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Capacity Analysis: Considering Factors Affecting Workforce Scheduling and Employee Productivity

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Abstract
Capacity analysis is like a key that unlocks the door to understanding the true potential of workforces, empowering employees to optimize operations and achieve tremendous success. The impact of workforce scheduling on employee productivity and identify the factors that can maximize workforce scheduling to enhance employee productivity, focusing on BurgerFi Glenview. The study seeks to answer three research questions regarding the impact of workforce scheduling on employee productivity, the key factors that influence workforce scheduling and employee productivity, and how organizations can optimize workforce scheduling to enhance employee productivity. The study will collect and analyze quantitative and qualitative data from surveys and interviews with 20 employees through a mixed-method research design. The findings of this study provide valuable insights into the development and implementation of effective workforce scheduling practices that can optimize employee productivity in BurgerFi Glenview and potentially in other fast-food restaurants and industries that rely on shift work schedules. This study can help BurgerFi Glenview to increase efficiency, reduce costs, and improve its bottom line.

Keywords: Capacity analysis, management functions, workforce scheduling, employee productivity

Introduction
Capacity analysis is a crucial process for any business or organization that wants to optimize its operations, increase efficiency, and maximize productivity. It involves analyzing a company's current resources and capabilities, identifying areas of improvement, and determining the optimal level of output that can be achieved with the available resources. Capacity analysis is an essential tool for optimizing workforce scheduling and improving employee productivity. By analyzing capacity, businesses can identify and allocate resources effectively, resulting in a more efficient and productive workforce that meets the demands of the business. In today's fast-paced business environment, organizations are constantly seeking ways to increase efficiency and profitability. One critical factor in achieving these goals is effective workforce management. At the heart of workforce management is scheduling, which can have a significant impact on employee productivity and satisfaction. Workforce scheduling is critical to managing a productive and efficient workforce. It involves assigning employees to work at specific times and locations in an organization, taking into account the skills, availability, and preferences of employees and the organization's operational needs. Effective workforce scheduling can have significant benefits, including increased productivity, reduced labor costs, and improved employee satisfaction. Employee productivity is a critical factor for the success of any organization (Peter Louch, 2014). The efficient scheduling of the workforce can play a crucial role in optimizing employee productivity. However, many organizations need help developing and implementing effective workforce scheduling practices that maximize employee productivity. This problem can be attributed to a need for more understanding of the factors that influence workforce scheduling. Effective workforce scheduling is essential for optimizing employee productivity, particularly in industries that rely on shift work schedules. Poor scheduling practices can lead to employee dissatisfaction, reduced productivity, increased absenteeism and turnover rates, and higher organizational costs (Thompson, 1995).

Therefore, it is crucial for organizations to develop and implement effective scheduling practices that enhance employee productivity and organizational performance. Capacity analysis is a vital process that helps businesses identify the factors affecting workforce scheduling and employee productivity. By analyzing capacity, businesses can gain a better understanding of their resource utilization, identify bottlenecks in their workflow, and allocate resources effectively to maximize employee productivity and meet business goals. Workforce scheduling is a critical aspect of any organization, as it directly impacts employee productivity and overall business performance. Optimizing employee productivity through workforce scheduling has been a longstanding challenge for managers, as they strive to balance employee availability, workloads, and shift preferences (Hariyati and Fujinami, 2017). With the increasing adoption of technology and data-driven solutions, managers can now leverage workforce scheduling tools and analytics to improve productivity and profitability. Workforce scheduling to optimize employee productivity, which can be approached in various ways. These approaches include maximizing total output and profit generated by the organization, maximizing employee satisfaction and well-being, minimizing labor costs, or minimizing employee turnover. The study particularly focuses on minimizing labor costs while fulfilling production or service demands by optimizing the number of employees scheduled, the number of hours worked, or the pay rates for different employees (Zhang and Wang, 2019).

This study aims to investigate the impact of workforce scheduling on employee productivity and identify the factors that can optimize workforce scheduling to enhance employee productivity. The study focuses on BurgerFi Glenview. The study will aim to answer the following research questions:

- How does workforce scheduling impact employee productivity in BurgerFi Glenview?
- What are the key factors that influence workforce scheduling and employee productivity?
- How can organizations optimize workforce scheduling to enhance employee productivity?

Methodology

The study has been conducted among employees of BurgerFi Glenview, a fast-food restaurant located in Glenview, Illinois, USA. The sample size has been determined using a random sampling technique, and a total of 20 employees will be selected to participate in the study. The study adopts a mixed-method research design, comprising both quantitative and qualitative research methods. We collect data through surveys and interviews. We use both descriptive and inferential statistics to analyze the quantitative data collected through the surveys. The Likert scales (Strongly disagree = 1, Disagree = 2, Neutral = 3, Agree = 4, and Strongly Agree = 5) have been used to conduct this study. The qualitative data collected through the interviews have been analyzed using thematic analysis to identify the key themes that emerge from the data. The study adheres to ethical principles of research, including informed consent, confidentiality, anonymity, and voluntary participation. The study has been limited to BurgerFi Glenview, and the findings may not be generalizable to other fast-food restaurants or industries.

Literature Review

Capacity analysis is essential for businesses that are experiencing growth or expansion, as it enables them to make informed decisions about hiring, production, and resource allocation. By understanding the capacity of the organization, companies can effectively plan for the future and ensure that they are operating at maximum efficiency. In this way, capacity analysis plays a critical role in helping businesses achieve their strategic goals and remain competitive in today's ever- changing market. Workforce scheduling is the process of assigning tasks and responsibilities to employees within an organization, taking into account factors such as workload, employee skills, and availability. Effective workforce scheduling practices have been found to have a positive impact on employee productivity, reducing burnout, absenteeism, and overtime costs, while improving morale and skills utilization.

In their study on the impact of workforce scheduling on employee productivity, Hariyati and Fujinami (2017) found that employees who were scheduled for balanced and fair workloads experienced less burnout, had fewer absences, and were more productive overall. Additionally, the study found that employees who had more control over their schedules reported higher levels of job satisfaction and were more productive.

The impact of scheduling practices on employee engagement and found that organizations that provided employees with more control over their schedules had higher levels of engagement and productivity (Thompson, 1995). The study also highlighted the importance of clear communication and collaboration in effective scheduling practices.

The process, coordination of workforce planning strategy, workforce analysis, workforce plan implementation, workforce plan evaluation, through which organizations review employee data and trends to determine firms current and future hiring needs. Effective workforce scheduling is essential for optimizing employee productivity, as it helps ensure that employees are assigned tasks that align with their abilities and availability. The resource-based model (Penrose, 2009) focuses on identifying the resources needed to complete a task, including human resources, and then scheduling these resources accordingly. This model can help ensure that the right employees are scheduled for the right tasks, which can enhance productivity. The shift-based model (Beverly Flaxington, 2023) involves scheduling employees to work specific shifts, such as day or night shifts, to ensure that the workforce is always available. This model can help reduce absenteeism and improve productivity by ensuring that there is always a full staff on duty.

The demand-based model (Peter Louch, 2014) implies scheduling employees based on customer demand, such as during peak hours or seasons. This model can help ensure that there are enough employees on duty to handle increased customer traffic, which can enhance productivity and customer satisfaction. The flexible scheduling concerns providing employees with flexible scheduling options, such as part-time or remote work, to accommodate their personal needs. This model can enhance employee morale and job satisfaction, which can improve productivity (Akkas, Hossain & Rahman 2015). The employee-driven model (Akkas, Chakma & Hossain, 2015) involves allowing employees to have input into their schedules and

preferences, such as shift preferences and days off. This model can enhance employee engagement and satisfaction, which can lead to improved productivity.

Numerous studies have been conducted to assess the impact of workforce scheduling on employee productivity. One such study conducted by Beltrán-Martín and Roca-Puig (2019) focused on the relationship between scheduling flexibility and employee productivity in the service industry. The study found that employees who had flexible schedules were more productive and reported higher levels of job satisfaction compared to those with rigid schedules. The impact of scheduling fairness on employee productivity in the manufacturing industry. The study found that employees who perceived their schedules to be fair were more productive, had higher job satisfaction, and were more likely to remain with the organization (Zhang and Wang, 2019).

A study by Landström (2020) examined the impact of scheduling practices on the productivity of nurses in a hospital setting. The study found that scheduling practices that provided nurses with a greater sense of control over their schedules led to improved productivity and reduced absenteeism. Furthermore, a study by Marta Rinaldi, Marcello Fera, Eleonora Bottani, Eric H. Grosse (2022) investigated the impact of scheduling practices on employee turnover and productivity in the retail industry. The study found that effective scheduling practices that provided employees with greater schedule predictability and flexibility were associated with lower turnover rates and higher productivity levels. Employees who had more control over their schedules had higher job satisfaction, which led to increased productivity (Hackman, Oldham (1976). Employees who had higher workload had reduced job satisfaction, which led to lower productivity levels. Effective scheduling practices that distribute workload evenly can help prevent employee burnout and improve productivity. The impact of communication on employee productivity in the hospitality industry. The study found that effective communication between managers and employees regarding scheduling practices led to increased employee satisfaction, which improved productivity levels (Verhoeven, Vibeke, 2022). In addition, a study by Hafeez, Mweenuddin, Yusrini, Hussain (2020) investigated the impact of flexibility in scheduling practices on employee productivity. The study found that employees who had more control over their schedules had improved job satisfaction, which led to higher productivity levels.

One approach to workforce scheduling is optimizing the number of employees scheduled. A study by Hariyati and Fujinami (2017) found that optimizing the number of employees scheduled can help organizations reduce labor costs while meeting organizational targets. Another study by Fred

N. Kiwanuka, Louay Karadsheh, Ja'far alqatawna, Anang Hudaya Muhamad Amin, (2021) investigated the impact of employee scheduling on labor costs and found that using mathematical models to optimize the number of employees scheduled can lead to significant cost savings. Another approach to workforce scheduling is optimizing the number of hours worked.

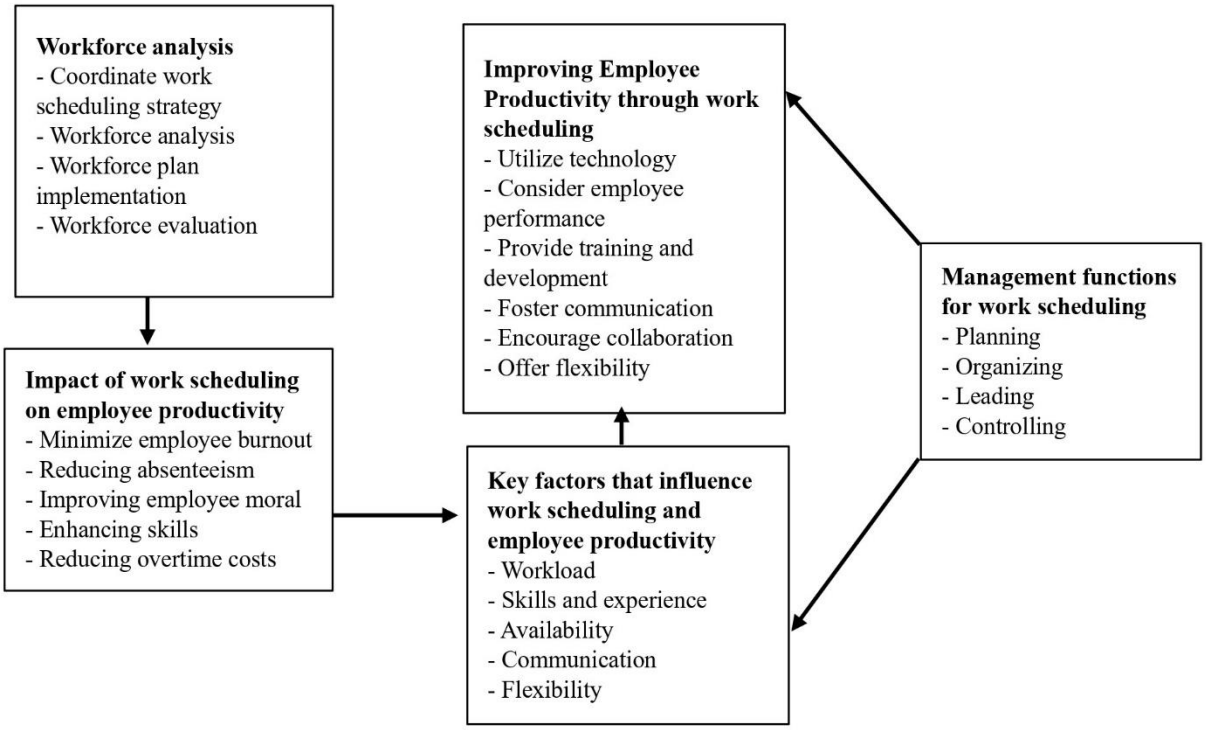

Figure 1: Conceptual framework of improving employee productivity through work scheduling

A study by Thompson, (1995) investigated the impact of reducing employee overtime on labor costs and found that reducing overtime can lead to significant cost savings. A study by Shelby, Jyoti, Anisa (2021) examined the impact of flexible work arrangements on labor costs and found that implementing flexible work arrangements can lead to cost savings by optimizing the number of hours worked. Optimizing pay rates for different employees can also help reduce labor costs. A study by Burgy, Michon-Lacaze, Desaulniers, (2019) examined the impact of implementing a variable pay system on labor costs and found that implementing such a system can led to cost savings by

optimizing pay rates for different employees. Optimizing workforce scheduling to enhance employee productivity can also lead to cost savings for the organization. For example, one study found that optimizing scheduling practices led to a reduction in overtime costs and improved employee retention rates, resulting in cost savings for the organization (C. Atkinson and L. Hall, 2011).

Furthermore, effective workforce scheduling practices can also improve the quality of work and customer satisfaction. When employees are scheduled appropriately and have the necessary skills and resources to perform their tasks, they are more likely to provide high-quality work and satisfy customer needs (Mowday, Steers, and Porter, 1979). The functions of management are a process of planning, organizing, leading and controlling plays a vital role in workforce scheduling in the workplace (Akkas, Chakma & Hossain, 2015). We have developed a conceptual framework for improving employee productivity through work scheduling (see Figure 1). This framework can be used by organizations to analyse their capacity and make informed decisions about work scheduling. Workforce analysis and work scheduling are important management functions that can have a significant impact on employee productivity, morale, and retention. By understanding the key factors that influence work scheduling and employee productivity, managers can develop and implement work schedules that are effective and efficient. This can lead to improved employee productivity, reduced costs, and increased customer satisfaction. Workforce analysis can help managers to identify skills gaps and ensure that the organization has the right people with the right skills in the right place at the right time. This can help to improve productivity and reduce costs. Work scheduling can help managers to ensure that there is enough coverage to meet the workload, while also minimizing overtime and absenteeism. This can help to improve employee morale and retention. Workforce analysis and work scheduling can help managers to comply with labour laws and ensure that employees are not overworked or exposed to health and safety risks. This can help to protect the organization from liability. Workforce analysis and work scheduling can help managers to improve customer satisfaction by ensuring that customers can get the service they need when they need it. This can help to boost sales and revenue. By understanding the managerial implications of workforce analysis and work scheduling, managers can make informed decisions that benefit the organization to set the capacity and its employees.

Impact of workforce scheduling on employee productivity

The impact of workforce scheduling on employee productivity can vary across different industries. However, in general, effective workforce scheduling practices can have a positive impact on employee productivity in the following ways:

- **Minimizing employee burnout:** When employees are overworked or scheduled for long hours, it can lead to burnout, which can significantly reduce their productivity. By creating balanced and fair schedules that distribute workload evenly, organizations can help prevent employee burnout and increase productivity.
- **Reducing absenteeism:** Poor scheduling practices can lead to absenteeism, which can disrupt the workflow and reduce productivity. By providing schedules that are predictable and flexible, organizations can help reduce absenteeism and ensure that their workforce is always available when needed.
- **Improving employee morale:** When employees have input into their schedules and feel like their needs are being considered, it can lead to improved morale and job satisfaction. This, in turn, can increase productivity as employees are more motivated to perform their tasks.
- **Enhancing skills utilization:** Effective workforce scheduling can ensure that employees with the right skills are scheduled for the right tasks at the right time. This can lead to enhanced skills utilization and better performance, which can increase overall productivity.
- **Reducing overtime costs:** Poor scheduling practices can lead to unnecessary overtime costs, which can impact an organization's bottom line. By creating schedules that maximize productivity during regular working hours, organizations can reduce the need for overtime and save on costs.

Effective workforce scheduling practices can have a positive impact on employee productivity by minimizing burnout, reducing absenteeism, improving morale, enhancing skills utilization, and reducing overtime costs.

Table 1: Mean and Standard Deviation of Impact of workforce scheduling.

Impact of Workforce Scheduling	M	SD
Minimizing employee burnout	4.95	0.223607
Reducing absenteeism	4.95	0.223607
Improving employee morale	4.9	0.307794
Enhancing skills utilization	4.9	0.307794
Reducing overtime costs	4.9	0.307794

Source: Data from BurgerFi Glenview, 2023.

key factors that influence workforce scheduling and employee productivity

Several key factors can influence workforce scheduling and employee productivity. These factors include:

- ***Workload:*** The amount of work that needs to be completed can significantly impact on workforce scheduling and employee productivity. If the workload is too high, it can lead to burnout, absenteeism, and reduced productivity. On the other hand, if the workload is too low, it can lead to boredom and underutilization of skills.
- ***Skills and experience:*** The skills and experience of

employees are critical factors that can influence workforce scheduling and employee productivity. Effective scheduling practices must consider the skills and experience of employees to ensure that they are assigned tasks that align with their abilities.

- **Availability:** The availability of employees can also impact workforce scheduling and employee productivity. Scheduling practices must consider the availability of employees to ensure that tasks are assigned to those who are available and avoid scheduling conflicts that can impact productivity.
- **Flexibility:** Flexibility in scheduling practices can enhance employee productivity. Employees who have more control over their schedules can adjust their work hours to better suit their personal lives, which can lead to improved morale and job satisfaction.
- **Communication:** Effective communication is crucial for successful scheduling practices. Employers need to communicate work schedules clearly and in advance to ensure that employees are aware of their schedules and can plan their personal lives accordingly.
- **Work environment:** The work environment can also impact workforce scheduling and employee productivity. Employers must ensure that the work environment is conducive to productivity and provides the necessary tools and resources for employees to complete their tasks efficiently.

Effective workforce scheduling practices must consider workload, skills and experience, availability, flexibility, communication, and the work environment to enhance employee productivity.

Table 2: Mean and Standard Deviation of Factors affecting workforce scheduling.

Factors affecting scheduling	M	SD
Workload	4.95	0.223607
Skills and experience	4.95	0.223607
Availability	4.9	0.307794
Flexibility	4.9	0.307794
Communication	4.9	0.307794
Work environment	4.894737	0.315302

Source: Data from BurgerFi Glenview, 2023.

Optimize workforce scheduling to enhance employee productivity

Organizations can optimize workforce scheduling to enhance employee productivity in the following ways:

- **Utilize technology:** Organizations can use workforce scheduling software to automate the scheduling process and optimize employee productivity. This software can help organizations create schedules that are balanced, fair, and predictable, which can reduce burnout and absenteeism.
- **Consider employee preferences:** Effective scheduling practices should consider employee preferences, such as work hours, days off, and shift preferences. This can enhance morale and job satisfaction, which can increase productivity.
- **Provide training and development:** Employers can provide training and development opportunities to employees to enhance their skills and improve their productivity. Effective scheduling practices should consider employee availability for training and development opportunities.
- **Foster communication:** Effective communication is essential for successful scheduling practices. Employers should provide clear and consistent communication regarding work schedules, tasks, and expectations. This can reduce confusion and improve productivity.
- **Encourage collaboration:** Employers can encourage collaboration among employees to enhance productivity. This can involve scheduling employees with complementary skills to work together, which can increase efficiency and reduce errors.
- **Offer flexibility:** Employers can provide flexibility in scheduling practices to enhance employee productivity. This can involve offering flexible work hours, remote work options, or part-time schedules to accommodate the needs of employees.

Optimizing workforce scheduling to enhance employee productivity requires the use of technology, consideration of employee preferences, training and development, effective communication, collaboration, and flexibility. By implementing these practices, organizations can create a productive and engaged workforce that can drive their success.

Result and Discussion

There were 13 participants who were male, constituting 65% of the total sample, and 7 participants who were female, constituting 35% of the total sample. The mean (average) value of some metric (likely a score or measurement) for males is 92.34, with a standard deviation of 0.34. The mean value of the same metric for females is 96.45. Unfortunately, the standard deviation for females is not provided in the table.

The participants are also categorized based on their marital status, with two categories: Married and Unmarried. There were 8 participants who were married, accounting for 40% of the total sample, and 12 participants who were unmarried, accounting for 60% of the total sample. The mean value of the metric for married participants is 89.56, with a standard deviation of 0.41. The mean value of the metric for unmarried participants is 93.23, but the standard deviation is not provided.

The participants are further categorized based on their type of weekly salary, with three salary levels: $480, $600, and $628. For the $480 salary level, there were 9 participants, making up 45% of the total sample. The mean value of the metric for this group is 94.33, with a standard deviation of 0.32. For the $600 salary level, there were 7 participants,

constituting 35% of the total sample. The mean value of the metric for this group is 91.34. Unfortunately, the standard deviation for this group is not provided. For the $628 salary level, there were 4 participants, accounting for 20% of the total sample. The mean value of the metric for this group is 90.21. The standard deviation for this group is also not provided.

Table 3: Demographic information.

Variables	n	%	M	SD	P
Sex					
Male	13	65	92.34	0.34	0.91
Female	7	35	96.45	0.45	
Marital status					
Married	8	40	89.56	0.41	0.97
Unmarried	12	60	93.23	0.43	
Type of salary (Weekly)					
$480	9	45	94.33	0.32	0.59
$600	7	35	91.34	0.45	
$628	4	20	90.21	0.42	

To develop a model, we are using BurgerFi Glenview to optimize workforce scheduling by incorporating length of employment, hiring the employees needed at minimum cost, sum of wages and training cost. A brief overview of BurgerFi Glenview about the length of employment, training costs, hiring costs, and wages costs are enumerated below.

Length of employment	Costs/Weekly	40 hours/ week	Total Wages
One Month	$480	$12 / hourly	$1920
Two Months	$600	$15 / hourly	$4800
Three Months	$628	$15.7 / hourly	$7536

Additional Employees for next six months –

Months	May	June	July	August	September	October
Employees	11	21	18	26	20	15

Training costs $900 for one month employment, no more training costs for two months and three months employment. The given practices, the linear programming formulation would be:

Here, *Xij* be the number of employees hired under length of employment *i* in month *j*; *i* be the length of employment for one month, two months, three months and *j* be the month of hiring.

$$\boldsymbol{Min}\ (1920 + 900)\,(X11 + X12 + X13 + X14 + X15 + X16) + (4800 + 900)\,(X21 + X22 + X23 + X24 + X25) + (7536 + 900)\,(X31 + X32 + X34)$$

$$\boldsymbol{S.t}$$

$$X11 + X21 + X31 = 11$$

$$X21 + X31 + X12 + X22 + X32 = 21$$

$$X31 + X22 + X32 + X13 + X23 + X33 = 18$$

$$X32 + X23 + X33 + X14\,X24 = 26$$

$$X33 + X24 + X34 + X15 + X25 = 20$$

$$X34 + X25 + X16 = 15$$

$$Xij \geq 0$$

i = Employment j = Months

Solver generates the solution – The following additional number of employees needs to be hired.

Table 4: Additional employees need to be hired.

Decision Variables							
Length of Employment	**May**	**June**	**July**	**August**	**September**	**October**	**Total**
One Month	4	3	0	0	5	0	12
Two Months	0	0	0	0	0	0	0
Three Months	7	11	0	15	0	0	33

The decision variables show the number of employees to be hired in each length of employment. Where the total cost of the plan is $312228.

Table 5: Total Costs Plan.

Summary Table			
Length of Employment	**Training**	**Contract**	**Cost for each Length of Employment**
One Month	900	1920	33840
Two Months	900	4800	0
Three Months	900	7536	278388
Total			312228

Training and Hiring costs –

Table 6: Training and Hiring Costs.

Summary Table			
Length of Employment	**Training**	**Contract**	**Cost for each Length of Employment**
One Month	900	1920	33840
Two Months	900	4800	0
Three Months	900	7536	278388
Total	40500	271728	312228

The Solver tool has generated a solution for the number of employees that need to be hired for each length of employment. Table 4 reveals for the months of May through October, four employees need to be hired for one month, three employees for one month in June, five employees for one month in September, and seven employees for three months, 11 employees for three months in June, and 15 employees for three months in August, totaling 33 employees for three months. No employees need to be hired for two months. These decision variables are summarized in the table provided. Table 5 exhibits that the total cost of the plan is $312,228. Table 6 provides a summary of the total cost plan, including the costs of training and hiring for each length of employment. The total cost for training and hiring is $40500 for training and $271728 for the contract, with a grand total of $312228 for the entire plan.

Conclusion

The research work highlights the importance of effective workforce scheduling in optimizing employee productivity and overall business performance. Many organizations struggle to develop and implement efficient scheduling practices due to a lack of understanding of the factors that influence workforce scheduling. Therefore, the research aims to investigate the impact of workforce scheduling on employee productivity and identify key factors that can optimize workforce scheduling to enhance productivity. The study has the potential to provide valuable insights into improving scheduling practices that can have significant benefits for organizations, including increased productivity, reduced labor costs, and improved employee satisfaction. The findings of this research can be used to develop strategies that optimize workforce scheduling to enhance productivity and organizational performance.

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