ON THE SECONDARY TEACHERS' SOURCE OF MOTIVATION: A FACTOR ANALYSIS AND *K*-MEANS CLUSTERING

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This research aimed to characterize the various sources of motivation among secondary teachers. The study employed random sampling to choose the sample participants, and primary data was collected. The data were analyzed using standard descriptive metrics, factor analysis, and *K*-means clustering. Results showed that secondary teachers are motivated (M=3.74, SD=0.54) in their school assignments. The factor analysis portrayed that the source of motivation of teachers can be categorized into two groups: personal benefits (Factor 1) and school leadership management (Factor 2). In addition, the *K*-means clustering depicted that 44.19% of the secondary teachers have low motivation (Cluster 1), and 55.81% are highly motivated in teaching (Cluster 2). In conclusion, some teachers are less motivated in their current jobs due to low satisfaction with the benefits and school management. The study suggests that to increase teaching motivation and productivity, teachers must be compensated for their hard work and develop quality school management that promotes well-being.

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1. INTRODUCTION

Motivation in teaching is a complex and multifaceted concept. It plays a crucial role in the effectiveness and satisfaction of teachers. Motivation refers to the internal and external factors that drive teachers to engage in their work, persist in facing challenges, and strive for continuous improvement (Fathi et al., 2023). Their working conditions influence teachers' educational motivation (Sat et al., 2024). Supportive environments that encourage collaboration, autonomy, and professional growth enhance motivation, while excessive workload, resource shortages, and limited professional development have a negative impact (Bukhari et al., 2021). Factors affecting engagement, commitment, and job satisfaction also play a role for secondary teachers. Intrinsic motivation, driven by a passion for the subject and the positive impact on students, is common. Witnessing progress brings joy and motivation; personal fulfillment comes from students' growth (Johnakin-Putnam, 2020). Teachers also find motivation in achievements, belief in the value of their work, skill enhancement, and positive feedback. A supportive environment and maintaining a work-life balance are crucial. Recognizing individual sources of motivation contributes to a supportive environment that enhances teachers' satisfaction and effectiveness (Gas-ib & Sannadan, 2023; Wang et al., 2024). In that case, motivation is a crucial factor in the success of educational institutions, particularly for secondary teachers who play a key role in shaping young minds.

The motivation of secondary teachers is an important area of research with implications for educational outcomes, teacher retention, and overall school effectiveness. This is especially true in the face of global challenges such as teacher shortages, burnout, and declining student performance (Bond, 2021). It is crucial to understand the factors that drive teachers to excel as educational practices and policies are influenced by international trends and cross-cultural exchanges. Many countries struggle with low salaries, heavy workloads, and insufficient administrative support, which can negatively impact teacher motivation and the quality of education (Knighton & Sciences, 2022). The discourse on teacher motivation includes intrinsic factors like passion for teaching and commitment to student success, as well as extrinsic factors like salary and job security. Recent literature emphasizes the importance of holistic approaches, such as professional development programs that address both skill enhancement and emotional support (Camacho et al., 2021). Mentorship and collaborative teaching models are also highlighted as they foster a sense of belonging and professional identity. The

COVID-19 pandemic has further emphasized the need for flexible teaching models and adequate support systems that prioritize mental health and well-being (Bettini et al., 2022). Countries that prioritize teacher well-being through supportive policies and adequate funding tend to have higher levels of teacher satisfaction and retention. This calls for a re-evaluation of existing policies to better align with teachers' needs and motivations (Kun & Gadanecz, 2022).

Lack of opportunities for professional and student success can demotivate teachers. Creating an environment that fosters continuous achievement for teachers and students is crucial. Insufficient professional development opportunities and recognition of accomplishments hinder teachers' growth and motivation. Monotonous or non-challenging tasks decrease job satisfaction among teachers. Designing tasks that are more engaging and meaningful is a challenge. Limited autonomy and creativity in instructional approaches reduce job satisfaction (Kutsyuruba et al., 2019). The inability to pursue personal and professional growth leads to dissatisfaction among teachers. Therefore, providing opportunities for continuous learning and skill development is crucial. However, limited access to professional development resources and opportunities hinders teachers' growth and satisfaction (Benigno et al., 2018). Moreover, limited career advancement opportunities result in stagnation and frustration. Thus, establishing clear and accessible career advancement opportunities for teachers is challenging. Additionally, insufficient mentorship and guidance for career development hinder teachers' professional growth (Sohail et al., 2023). It is worth noting that different leadership styles impact teachers' motivation and satisfaction. Autocratic leadership stifles creativity and collaboration, while laissez-faire leadership leads to confusion and dissatisfaction. Balancing decision-making with input from teachers is a challenge in democratic leadership. Therefore, implementing and sustaining transformative changes are required for transformational leadership (Knighton & Sciences, 2022). Lastly, there are gaps in these leadership styles, such as limited communication channels between teachers and administrators, inconsistent expectations and unclear communication, and limited mechanisms for involving teachers in decision-making processes. Addressing these challenges and gaps is crucial for enhancing teachers' motivation, job satisfaction, and performance. By providing fair compensation, acknowledging teachers' contributions, balancing workload, improving working conditions, offering opportunities for professional and student success, designing engaging tasks, promoting personal and professional growth, providing career advancement opportunities, and implementing effective leadership styles, we can create an

environment where teachers feel valued, supported, and motivated to excel in their vital role of shaping the future through education.

Motivation is crucial for teacher performance and retention, especially during the pandemic. Motivated educators engage in innovative teaching practices, create positive classroom environments, and stay committed to their profession (Adarkwah, 2023). The shift towards flexible teaching models and technology integration underscores the need to understand factors influencing teacher motivation. Countries prioritizing teacher motivation through supportive policies, professional development, and adequate funding see improved educational outcomes, higher teacher satisfaction, and better retention rates (Zhang & Zou, 2024). This results in a stable, effective workforce capable of addressing students' diverse needs. International studies reveal that factors like professional autonomy, recognition, and career advancement opportunities significantly influence teacher motivation. Policymakers can leverage this information to create targeted interventions that enhance the educational system (Scales et al., 2020). In the Philippines, understanding teacher motivation is critical due to challenges like large class sizes, limited resources, and inconsistent support for educators. While the Department of Education acknowledges the importance of teacher well-being and motivation, more comprehensive research is needed to explore the specific sources of motivation for Filipino teachers (Tomas et al., 2021). Recent initiatives aimed at improving teacher welfare, such as professional development and mental health support, show a growing recognition of this need. However, there is still a gap in understanding how these initiatives align with teachers' actual motivations (Cann et al., 2024).

Hence, this research aims to identify and describe the various sources of motivation among secondary teachers. It contributes to the existing literature on teacher motivation by examining the diverse sources of motivation among secondary teachers in the Philippines. Unlike previous studies that broadly categorize motivation into intrinsic and extrinsic factors, this research focuses on specific contextual and cultural influences within the educational landscape. Key findings include the impact of local socio-economic conditions, educational policies, and community expectations on motivation—areas that are often overlooked in existing literature. The study also emphasizes the importance of mental health and professional development in motivating teachers, providing insights for targeted interventions and policy decisions to enhance teacher welfare. By highlighting teachers' voices and their lived experiences, the research adds qualitative data that contrasts with the often-ignored subjective dimensions in

quantitative studies. Moreover, this study sheds light on the diverse sources of motivation among secondary teachers, revealing the complexities of their engagement and retention. Key motivators such as mental health and professional development offer valuable insights for policymakers, who can prioritize training programs and wellness initiatives. Additionally, the study's characterization of motivation sources lays the groundwork for future research, exploring how these factors influence teacher performance and student achievement, and consequently informing educational practices and policies.

2. METHODOLOGY

Research Design

This study adopted a descriptive exploratory research design that is useful in summarizing the data set utilizing multivariate factor analysis and a *K*-means clustering approach. These statistical treatments were applied to transform available data into meaningful insights, aiming to characterize secondary teachers in terms of their source of motivation in their teaching environment. Figure 1 presents the schematic diagram of the data extraction and analysis.
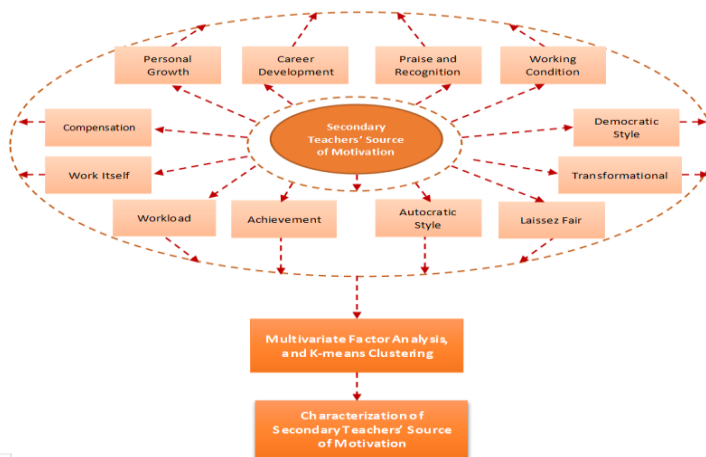

Figure 1. Schematic diagram

Respondents, Sampling, and Ethics

The target population of this study is the secondary teachers of Baybay City, Leyte, Philippines. The place was chosen since no studies have been conducted yet regarding secondary teachers' well-being and their teaching

productivity. In addition, the Human Resource Management of Baybay City division office record portrayed that 5.26% of the teachers resigned in the academic year 2022. Hence, the researchers were inspired to investigate the level of motivation in teaching at the secondary level to understand its phenomenon and recommend policies that eradicate teachers' turnover rate. This survey study focuses on three schools, particularly in District 6 in Baybay City, where the research enumerator can easily collect the data at their convenience. The schools involved in this study are the following: (1) Bitanhuan National High School (NHS), (2) Plaridel NHS, and (3) Punta NHS, as reflected in Table 1. The study employed sampling techniques to address the researchers' resource constraints, specifically utilizing Cochran's equation and a population correction to obtain the required sample size. The researchers set the confidence level at 95%, the precision level at ±7%, and the estimated proportion at 0.5% to be as minimal as possible, ensuring that the results accurately represent the population of interest with a higher confidence level (Kotrlik & Higgins, 2001). In this case, the total sample size involved in the study is 43 secondary teachers. After this, each NHS's sample size was proportionally divided, and simple random sampling was employed. Table 1 depicts the distribution of respondents in each NHS.

Table 1. Distribution of respondents in District 6 Baybay City.

National High Schools	Actual Number of Teachers	Respondent
Bitanhuan	18	14
Plaridel	31	25
Punta	5	4
Total	**54**	**43**

Before the survey was conducted, a letter of permission was given to the Division's Office of Baybay City indicating the purpose of the research study. Fortunately, the division head approved the formal request. After that, formal letters of consent were sent to the principal office of the three targeted NHS. When the request was approved, the teachers involved in the study were oriented about the purpose and significance of the study. Moreover, respondents were informed that the survey does not contain sensitive content that may harm their reputation. Furthermore, respondents were educated that their participation in the survey was

voluntary, and data gathered would be strictly confidential following the Data Privacy Act in the Philippines, which was used only for this article study.

Research Instrument and Data Gathering Process

This study used a self-developed structured questionnaire to collect cross-sectional and primary data from the secondary teachers. The questionnaire's content is based on the different sources in the literature that dealt with the teachers' motivation and its source. Revisiting some current literature on well-being in teaching, the researchers identified 12 various possible sources of motivation (Casinillo & Casinillo, 2021; de Brabander & Glastra, 2021; Yildiz & Kiliç, 2021; Alvariñas-Villaverde et al., 2022; Casinillo & Suarez, 2022; Panadero et al., 2022; Nalipay et al., 2023). Hence, the said motivation questionnaire contains the following: (1) "compensation" - refers to the salary and benefits (3-item question); (2) "praise and recognition" - refers to the awards and proper recognition for the job well done (3-item question); (3) "workload" - refers to the job assignment and task as a teacher (3-item question); (4) "working conditions" - refers to the school environment and social relationship with other teachers and school heads (4-item question); (5) "achievement" - refers to the accomplishment of the assigned task in which correlates as fulfilling and meaningful (3-item question); (6) - "work itself" - refers to the satisfaction and happiness as a teacher (3-item question); (7) "personal growth" - refers to the personal improvement and maturity as being a teacher (3-item question); (8) "career development" - refers to the advancement of professionalism and career goals (3-item question); (9) "autocratic Style" - refers to the authority of the school heads (2-item question); (10) "laissez faire" - refers to the dealings of school heads to the teachers (2-item question); (11) "democratic style" - refers to the initiative of the school heads that values the opinion of teachers (2-item question); and (12) "transformational" - refers to the effectiveness of the school heads in progressing the efficiency and productivity of the institution (2-item question).

The teachers were asked to rate each question on a 5-point scale, indicating one is the lowest (not motivated) and five is the highest (very motivated). Table 2 below presents a scale that measures teachers' perception of their motivation source. A score between 1.00 and 1.80 indicates strong disagreement and suggests that teachers are not motivated. Teachers may lack the drive or enthusiasm to perform their duties effectively within this score range. A score between 1.81 and 2.60 indicates disagreement and suggests that teachers are only slightly motivated. Teachers may have some motivation within this range, but it is not strong enough

Work itself	3	0.297	0.642
Personal growth	3	0.359	0.779
Career development	3	0.298	0.774
Autocratic style	2	0.473	0.879
Laissez fair	2	0.542	0.901
Democratic style	2	0.493	0.838
Transformational	2	0.716	0.909

Data Analysis

When the desired data were all collected, it was encoded to Microsoft Excel and underwent clearing by removing missing data and outliers. Additionally, the encoded data were then formatted for statistical software. The data were summarized and described using descriptive statistics such as ranking, average mean (M), and standard deviation (SD) as measures of dispersion. Moreover, multivariate factor analysis was utilized to consolidate variables and derive conceptual frameworks from the identified factors concerning the source of motivation among secondary teachers. The covariance matrix was extracted, and factors were rotated using principal component analysis (PCA) with varimax rotation. PCA is used in this study since it focuses on the descriptive aspect of the data which is appropriately needed to answer the research objectives. Factor analysis was employed to group variables and form factors. These factors are computed by multiplying the factor loadings of the variables on a factor. Identifying the number of factors to be extracted is crucial for obtaining meaningful results. In this study, the Scree plot was utilized to determine the number of factors, with the "elbow" indicating the optimal number. Subsequently, *K*-means cluster analysis was employed to group secondary teachers based on the twelve variables affecting the motivation of secondary teachers. The researchers used STATA version 14.0 for descriptive statistics and Minitab 16 to implement multivariate factor analysis. For *K*-means cluster analysis, we utilized Python with the *sklearn* library. All statistical results were presented in a tabular form and interpreted accordingly.

3. RESULTS AND DISCUSSION

Descriptive Statistics

Table 4 below presents the mean scores, standard deviations, and descriptions of various sources of motivation for secondary teachers. These sources of motivation are ranked based on their mean scores. Achievement is the highest-ranking source of motivation for secondary teachers, with a mean score of 4.04. It signifies the sense of accomplishment and success teachers derive from their work. The work is another highly motivating factor, with a mean score of 4.02, indicating that teachers find intrinsic satisfaction and enjoyment in their teaching responsibilities. With a mean score of 3.98, secondary teachers perceive working conditions as motivating. This includes factors such as the physical environment, resources, and teacher support. Opportunities for personal growth, such as professional development, learning, and skill enhancement, also motivate secondary teachers, as indicated by a mean score of 3.75. Career development, with a mean score of 3.74, is a motivating factor for secondary teachers. This includes opportunities for advancement, promotion, and professional growth. Although ranking lower with a mean score of 3.68, secondary teachers still perceive compensation as a motivating factor. This includes salary, benefits, and other financial rewards.

With a mean score of 3.63, transformational leadership motivates teachers through vision, charisma, and the ability to empower others. Despite ranking lower with a mean score of 3.59, autocratic leadership is still perceived as motivating. This style involves a more directive and controlling approach to leadership. Both laissez-faire and democratic leadership styles have the same mean score of 3.51, suggesting that they moderately motivate secondary teachers. Laissez-faire leadership involves minimal interference, while democratic leadership involves shared decision-making. Secondary teachers find moderate motivation in praise and recognition, with a mean score of 3.37. This includes acknowledgment and appreciation for their efforts and achievements. Workload, with a mean score of 3.33, is perceived as moderately motivating and refers to the amount and intensity of work teachers are expected to handle.

The study highlights that achievement and work are the primary motivators for secondary teachers. Therefore, offering opportunities for accomplishment and success in their roles can significantly increase levels of motivation. Additionally, the research emphasizes the importance of working conditions, including the physical environment, available resources, and support systems, as key factors in motivating teachers (Ndijuye & Tandika, 2019). By improving these conditions, we can enhance teacher motivation and job satisfaction, ultimately cultivating a more effective and dedicated teaching

workforce. This aligns with the findings of Billingsley and Bettini (2019) who argue that supportive working conditions are crucial for teacher satisfaction and retention. Consequently, enhancing these conditions can lead to greater teacher motivation and job satisfaction, fostering a more effective and dedicated teaching workforce.

Furthermore, the study emphasizes the importance of personal growth opportunities, such as professional development and skill enhancement, in motivating secondary teachers. Providing avenues for continuous learning and growth can help sustain their motivation. Career development, including opportunities for advancement and promotion, is also seen as a motivating factor (Orina et al., 2022). Offering clear pathways for professional growth can enhance teacher motivation and retention. Although compensation ranks lower as a motivating factor, it is still perceived as important. Ensuring competitive salaries, benefits, and financial rewards can contribute to teacher motivation (See et al., 2020). The study also provides valuable insights into the factors that drive teacher motivation. It highlights the significance of intrinsic motivation factors, such as achievement and the work itself, in motivating teachers. This suggests that fostering a sense of purpose and enjoyment in teaching can significantly impact teacher motivation. Transformational leadership, characterized by vision, charisma, and empowerment, is perceived as motivating. This implies that school leaders who exhibit these qualities can positively influence teacher motivation. Although ranking lower, autocratic leadership is still motivating, indicating that some teachers may respond positively to a more directive and controlling leadership style. Both laissez-faire and democratic leadership styles have similar moderate levels of motivation, suggesting that a balance between minimal interference and shared decision-making can effectively motivate secondary teachers.

Praise and recognition, as well as workload management, are also perceived as moderately motivating factors. Acknowledging teachers' efforts and ensuring a manageable workload can contribute to their motivation levels. Based on the findings, several inferences can be made. A multifaceted approach is needed to enhance teacher motivation, addressing intrinsic factors (achievement, work itself) and extrinsic factors (working conditions, compensation) and leadership styles. The study suggests combining transformational and autocratic leadership styles may effectively motivate teachers, as both positively correlated with motivation. The moderate motivation levels associated with laissez-faire and democratic leadership styles indicate that a balance between autonomy and

shared decision-making is vital for teacher motivation. In terms of future research, several areas can be explored.

Further investigation into the relationship between teacher motivation and student outcomes can provide valuable insights for educational policymakers. Understanding how teacher motivation impacts student achievement can inform strategies to improve educational outcomes. Additionally, studying the role of organizational culture and climate in teacher motivation can provide a deeper understanding of the contextual factors that influence motivation levels. Exploring the impact of different leadership styles on teacher motivation in different cultural and educational contexts can help identify effective leadership practices. Lastly, examining the role of intrinsic and extrinsic motivation in teacher retention and job satisfaction can contribute to strategies for improving teacher recruitment and retention rates.

Table 4. Secondary teachers' source of motivation.

Source of motivation	Mean	SD	Description	Rank
Compensation	3.68	0.88	Motivated	6
Praise and Recognition	3.37	0.81	Moderately motivated	11
Workload	3.33	0.90	Moderately motivated	12
Working condition	3.98	0.56	Motivated	3
Achievement	4.04	0.69	Motivated	1
Work itself	4.02	0.68	Motivated	2
Personal growth	3.75	0.67	Motivated	4
Career development	3.74	0.62	Motivated	5
Autocratic style	3.59	0.73	Motivated	8
Laissez fair	3.51	0.78	Motivated	9.5
Democratic style	3.51	0.77	Motivated	9.5
Transformational	3.63	0.89	Motivated	7
Total	**3.74**	**0.54**	**Motivated**	-

Factor Analysis

The following results present the factor analysis on the source of motivation among secondary teachers in terms of "compensation," "praise and recognition," "workload," "working condition," "achievement," "work itself,"

"personal growth," "career development," "autocratic style," "laissez fair," "democratic style," and "transformational." Figure 2 suggests that the optimal number of factors to be extracted is two (2), implying that the source of motivation for secondary teachers can be characterized into two distinct factors. These findings imply that secondary teachers' motivation can be distilled into two main categories, which can streamline efforts to enhance teacher engagement. By understanding these key motivational factors, educational leaders can design targeted interventions to improve teacher satisfaction and performance. Existing literature supports the significance of motivational factors. For example, Herzberg's Two-Factor Theory differentiates between hygiene factors (e.g., working conditions, compensation) and motivators (e.g., achievement, recognition) in relation to job satisfaction and motivation (Koncar et al., 2022). On the other hand, some perspectives argue that motivation is multifaceted and cannot be easily classified. Self-Determination Theory suggests that motivation arises from the interplay of autonomy, competence, and relatedness, indicating a more complex structure than just two factors. This viewpoint challenges the reductionist approach implied by factor analysis (van Egmond et al., 2020). The implication of two distinct motivational factors in this study provides a focused framework for educational policymakers and administrators. By emphasizing key motivators such as compensation, recognition, and working conditions, more effective strategies can be developed for teacher retention and satisfaction. However, it is important to acknowledge the complexity of motivational theories to avoid oversimplification and ensure comprehensive approaches in educational policy and practice.
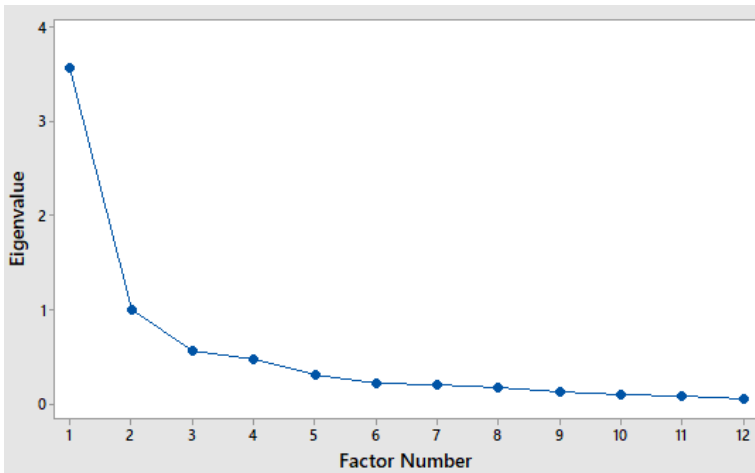
Figure 1. Scree plot of the number of factors.

The set of variables 1 to 8 displays relatively high positive loadings on Factor 1 and relatively low loadings on Factor 2, as presented in Table 5. This indicates that the first eight variables are more associated with each other (Tavakol & Wetzel, 2020). And these 1 to 8 variables are linked to the personal motivation of secondary teachers. Personal sources of motivation are components in a teaching career that teachers can be benefited such as "compensation," "praise and recognition," "workload," "working condition," "achievement," "work itself," "personal growth," and "career development" (Orina et al., 2022). These results imply that the primary drivers of secondary teachers' motivation are intrinsically personal factors. This insight can guide educational leaders in developing policies and interventions that focus on enhancing personal motivation, such as professional development opportunities, recognition programs, and supportive working conditions. Addressing these personal motivators can lead to increased job satisfaction, retention, and overall teacher effectiveness. Research supports the importance of intrinsic motivation in education. Herzberg's Two-Factor Theory identifies intrinsic factors like achievement, recognition, and work itself as key to job satisfaction (Bukhari et al., 2021). Similarly, Self-Determination Theory emphasizes that intrinsic motivators such as autonomy, competence, and relatedness are crucial for maintaining motivation and job satisfaction (Srivastava et al., 2022). Contrary viewpoints suggest that extrinsic factors play a more significant role in teacher motivation than personal or intrinsic factors. For

example, studies by Van den Broeck et al. (2021) argue that external rewards, such as salary and job security, are more influential in motivating teachers. This perspective challenges the emphasis on personal motivation and suggests that a balance of both intrinsic and extrinsic motivators is necessary for comprehensive motivational strategies.

Competitive compensation packages acknowledge the importance of teachers, alleviating financial burdens and allowing them to focus on teaching (Ryan & Deci, 2020). Career advancement prospects and specialized training contribute to long-term motivation, while professional development opportunities, awards, and positive feedback reinforce teachers' sense of achievement. Workload and working conditions also have a significant impact on teacher motivation. Managing workloads and providing conducive environments empower educators to concentrate on their primary goal of student education. The availability of resources and support positively influences motivation and teaching excellence (Gas-ib & Sannadan, 2023). Pursuing achievement for students and teachers is a powerful motivator, emphasizing the importance of personal growth and career development for sustained teacher motivation (Ndijuye & Tandika, 2019).

Meanwhile, variables 9 to 12 exhibit higher factor loadings in Factor 2 than in Factor 1. Hence, it implies that 9 to 12 variables are associated with each other, identified as leadership motivation. These findings suggest that leadership-related factors significantly influence secondary teachers' motivation. Policymakers should focus on enhancing leadership qualities within schools, such as promoting transformational leadership practices, providing leadership training for administrators, and fostering a supportive and inclusive school culture. Strengthening leadership motivation can lead to a more motivated and effective teaching workforce, improved teacher morale, and better educational outcomes. Existing research highlights the importance of leadership in teacher motivation. Pellegrini et al. (2020) found that transformational leadership positively impacts teachers' commitment and motivation. Additionally, the effective leadership practices, such as providing vision and support, are crucial for enhancing motivation and job satisfaction among teachers. Contrary perspectives argue that teacher motivation is primarily driven by individual and task-related factors rather than leadership. For instance, Heffernan et al. (2022) points out that issues like workload, compensation, and working conditions are more critical in influencing teacher motivation and retention. This viewpoint suggests that while

leadership is important, focusing solely on leadership-related factors may overlook other crucial elements that impact teacher motivation.

Leadership styles, ranging from hindering autocratic to inspiring democratic and transformational styles, play a pivotal role in shaping the motivational landscape (Paais & Pattiruhu, 2020). Addressing these factors can create an environment where teachers feel valued, supported, and motivated to excel in shaping the future through education (Casinillo & Suarez, 2021). A combination of competitive compensation, manageable workloads, professional development opportunities, recognition, and effective leadership styles synergistically contributes to heightened teacher motivation and job satisfaction (Wang, 2024). These results are well-explained through factor analysis, showing a cumulative variance of 66.8%. These two factors are visualized in Figure 3, illustrating how the variables are related to the identified factors.

Table 5. Factor analysis for the teachers' source of motivation.

| Variable	Factor 1	Factor 2	Communality
Compensation	0.685	0.115	0.482
Praise and Recognition	0.598	0.212	0.403
Workload	0.634	0.421	0.579
Working condition	0.278	0.190	0.113
Achievement	0.544	0.138	0.315
Work itself	0.538	0.036	0.291
Personal growth	0.521	0.161	0.297
Career development	0.312	0.197	0.136
Autocratic style	0.222	0.621	0.435
Laissez fair	0.056	0.600	0.364
Democratic style	0.234	0.681	0.519
Transformational	0.236	0.767	0.643
Variance	2.422	2.154	4.576
% Variance	**35.3**	**31.4**	**66.8**
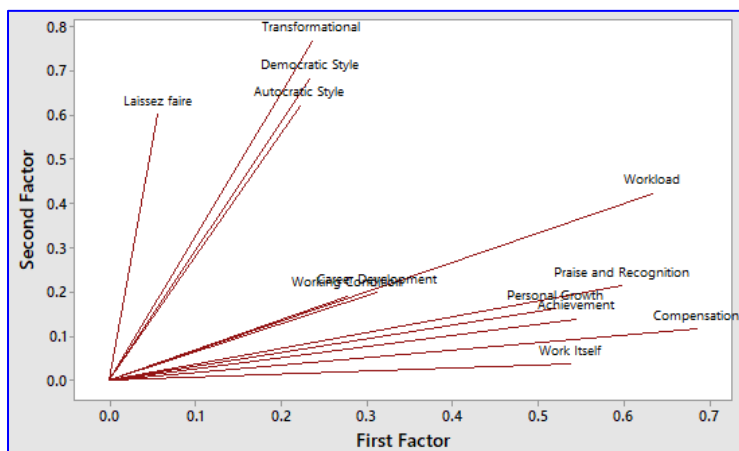
Figure 2. Loading plot of factors.

K-means Clustering

Moreover, the subsequent findings illustrate the multivariate cluster analysis, considering the twelve variables that affect the motivation of secondary teachers. Both the Elbow curve and Silhouette analysis in Figure 4 suggest that the optimal number of clusters for the dataset is two (2). The Elbow curve exhibits a distinct 'elbow' at $K = 2$, indicating a deceleration in the decrease of within-cluster sum of squares (WCSS). Additionally, Silhouette analysis supports this observation, achieving the highest average silhouette score of 0.299 at $K = 2$, emphasizing well-defined clusters with minimal overlap and robust internal cohesion. Additionally, these results imply that secondary teachers can be grouped into two distinct motivational clusters. Policymakers should tailor interventions to address the specific needs of each cluster. For instance, one cluster might benefit more from personal growth opportunities, while the other might need better working conditions or leadership support. By customizing policies and programs to target these specific groups, educational leaders can more effectively enhance teacher motivation and job satisfaction. The identification of distinct motivational clusters aligns with existing research on teacher motivation. Jeon (2021) found that teachers' motivations and job satisfaction could be grouped into different categories, each requiring unique strategies for improvement. Additionally, the importance of recognizing diverse motivational needs among

teachers to implement effective professional development and support programs. However, the cluster analysis approach, some researchers argue for a more individualized understanding of teacher motivation. For example, Muhammadin and Herda (2024).Self-Determination Theory posits that motivation arises from individual psychological needs for autonomy, competence, and relatedness. This perspective suggests that grouping teachers into clusters might overlook individual differences and nuances in motivation, advocating instead for personalized motivational strategies.
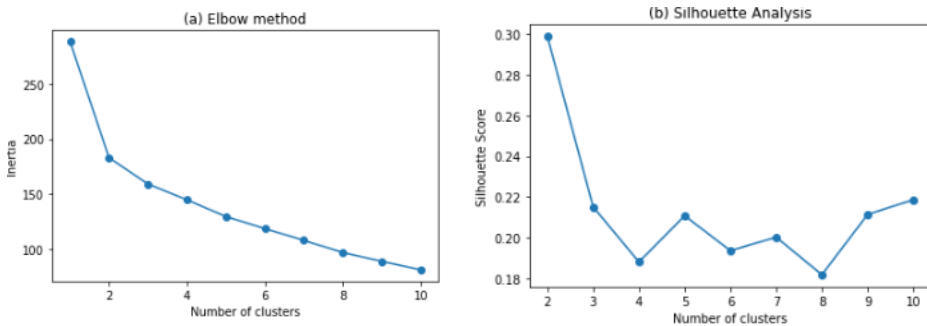

Figure 3. The optimal number of clusters.

Table 6 indicates the number of secondary teachers belonging to each cluster. The clustering of secondary teachers was determined based on their similarities in these twelve variables such as "compensation," "praise and recognition," "workload," "working condition," "achievement," "work itself," "personal growth," "career development," "autocratic style," "laissez fair," "democratic style," and "transformational." Cluster 1 comprises 19 teachers, while Cluster 2 consists of 24 teachers. These findings imply the need for differentiated policies tailored to the distinct clusters of teachers. For Cluster 1, which might prioritize personal growth and career development, policies could focus on professional development opportunities and mentorship programs. For Cluster 2, which may emphasize working conditions and leadership styles, improving the physical work environment and promoting effective leadership practices could be key. Understanding these clusters enables targeted interventions that address the specific motivational needs of different teacher groups, ultimately enhancing job satisfaction and retention. Research supports the effectiveness of tailored

approaches to teacher motivation. Darling-Hammond et al. (2020) found that teachers' job satisfaction and motivation can be categorized into distinct groups, each requiring unique support strategies. Similarly, the importance of recognizing diverse motivational needs among teachers to design effective professional development programs. Conversely, some researchers argue for a more individualized approach to understanding and addressing teacher motivation. Louick et al. (2019) Self-Determination Theory posits that motivation is driven by individual psychological needs for autonomy, competence, and relatedness. This perspective suggests that while clustering can provide useful insights, it might oversimplify the complex and individualized nature of teacher motivation, advocating instead for personalized strategies that cater to individual teachers' unique needs and circumstances.

Table 6. Final partition.

Cluster	Number of Observations	Percentage (%)	Within Cluster Sum of Squares	Average Distance from Centroid	Maximum distance from Centroid
1	19	44.19	95.518	2.174	3.159
2	24	55.81	86.729	1.738	3.301

Table 7 displays the cluster centroids for the twelve variables of interest, representing the average values within each cluster. The analysis indicates that Cluster 1 exhibits lower personal and leadership motivation. In contrast, Cluster 2 demonstrates the highest personal and leadership motivation. Cluster 1 can be characterized as comprising teachers with a low level of motivation, while Cluster 2 is linked to teachers with a higher level of motivation. This implies that there are secondary teachers who are not motivated (Cluster 1: 44.19%) in their current situation. These are teachers who are unsatisfied with their job, and the source of motivation does not influence their well-being. According to Malquisto et al. (2023), teachers experienced burnout and were unmotivated because of heavy workloads, a not conducive environment, small salaries, and few benefits. Likewise, Casinillo et al. (2020) portrayed that teachers are unhappy if the institution's administration has poor management skills

On the other hand, cluster 2 depicts teachers who are highly motivated in their teaching careers. In that case, their motivation is influenced by a combination of personal benefits and leadership management of their school, which drive their commitment and dedication to the teaching profession. A deep passion for

education drives teachers to find intrinsic motivation in witnessing their students overcome challenges and thrive academically (Mérida-López et al., 2022; Katsarou et al., 2023). Motivated teachers bring enthusiasm for their subject matter and create a positive and engaging learning environment, imbuing their role as knowledge facilitators with a sense of purpose (Sutrisni et al., 2021; Kun & Gadanecz, 2022; Solania et al., 2023). These discernible clusters are visually depicted in the plot shown in Figure 5.

Additionally, these findings imply a need for targeted interventions to address the specific motivational challenges faced by Cluster 1. Educational leaders and policymakers should develop strategies to boost both personal and leadership motivation for this group, such as implementing mentorship programs, offering professional development opportunities, and improving working conditions. For Cluster 2, maintaining and enhancing their high motivation levels through recognition programs, career advancement opportunities, and supportive leadership practices is essential. Tailoring approaches to the distinct needs of each cluster can lead to a more motivated and effective teaching workforce. Research supports the notion that tailored interventions can effectively address varied motivational needs. Niskala et al. (2020).found that different groups of teachers require distinct support strategies to enhance job satisfaction and motivation.

Additionally, the impact of transformational leadership on increasing teacher motivation, highlighting the importance of leadership in Cluster 2. Opposing viewpoints suggest that teacher motivation should be addressed on an individual basis rather than through clustering. Louick et al. (2019) Self-Determination Theory posits that motivation is driven by individual needs for autonomy, competence, and relatedness, advocating for personalized strategies that cater to unique motivational factors. This perspective argues that clustering might oversimplify the complex nature of motivation and that individual-focused interventions may be more effective in addressing specific motivational needs.

Table 7. Cluster centroids.

Variable	Cluster 1	Cluster 2	Grand Centroid
Compensation	3.0877	4.1528	3.6822
Praise and Recognition	2.7544	3.8750	3.3798
Workload	2.6667	3.8472	3.3256
Working condition	3.6053	4.1563	3.9128
Achievement	3.6140	4.3750	4.0388

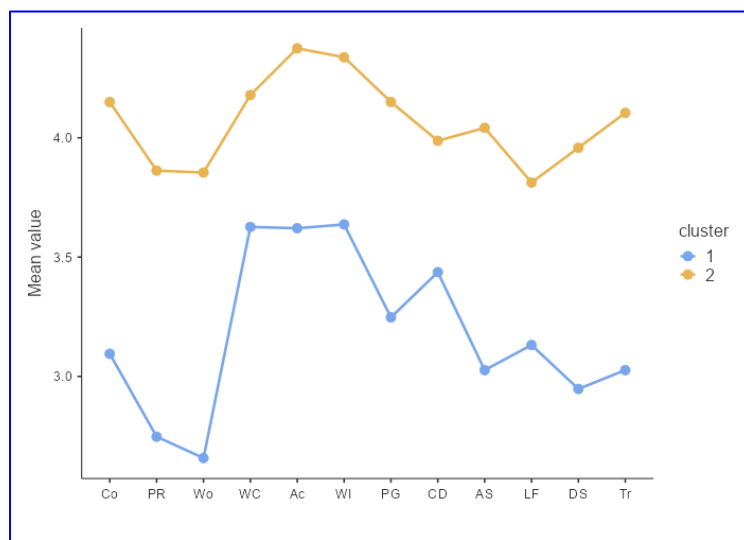| Work itself	3.6316	4.3333	4.0233
Personal growth	3.2456	4.1528	3.7519
Career development	3.4386	3.9861	3.7442
Autocratic style	3.0263	4.0417	3.5930
Laissez fair	3.1316	3.8125	3.5116
Democratic style	2.9474	3.9583	3.5116
Transformational	3.0263	4.1042	3.6279

Figure 4. Plot of means across clusters.

4.   CONCLUSION

The study quantifies teacher motivation among secondary teachers and categorizes the sources of motivation into personal benefits and school leadership management. The findings highlight the complex interplay between intrinsic and extrinsic motivational factors. The use of K-means clustering reveals a mix of low and high motivation levels among teachers. The implications for policy and practice emphasize the need for a dual approach that incorporates both personal benefits and effective management practices. Policies should address intrinsic

rewards, such as professional growth opportunities, and extrinsic rewards, including supportive leadership. Fostering an environment that emphasizes professional development can enhance teachers' sense of competence and career satisfaction. Establishing a supportive leadership framework can ensure that teachers feel valued and supported. This comprehensive strategy acknowledges the interplay between intrinsic and extrinsic factors and aims to sustain high levels of teacher motivation. Targeted interventions based on identified motivational profiles can further refine policies and provide appropriate support to lower and higher-motivated teachers. Implementing policies that effectively balance motivational aspects can significantly enhance teacher engagement, performance, and overall educational quality. This research contributes to the existing literature by providing empirical evidence on the effectiveness of integrated motivational strategies in educational settings and offers a framework for future policy development. The study underscores the importance of personalized motivational strategies and paves the way for further research on the causal relationships between motivational factors and teacher performance. Future studies should explore the long-term impacts of targeted interventions on educational outcomes and provide insights into how these strategies influence teacher engagement and student achievement over time. This research provides a robust framework for developing more effective motivational policies and practices, enhancing educational quality and teacher satisfaction. Further research can refine our understanding of teacher motivation and its implications for educational success.
 This study strongly recommends that to improve teaching motivation and satisfaction as correlates to productivity, the administration must increase teachers' benefits, provide incentives, and implement policies that enhance their well-being. Based on Descriptive Statistics and Factor Analysis, it is recommended that schools promote personal benefits, such as competitive salaries and opportunities for personal growth, as they are a significant source of motivation. Strengthening school leadership through investment in leadership development programs is also crucial. Tailoring professional development programs to address both motivation factors can enhance teacher motivation. Regular monitoring systems should be implemented to track teachers' motivation levels and adjust policies accordingly. Schools should foster a supportive environment that values teachers. Future research could include longitudinal studies to track changes in teacher motivation, qualitative studies for deeper insights, comparative studies across different educational systems, and intervention studies to measure the effectiveness of specific strategies. Expanding the factor analysis model to include

additional motivational factors could provide a more comprehensive understanding of teacher motivation.

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