keeping in account the population in the vicinity. | | |
| C6 - The essential commodities are distributed regularly on monthly basis. | | |
| C7 - The prices charged are affordable and reasonable. | | |
| C8 - The price charged to me for the food grains are revised from time to time. | | |
| Construct-2: Right Quality | | |
| Q1 - The allotted quality meets the dietary requirements of my family members. | | |
| Q2 - The allotted commodities are reasonable on quality. | | |
| Q3 - Fair price shop owner is committed to lift quality food grains from the State Level Godown. | | |
| Q4 - There is an accurate allotment of food grains at the fair price shop with bio-metric machines. | | |
| Construct-3: Right Quantity | | |
| PQ1 - I am disbursed correct amount of allotted quota. | | |
| PQ2 - The allotted quantity is sufficient to meet the requirements of my family. | | |
| Construct-4: Operational Efficiency | | |
| OE1 - Food grains through ration shops are regularly distributed on time. | | |
| OE2 - Food grains supplied through ration shop are reasonably sufficient to my family. | | |
| OE3 - Food grains supplied through ration shops are of reasonable quality. | | |
| OE4 - The prices charged under public distribution system are affordable to me. | | |
| OE5 - The fair price shop is located at convenient place in my locality. | | |