



ChApter 3: ReseArch Methodology

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Chapter 3: Research Methodology

3.1. Introduction

This chapter provides a comprehensive overview of the methodological approach adopted in this study. It details the framework and procedures used to conduct the analysis presented in the subsequent chapters. The purpose is to outline the research design, describe the population and sampling strategies, explain the methods of data collection and analysis, and define the types of data used. By presenting a clear and systematic methodology, this chapter ensures the transparency and credibility of the research process, establishing a foundation for the interpretation of the findings.

3.2. Operational Definitions of Research Variables

For the purpose of this study, the variables were defined based on their roles in the analysis. The research utilized several variables from a salary survey dataset, which were categorized to facilitate analysis. These included demographic and professional characteristics such as the employee's hierarchical position (Job Level), the type of organization they work for (Sector), their highest academic qualification (Education), and their field of expertise (Discipline). Furthermore, quantitative measures such as the employee's age and monthly salary were also central to the analysis.

3.3. Research Design (Research Compass)

The study employed a **quantitative and descriptive research design**. The quantitative approach was chosen because the research is based on numerical data derived from existing datasets, which allows for structured analysis. The design is descriptive in nature, as its primary goal is to summarize and describe the characteristics of the data, such as the distribution of employee salaries, the composition of the workforce by education level, and trends in sales over time. The analysis also incorporates inferential techniques to test specific claims and forecast future outcomes, making it an analytical study grounded in established statistical principles.

3.4. Research Population, Methods, and Sampling Techniques

The study drew upon different populations depending on the analysis. For the sampling methodology exercise, the population was defined as a manufacturing company with 520 employees distributed across four distinct departments: Production, Maintenance, Sales, and Administration.

The sampling technique proposed for this population was **Stratified Random Sampling with Proportional Allocation**. This method was selected because it ensures that each department (stratum) is represented in the sample in proportion to its size within the total population. This technique is considered superior to simple random sampling in this context, as it is likely to yield a more representative sample and reduce sampling error, especially when the characteristics being measured (like transportation allowances) are expected to differ between departments.

3.5. Data Collection Method

This research was conducted using **secondary data**. The data was not collected directly by the researcher but was obtained from pre-existing datasets provided for the assignment. The primary datasets included a comprehensive salary survey containing demographic and professional information about a sample of 682 employees, and a historical sales dataset tracking sales figures over 18 quarters. The use of secondary data is an efficient method for conducting research, as it leverages existing, high-quality data without the need for a lengthy and resource-intensive primary data collection process.

3.6. Data Types

The research utilized two main types of data:

- **Qualitative Data:** This type of data represents categories or attributes and cannot be measured numerically. In this study, qualitative data included variables such as 'Job Level' (e.g., Junior, Manager, Senior), 'Sector' (Public, Private), 'Education' (e.g., Bachelor, Master, Doctorate), and 'Discipline' (e.g., Engineering, IT, Business).
- **Quantitative Data:** This type of data represents numerical values and can be measured. The quantitative data in this study included variables like 'Age', 'Salary', 'Customer Satisfaction', and historical 'Sales' figures. This data type is suitable for a wide range of arithmetic and statistical operations.

3.7. Statistical Analysis Procedures

The data was analyzed using a descriptive and inferential approach, intended to be performed with standard statistical software like SPSS and Minitab. The procedures were planned as follows:

- 1 **Descriptive Analysis:** This procedure was used to summarize and describe the main features of the data. It involved creating frequency tables to show the distribution of categorical variables and generating various charts—such as bar charts, pie charts, and histograms—to visually represent the data. Key statistical measures like the mean, median, and standard deviation were also described to understand the central tendency and dispersion of quantitative variables.

- 2 **Pareto Analysis:** This technique was described as a method to identify the most significant factors in a dataset. Specifically, it was used to determine the "vital few" disciplines that contribute to the majority of total salary costs, following the 80/20 principle.
- 3 **Hypothesis Testing:** This inferential procedure was used to make a decision about a claim regarding a population. The process involved setting up a null and an alternative hypothesis, selecting an appropriate statistical test (a one-sample Z-test), and interpreting the results to determine if there is enough evidence to reject the null hypothesis at a given significance level.
- 4 **Time Series Analysis:** This procedure was employed to analyze the historical sales data. It involved plotting the data over time to identify the underlying trend, assessing the model's accuracy, and using the identified patterns to forecast future sales.

3.8. Conclusion

This chapter has detailed the methodology that underpins the analyses conducted in the study. It has specified the research design, the nature of the population and sampling techniques, the data collection methods, and the types of data used. Furthermore, it has outlined the descriptive and inferential statistical procedures that were employed to transform raw data into meaningful insights. This structured and transparent methodological approach ensures that the findings of the research are robust, credible, and grounded in sound scientific practice.

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