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Chapter 3

Data and Methodology of the Study

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3.1. Introduction

The methods of performance evaluations have based on productivity and efficiency comparison of agricultural practices. First, agricultural productivity and efficiency have been considered the main argument of debate in the farming sector's policy agenda. The agricultural productivity measurement is not a new concept and has origins in microeconomic theory (Solow, 1957; Ball et al., 1997). The public and managerial interests in productivity stem that productivity changes social welfare. In general, productivity is the volume produced (output) per resources utilized (input). The measuring of economic impact is quantitative and qualitative phenomenon.

The productivity measurement can be for a single farm or group of farms at any regional or geographical setup. The comparison of productivity levels in the farms or groups of farms at micro and macro levels needs to measure suitable entities involved in production. The present study considers micro-entities for productivity measures at farm levels, and for national-level policy evaluations, The present study need macro-level entities. Agricultural productivity depicts the production process's efficiency based on assumptions that producers or decision-makers are technically efficient. The decision-makers are often interested in efficiency assessment because they consider it *an ex-post* measure that shows how well the production process optimizes the resources. The notions of agricultural productivity and Technical Efficiency (TE) depend on the input type, quality, and how well these inputs have utilized in the production process (Cruz, 1991).

The TE is the ratio of actual output and maximum potential output from the production process. The utilization of inputs to get maximum potential output depicts the production frontier of the production process available technology. The distance between frontier and output level depicts the inefficiency in the production process. The TE justifies different productivity targets of decision-makers. TE is a more suitable indicator for farming comparison over productivity because it provides a relative measure considering both input base and resource and frontier distance from best practice. Hence, considering these advantages of TE over productivity index, this study compares the farming practice based on their TE score. The following sections describe the basics of performance measurement techniques for agricultural sectors,

followed by separate sections of parametric, non-parametric, and semi-parametric agricultural performance measurement techniques (Sekaran, 2005).

3.2. Research Questions

The study developed and intending a test is a conceptual frame work and the important factors that contribute the agricultural development of the Kerala, and how the organic farming will affect the economy in the field of production, saving and investment etc. Ensuring the environmental sustainability and providing organic – healthy products to the society for reducing the health hazards of the organic consumers in the society. The relationship constructed among the different variables leads to arrive the research questions of the study. The three main research questions are arrived that is

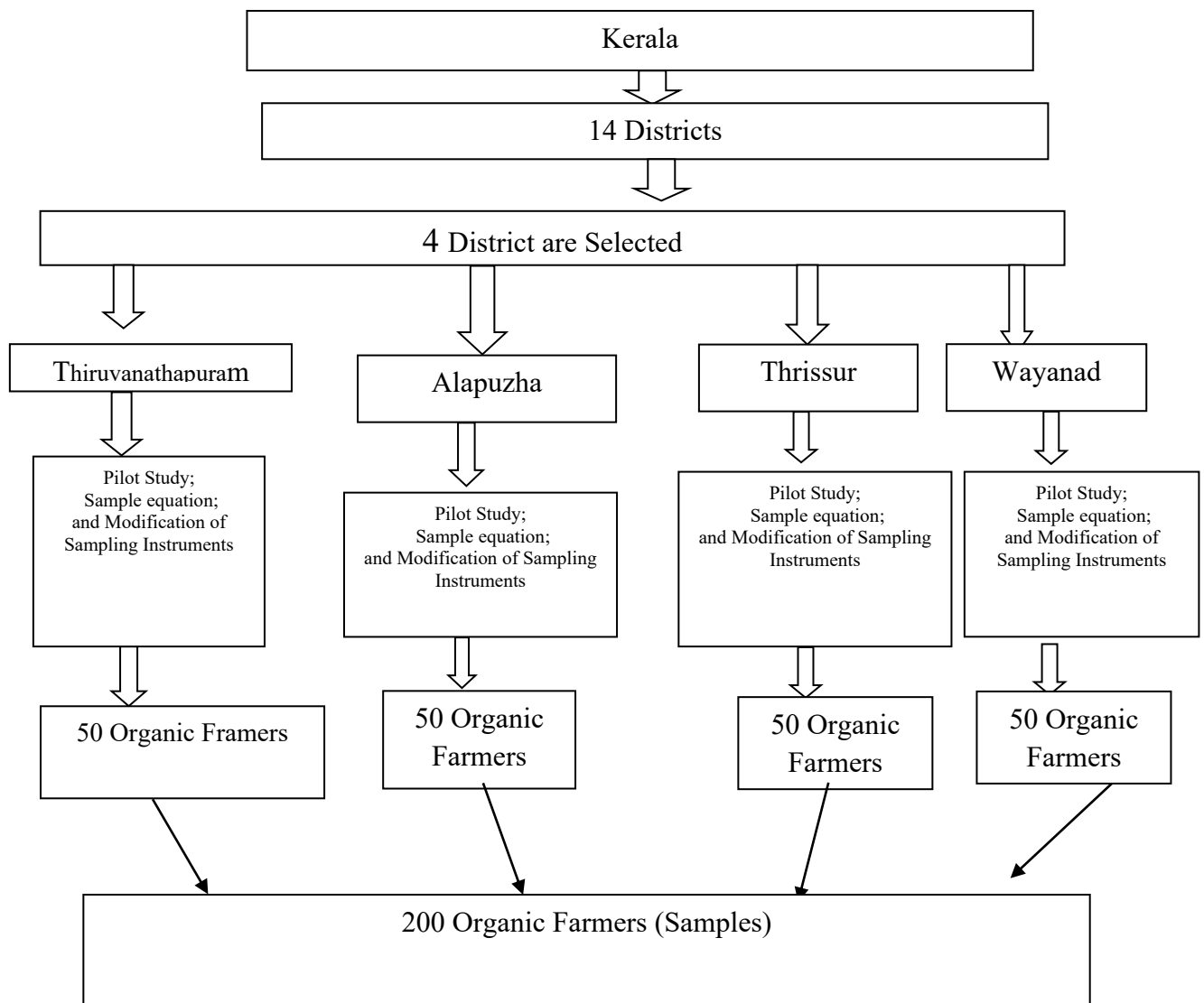
1. What is the trend and pattern of organic farming in Kerala?
2. What are the government schemes and programmes on organic farming in India?
3. What are the Socio-economic conditions of the organic farmers in Kerala?
4. What is the productivity and profitability trend of organic farming in Kerala?
5. What are the major constraints faced by the organic farmers in Kerala?

To find answers for this research questions the study developed five objectives. The objectives are included in the chapter-1 under the sub heading of objectives of the study and hypothesis of the study.

3.3. Sampling Frame Work

As the objective of the study is to understand the economic impact of organic farming in Kerala is through measuring efficiency and functioning of the selected Organic farming units in selected districts in Kerala. The sample was taken from the four districts of Kerala. Out of 14 districts, four districts are selected as advised by the agronomists of Kerala Agriculture University and various NGOs (see Chart 1).

Chart 1
Sampling Frame Work



Source: Prepared by the investigator

The sample districts are Thiruvananthapuram, Alappuzha, Thrissur, and Wayand. Fifty organic farmers are selected from each district. The total sample size is two hundred and one organic farming units is also selected from the same districts. Well-structured interview schedule is used to collect information from the farmers. The study has three main components

- 1) The survey of selected organic farmers in sample district
- 2) Discussion with organizers of the organic farming units in Kerala by using well-structured interview schedule.
- 3) Locate speech case studies of farming units in the sample area. A structured case study schedule is used to gather the information from the organizers of the farming society. Questionnaire survey was followed by visit to selected farmers from the organic units.
- 4) Periodical visit were made to the farm covering on season of agricultural activities in the farming units. The qualitative data collected through direct observation and verification of farm records is available to record the problems faced by organic farmers and the recommendations by them.

Assess the profitability productivity and viability of the organic farming units,

This study utilizes annual data regarding the cost of cultivation by the organic farmers in the selected districts in Kerala 2016-2020 for comparison of performance and Technical efficiency of different organic farming units. The list of all considered district is provided below in table 3.2. The study takes four inputs and one output variable for performance evaluation of organic farming in India. The four inputs are the farm area (measured in hectare), the number of organic farmers, organic manure, and bio-fertilizers used in organic production. The output is total organic production (pure organic production + organic production in the conversion period). This study considers conversion period production as a part of purely organic production because it does not affect the performance level if we include only pure organic production output (Yadava and Komaraiah, 2020).

1. Farm Area-cultivated farm area (organic +conversion) in hectare (ha)
2. Farmers- Number of farmers engaged in organic farming
3. Bio-Fertilizers - quantity of bio fertilizers used in a year in kilogram (carrier +liquid base)
4. Manure-Total manure used
5. Total production-total quantity of output produced (organic production + production in the conversion period)

Table 3.1
Sampling Frame Work

Sl.No	District	Geographical Division	Population	Sample Size
1	Thruvananthapuram	Midlands	228	50
2	Alapuzha	Lowlands	245	50
3	Thrissur	Midlands	270	50
4	Wayanad	highlands	241	50

Source: Prepared by the Investigator

The data sources and description of variables considered for organic farming performance are detailed below.

Table 3.2
Input-output Variables Used for organic Farming Performance Measurement

Sl.No	Variable Name	Description	Source
1	Gross cropped Area	Cropped area for all food crops for all seasons in a year	Primary source
2	Agriculture Labour	Labour involved in agricultural activities	Primary data
3	Fertilisers	Vermi-compost Green manure etc are used in a year in KG	Primary data
4	Live stocks	No. of Total live stock	Primary source

Source: Prepared by the Investigator

The performance assessment of organic farming in Kerala, in the inter temporal context is difficult for researchers. The primary constraints are related to district -wise input-output data availability. Nevertheless, the conventional farming and organic farming are different in technology and practice adoptions, but we should try to include similar featured variables for both farming systems. This homogeneity of

input-output variable choices will help to compare these farming systems. The present study targets those input-output variables for organic production closer to considered input-output variables of organic farming production.

This study considers prominent input variables like farm area, agricultural labour, and fertilizers as input. Despite these considered input variables, livestock can also be treated as an input for farmers depending on production needs ,as decided by the farmers either uses livestock as input or output. Agricultural productivity considering livestock as an input variable and recommended a noticeable input (fixed asset type input) for agricultural production.

In the last objective, this study explores the productivity and profitability the organic products. Productivity of organic farming is measured through the Technical efficiency of the farm and profitability is measured through the market demand for organic products and by using the consumer surplus. The term consumer surplus means that it is the net difference between the actual price of the products and consumer willing to pay for the same. The factors measuring the consumer surplus are categorized into two heads that is price of the commodity and quality of the commodity. The multi-linear regression model is used to analyse the relationship between various input factor and output. Details of three broad head and their representative proxy variables are provided in empirical chapters of the thesis.

3.4. Positive and Interpretivist Approach.

Positive approach is widely known approach as the scientific approach or quantitative approach. This approach views reality as objective and which can be measured and revealed (Gall et al., 2007). In positive research approach, investigator apply theories include data collection and organizing data in to quantifiable variables, testing hypotheses and uses of statistical tools for analyzing data.

Interpretivist approach is commonly a known as a qualitative approach. Qualitative methods can be differentiated as instead of relying on relying empirical inferences it rely on close association of the researcher and the respondents (Lincoln 2005). In interpretivist approach research is based on induced methods. This approach promotes the value of qualitative data and the writing styles of qualitative purists

comprise a detailed description with loaded information as compared to the detached and formal style of writing followed by the quantitative purists.

3.5. Research Approach Adopted in the Study

The study conducted extensive literature survey, identified the work related and personal life related variables of the organic farmers. Based on the various agricultural theories conceptual model is formulated. Hypotheses are developed in order to test the relationship between variables in the proposed model. Data was collected through the well-structured questionnaire and interview schedule is used to gather information from the scientific experts of the organic farming. Data recording sheet given to each selected farmers to note the routine expenditure related to their farm activities separately in annually. The study collected data, with clear theoretical focus and provides inference from empirical analysis. Hence this study follows positive approach rather than interpretivist.

3.6. Population

The present study the targeted population is the all those farmers who are practicing organic farming in entire Kerala, Kerala is the state which encourage organic farming as a holistic farming practice, So the organic farmers are distributed in entire state, but the volume of the farmers are not identical in each districts. The geographical features of the each district and the number of depends of the agricultural live hood are also different. The study was conducted in Thiruvananthapuram, Thrissur, Alapuzha, and Wayanad districts of Kerala.

3.7. Sampling Frame and Sample Size

In the present study out of 14 districts four districts selected as a sample districts on the basis of the number of number of farmers engaged in organic farming. The research cell of Kerala Agricultural University provides the detailed list of registered organic farmers in Kerala. The simple random method is used to take sample from the selected district. The large concentration of the organic farmers is, Thrissur, Thiruvananthapuram, Alapuzha, and Wayanad. Fifty organic farmers are selected from each district. The total sample size is two hundred. One farm selected from each district two measure the productivity and profitability of organic farming in Kerala. In

the present study case study approach is used to access the origin and functioning of the societies.

3.8. Data Collection and Procedures

The search for answers to research questions and analysing research objectives calls for data collection. Data can be facts, figures, or other relevant materials of past or present, that serve as a base for the study and analysis. The process of collecting the data involves the collecting the information or opinions from target participants regarding the research questions or topic of research. Diverse methods have been identified in the research literature to collect data such as using post services, meeting face to face with the sample respondents, making telephonic conversions, sending electronic mails or a combination of these methods. In this section, researcher explains in detail type and source of data, methods used for data collection, scaling of instruments and development of instruments.

In Social science research, the collected data can be pertaining to human beings, relating to organizations or territorial areas (Krishna Swami, 2000). data pertaining to human being consists of demographic and socio-economic characteristics such as age gender, marital status, education, income, family size, etc and other behavioural variables like attitudes, intentions, opinions and awareness. Organizational data consists of information's relating to its origin, functions, performance etc. Territorial data represents geographical characteristics, population and economic structure, degree of development of divisions like village, cities, districts, states and nations.

The present study deals with data pertaining to human beings, both demographic variables like age, gender, income, family status are considered for measuring socio economic status of the sample respondents. Behavioral variables like perceptions on organic farming and opinion regarding their farming practices. Organizational data and Territorial data are used to access the performance of organic farming and territorial data used to explain the geographical features.

The nature of data can be either primary or secondary, so as the data source primary data refers to the information obtained first hand by researcher on the variables elated to the field of study. The source of primary data can be individuals,

focus group etc. It consists of readily available compendia and compiled reports and statistical statements whose data may be collected and used by some researcher for their study. Source of secondary data were government publications, websites, internet, text books, published thesis, publications in journals, newspaper etc. In the present research researcher used both primary and secondary data from both the sources.

3.9. Methods for Data Collection

Method of data collection refers to the way or mode of gathering data. There are various methods for data collection such as observation interviewing, survey, experimentation, simulation and projective techniques. However in social science, survey research adopts observation interviewing and administering questionnaire or combination of these for collecting data. The data for the present study was collected using a combination of these methods by using data collection tools like interview schedule, unstructured questionnaire and personally administered questionnaire and finally collected data through the observation method.

3.10. Pilot Study & Pre-Testing

Pilot study is a small scale replica of the main study. It is the rehearsal of the main study covering preparation of a broad plan, collecting data with constructed tool and processing it. Here the researcher delivered the instruments to a pilot group consists of 25 organic farmers in Adatt grama panchayat at Thrissur District. The research scholar conducted pilot study from the period of January 2020.

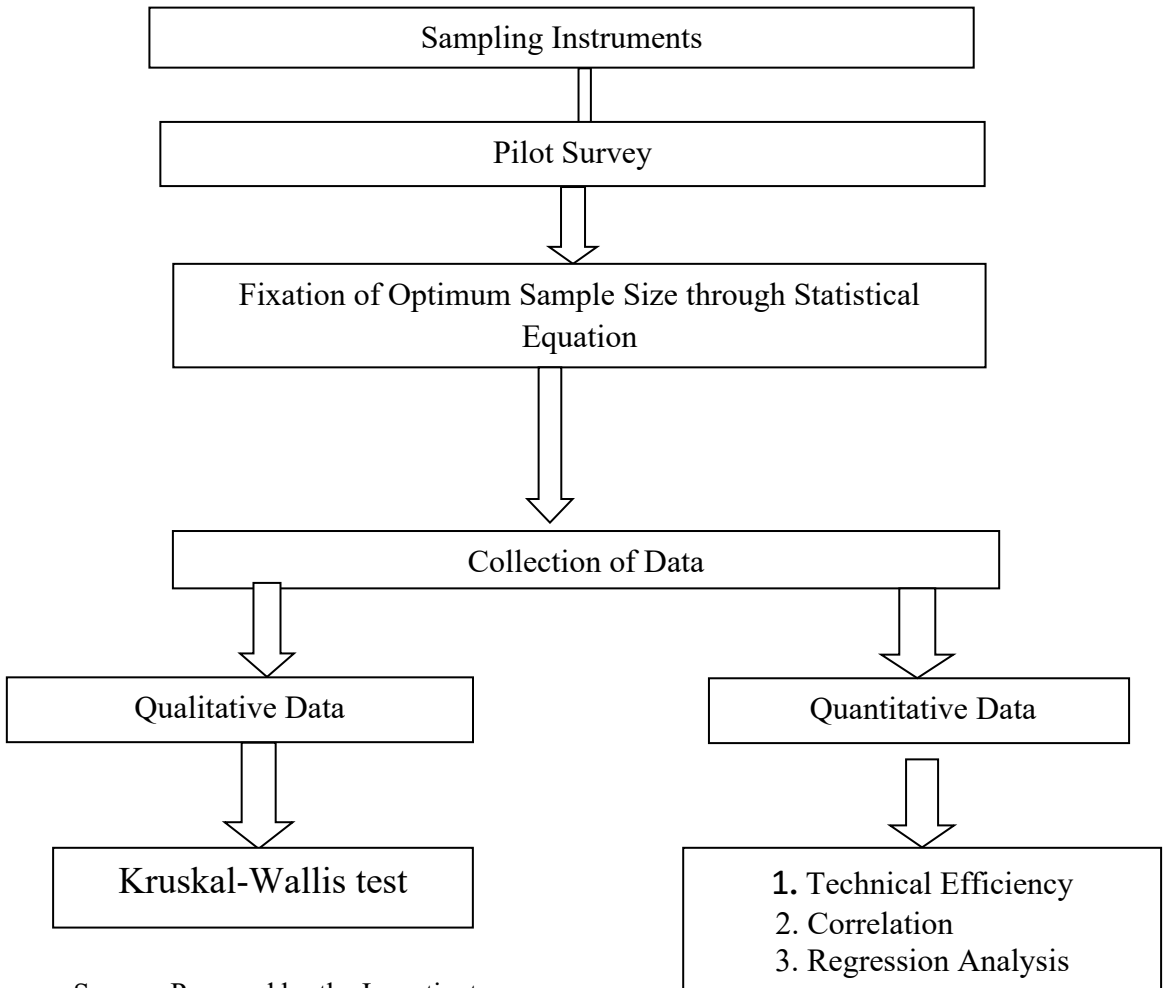
3.11. Data Collection and Processing the Data

After finalizing the questionnaire, the next step was to conduct actual data collection. As explained in the sample design, 200 samples were randomly selected from Thiruvananthapuram, Alapuzha, Thrissur and Wayanad districts representing various agro climatic zones and practicing organic farming .The personal interview conducted among each farmers. Actual data collection was conducted from July 2020. Then the researcher moved to the data processing stage. Data processing is an intermediate stage between data collection and data analysis. The collected data was coded and analyzed with the help of SPSS statistical package.

3.12. Agricultural Performance Measurement

The performance measurement or performance management of an operation unit can be evaluated through the output per unit of input consumption in the production process, commonly known as productivity or efficiency (relatively) of the performing unit (Yadava & Neog, 2019). Decision-Making Units' (DMUs) performance often depends upon different variables involved in the production process, and these DMUs can be firms, industries, institutions, policymakers, or the government itself (Donnell, 2018). Performance assessment enhances different notions of efficiency. Based on the performance evaluation of DMUs, further investigations provide information about the best and worst performers and how the peer-performing units can improve their efficiency. In addition to performance measurement, the benchmarking gives further in-depth information about the production process.

Chart 2
Analytical Frame Work



Source: Prepared by the Investigator

1. Production technology is characterized by the type of inputs and resources available. For a given commodity, many different technologies may exist, reflecting different economic, environmental, and agronomic conditions
2. A farm is technically inefficient when it does not produce the maximum level of output that can be expected given the type of available inputs.

The basic notions of performance evaluation are intuitive and straightforward, and the production theory combines the concepts of technical efficiency, scale efficiency, and allocative efficiency. Furthermore, some of these concepts are operationalized as per requirements (Huguenin, 2013). For example, the concept of technical efficiency, which has been carried out in this study for performance comparison, can be used for input optimization (input-oriented), output optimization (output-oriented), and for both (optimization of input and output both at the same time). The basic notions of technical efficiency for output optimization purpose are as follows;

$$\text{Technical Efficiency} = \frac{\text{Actual Output}}{\text{Maximum potential output}}$$

Historically the measures of performance efficiency started with Farrell (1957), who provided defined the firms' efficiency based on the work of Koopmans (1951) and Debreu (1951). Farrell proposed that the firm efficiency consisting two modules: technical efficiency (i.e., ability to obtain maximum output with given inputs) and allocative efficiency (i.e., ability to utilize the inputs in optimal proportions while the price of inputs is available).

The combination of technical and allocative efficiency postulates total economic efficiency. It is not always possible to get the price of the inputs, and without price information, the allocative and economic efficiency cannot be estimated. The performance efficiency measures can be decomposed into various other notions such as cost efficiency, profit efficiency, revenue efficiency, etc.; this decomposition additional information in the data.

3.13. Decomposition of Performance Efficiency

Measurement techniques do not hold any functional relations between input and output; instead, it estimates based on available technology sets of input and output. A production process may be technically inefficient if the available technology exhibits higher outputs with the same inputs (output-oriented model) or the same output is attainable with lower inputs (input-oriented model). These two production efficiency possibilities based on the orientations of measurements shape the frontiers differently.

3.14. Stochastic Frontier Analysis (SFA)

The stochastic frontier approach is a parametric approach for performance efficiency Measurement. The SFA method is independently developed by Aigner et al. (1977) and Meeusen and Broeck (1977). In production function econometric model estimation, the SFA considers the error term has two main components; the first component accounts for the model's random statistical error. The second component accounts for the inefficiency during the production process (Coelli, 1995). The SFA approach requires a priori form of production functional, and in the TE estimates, generally, Cobb Douglas and log translog production are used. The Cobb Douglas-based SFA estimation is smooth and has a convex isoquant, and alternatively translog model has not these benefits, and also, it is not monotonic.

The study's third objective uses primary as well as the secondary data for analyzing the role of government towards promoting organic farming in Kerala and the attainment of various programmes introduced by the government is accessed through the primary data collection from the sample respondents and by the various government authorities. The fourth and fifth objective of the study is an examination of the socio economic status of the organic farmers, performance of organic farming in Kerala and analyse the productivity and profitability of organic farming, for measuring the socio economic background socio-economic variables like family income, Economic status, employment, education etc are considered by using simple statistical tools like average (mean, median and Mode) percentage etc.

The chapter mentions the research questions and arrives at the hypotheses are empirically tested. Overall the chapter brings a clear idea about the methodology adopted in the study including the approach of research, research design, Data collection procedure, pre testing, pilot study, data collection and processing the data .The chapter covers the actual blue print of the research process.

3.15. Kruskal-Wallis Statistic (KW) Test

Kruskal Wallis (KW) test is a non-parametric alternative to one –way ANOVA on rank is a parametric method for testing the samples originate from the same distribution. It is used for comparing two or more independent samples of equal or different sample sizes. KW test is also used to analyse the variables measured I ordinal level. The KW technique tests the null hypothesis that the k samples come from the same population or from identical population with the same median.