Strategies to Improve Morale and Retention in Transportation Management Centers

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Abstract

This study examines strategies to improve morale and retention for operators in transportation management centers (TMCs). The research methodology included a literature review, on-site observations of TMC operations, and interviews with operators and managers. Several strategies to reduce turnover were identified, including (1) formalizing a process for operators to report software issues; (2) enhancing the prestige of performance awards; (3) improving compensation in terms of both hourly wages, timing of raises to occur during periods of high turnover at the one- or two-year employment mark; and (4) improving the TMC work environment by limiting the use of conference rooms overlooking the TMC floor. These findings contribute to the understanding of TMC operations and offer potential strategies for improving operator morale and retention, which may ultimately enhance the efficiency and effectiveness of traffic management operations.

INTRODUCTION

Transportation management centers (TMCs) play a crucial role in modern traffic management systems. These centers operate 24/7, responding to a variety of traffic situations including recurring and non-recurring congestion, incidents, work zones, and special events. Staff in TMCs, called operators, are crucial to managing road operations, simultaneously monitoring multiple data streams, interacting with various stakeholders, and making critical decisions that impact traffic flow and safety.

Despite their importance, TMCs face significant challenges in operator workload management and staff retention. Operators often juggle multiple tasks, including monitoring traffic cameras, computer-aided dispatch feeds, radio communications, various sensors, and crowdsourced data from platforms like Google Maps and Waze. This high-stress environment, combined with the demands of shift work, can lead to operator fatigue, decreased job satisfaction, and high turnover rates.

While extensive research has been conducted on workload and fatigue management in fields such as air traffic control and rail dispatch, there is a notable gap in literature specifically addressing these issues in transportation management centers. This study aims to bridge this gap by focusing on three key areas: data management, employee retention, and scheduling practices in TMCs.

Drawing on interviews conducted across multiple TMCs, this paper explores how operators monitor and manage incoming data, investigates the factors influencing employee retention in this unique work environment, and examines scheduling practices that impact operator performance and satisfaction. By analyzing these aspects, the strategies that can mitigate operator workload, improve job satisfaction, and ultimately enhance the efficiency and effectiveness of TMC operations are identified.

The findings and recommendations presented in this paper are intended to provide insights for TMC managers, transportation agencies, and policymakers, contributing to the ongoing efforts to optimize traffic management operations in an increasingly complex transportation landscape.

LITERATURE REVIEW

This review examines two critical aspects affecting TMC operations: employee retention and scheduling/staffing practices.

Employee Retention

Multiple studies have identified key factors influencing employee retention across industries. Das and Barauh (2013) conducted a comprehensive literature review, highlighting several critical elements:

1. Compensation and rewards: Fair and competitive pay, along with recognition for good work, significantly impact retention.
2. Career growth opportunities: Employees value chances for promotion, advancement, and skill development.
3. Work-life balance: Flexible work arrangements and supportive policies contribute to retention.
4. Work environment: A positive, supportive work culture and physical environment are crucial.

5. Training and development: Investment in employee learning and growth helps retain talent.
6. Leadership and supervision: Good relationships with managers and effective leadership practices affect retention.
7. Job security: Employees are more likely to stay when they feel their jobs are secure.
8. Participation in decision-making: Involving employees in decisions creates a sense of ownership and belonging.
9. Job satisfaction: Overall job satisfaction is strongly linked to retention.

Kossivi et al. (2016) conducted a similar review, reinforcing many of these findings while also emphasizing the importance of autonomy and social support in retention strategies.

Singh (2019) identified recent trends in retention strategies, including the adoption of sustainable human resource management practices, hiring dedicated retention specialists, and adapting to the "gig economy" with more flexible work arrangements.

Scheduling and Staffing

The impact of work schedules on retention has been a focus of several studies. Martin et al. (2012) examined the retail industry and found that employees working nonstandard shifts (afternoons, nights, or mixed shifts) had significantly higher turnover rates compared to those on standard day shifts. Their study also quantified the impact of wages on retention, finding that a one standard deviation increase in hourly wages was equivalent to a 28% increase in retention rates.

Bolino et al. (2021) reviewed literature on nonstandard work schedules, finding that such schedules can lead to decreased job performance, increased absenteeism and turnover, lower job satisfaction, and reduced work engagement. They suggest increasing schedule predictability and employee control over schedules as potential mitigation strategies.

In the context of 24/7 operations, Gertler et al. (2004) studied staffing levels at railroad dispatching centers. They estimated a "shift relief factor" between 1.5 and 1.8, indicating that centers should have 1.5-1.8 times more employees than the number of position-shifts on a given day to adequately cover all necessary shifts.

Summary

The literature suggests that employee retention is influenced by multiple factors, including compensation, career growth opportunities, work-life balance, positive work environment, training and development, effective leadership, job security, and employee participation in decision-making. Studies on nonstandard work schedules reveal their significant impact on job performance, satisfaction, and turnover rates, with employees working nonstandard shifts or weekends showing higher turnover risks. To address these challenges, organizations are advised to increase schedule predictability, consider individual preferences in shift assignments, and potentially offer higher compensation for less desirable shifts.

METHODOLOGY

This study employed a multi-faceted approach to investigate strategies for mitigating workload and improving retention in TMCs. The research methodology used qualitative methods to provide a comprehensive understanding of the challenges and potential solutions in TMC operations.

A key component of the research involved in-depth, semi-structured interviews with TMC operators and managers at five TMCs operated by the Virginia Department of Transportation (VDOT), as well as representatives from Georgia DOT and North Carolina DOT. These interviews explored various aspects of TMC operations, including data feed utilization and management, operator workload and stress factors, shift scheduling practices and preferences, compensation and career development opportunities, and factors affecting job satisfaction and retention.

On-site observations were conducted on-site observations at five TMCs in Virginia. These observations took place during various shifts, including peak and off-peak hours, providing firsthand insight into operator tasks and workflows, data management practices, workplace environment and ergonomics, and real-time decision-making processes.

The study also incorporated a comparative analysis component, where data and practices from the observed TMCs were compared with information gathered from other transportation agencies and similar industries. This comparison helped identify common challenges and innovative solutions across different operational contexts, broadening the applicability of the study's findings.

The findings from the literature review and interviews were synthesized to develop a set of best practices and recommendations for TMC operations. These recommendations focused on workload mitigation, retention improvement, and operational efficiency, grounded in both theoretical insights and practical realities of TMC operations.

This comprehensive methodology allowed for a thorough examination of TMC operations from various perspectives, providing a solid foundation for the study's findings and recommendations. The research captured both theoretical insights and practical realities of TMC operations, ensuring the relevance and applicability of its conclusions.

RESULTS AND DISCUSSION

The comprehensive analysis of TMC operations revealed several key areas that significantly impact operator workload, job satisfaction, and retention. This section presents the main findings of the study and discusses their implications for TMC operations and management.

Data Management in TMCs

Operators reported no issues with incoming data but expressed challenges with data output systems. TMC operators primarily rely on computer-aided dispatch (CAD) for incident detection, with other sources such as video feeds, radio communications, and crowdsourced data serving as supplementary inputs. Previous research has shown that in Virginia, CAD is generally faster than Waze for reporting incidents (Goodall and Lee, 2019).

Operators reported significant difficulties with data output systems, particularly in updating traffic management software. Common issues included outdated maps, inability to reflect recent road name changes, and problems with certain intersection types. These challenges often led to the development of informal workarounds by operators, potentially impacting operational efficiency and data accuracy.

While VDOT operators primarily rely on CAD for incident detection, interviews with other state DOTs revealed varied approaches. Georgia, for example, uses automatic incident detection technology for video monitoring, while North Carolina relies heavily on Google Maps and Waze for incident detection.

Compensation and Retention Strategies

The study revealed that operator compensation is a significant factor affecting retention in TMCs. Starting salaries for operators were found to range between $17 and $25 per hour, with higher rates typically offered in high-cost urban areas. Analysis of Bureau of Labor Statistics (2023a, 2023b) data for similar occupations suggested that TMC operator salaries might indeed be below market rates. For instance, as of May 2024, the mean hourly wage for dispatchers in urban transit systems was projected to be $23.42, while customer service representatives earned an average of $20.95 per hour. Table 1 shows the wages of competing industries as of May 2023 and updated based on 3.27% inflation in May 2024.

Table 1. Hourly Wages for Transportation Dispatchers (Bureau of Labor Statistics, 2023a) and Customer Service Representatives (Bureau of Labor Statistics, 2023b)

Industry	Hourly mean wage as of May 2023	Hourly mean wage as of May 2024 (3.27% inflation)
Support Activities for Road Transportation	$18.94	$19.56
Taxi and Limousine Services	$17.05	$17.61
Other Transit and Ground Passenger Transportation	$19.49	$20.13
Urban Transit Systems	$22.68	$23.42
Interurban and Rural Bus Transportation	$22.28	$23.01
Customer Service Representatives	$20.29	$20.95

Other financial incentives played a crucial role in retention. Operators expressed a strong desire for predictable and meaningful holiday bonuses, preferably disbursed early in the holiday season. The perceived value of these bonuses was found to be as important as the actual amount, with bonuses below $150 often viewed as inadequate.

Interviews with other state DOTs revealed similar challenges with compensation. Both Georgia and North Carolina reported starting salaries for operators at approximately $18 per hour, which they acknowledged as a factor in their hiring and retention difficulties.

While increasing wages may seem costly, research suggests it can yield positive returns on investment. A study by Emanuel and Harrington (2020) examining customer service representatives at a Fortune 500 retailer found that wage increases can lead to both reduced turnover and increased productivity. Their analysis showed that a $1 increase in hourly wages (costing $1.30 after taxes) resulted in 1.3 fewer monthly resignations per 100 employees, generating a return of $0.13 from reduced turnover alone. More significantly, the wage increase led to improved worker productivity, yielding an additional return of $1.56. In total, the $1.30 investment produced a $1.69 return, equating to a benefit-cost ratio of 1.3. The study found similar results for warehouse workers, with a benefit-cost ratio of 1.35.

While these findings are from a different industry, they suggest that strategic wage increases for TMC operators could potentially yield positive returns through reduced turnover and enhanced productivity. Further research is needed to confirm if similar effects would be observed in the context of transportation management centers.

Scheduling Practices

The research uncovered diverse scheduling practices across TMCs, each with its own set of challenges and benefits. In Virginia, shift durations varied from 8 to 12 hours, with some centers

employing rotating shifts while others maintained fixed schedules where staff worked the same shift without switching. This diversity in approaches reflects the complex nature of staffing a 24/7 operation and the need to balance operational requirements with employee preferences.

A consistent finding across centers was the difficulty in staffing the evening peak period shifts, which were often the busiest and most stressful. This challenge was exacerbated by the common practice of assigning new operators to these difficult shifts, potentially contributing to early burnout and higher turnover rates among new hires.

Operators expressed a strong preference for predictable schedules, particularly regarding weekends off. Centers that provided consistent weekend schedules reported higher operator satisfaction.

The process for handling short-notice absences varied between centers but was generally reported as a significant source of stress for both operators and managers. Many centers relied on ad-hoc approaches, such as managers calling or texting available operators to find replacements. This practice was often perceived as contentious, with some operators feeling that extra shifts were awarded unfairly, limiting the opportunities for overtime pay. In some cases, operators were required to find their own replacements, which was reported as a major source of frustration.

Staffing holiday shifts was generally not problematic. Operators in Virginia receive 8 hours of holiday pay regardless of whether they work, with those staffing holiday shifts receiving additional pay for hours worked. This policy seemed to effectively incentivize holiday coverage.

Comparisons with other states revealed varied approaches to these challenges. In Georgia, for example, operators work rotating shifts unless they have specifically requested overnight shifts, as overnight shifts were their most difficult to fill. Georgia also has the capability for operators to work from home as needed, with full access to video and traffic operations systems from work-issued laptops. They reported that this flexibility has helped reduce the number of short-notice call-outs.

North Carolina, on the other hand, maintains fixed shifts for operators, with new employees typically starting on the 2nd or 3rd shift as these are the most difficult to fill. They have had success in filling gaps in the schedule by utilizing employees in other regions, as operators at any TMC in the state can operate another region's equipment from their own TMC.

The study also revealed concerns about the lack of formal policies regarding minimum time between shifts. Some operators reported observing colleagues working with as little as 8 hours off between shifts, raising concerns about fatigue and potential impacts on performance and safety.

These findings highlight the complexity of scheduling in a 24/7 operation and the significant impact that scheduling practices can have on operator satisfaction, performance, and retention. They suggest that there may be benefits to developing more formalized, equitable systems for shift assignments and managing short-notice absences. Additionally, the success of flexible approaches like work-from-home options in Georgia indicates potential avenues for improving schedule management while enhancing operator satisfaction.

The diversity of practices observed across different states and centers underscores that there is no one-size-fits-all solution to scheduling challenges in TMCs. However, the common themes of predictability, fairness, and flexibility emerge as key considerations in developing effective scheduling practices.

Workplace Environment and Recognition

The importance of workplace environment and recognition programs emerged as a significant theme, echoed by findings from other state DOTs. In Virginia, a recurring issue was the presence of observation rooms overlooking the operations floor. Many operators reported feeling constantly under surveillance, leading to increased stress levels throughout their shifts. This was particularly problematic when the rooms were used for non-critical meetings or left open unnecessarily.

Recognition programs, especially performance-based awards in the form of small value gift cards, were found to have a significant impact on operator morale. However, the effectiveness of these programs varied based on their implementation. Operators expressed a strong preference for awards presented promptly, publicly, and by senior leadership. Awards given with significant delay or with little fanfare were often perceived negatively, sometimes even counterproductively affecting morale.

The study also revealed a sense of disconnection between contract operators and the broader transportation department. Operators expressed a desire for greater acknowledgment of their role and more direct communication with departmental leadership. Instances where senior VDOT staff personally thanked operators for excellent performance during critical events were recalled fondly and had a lasting positive impact on morale.

These findings align with practices in other states. Georgia DOT, for example, has placed significant emphasis on employee appreciation to improve retention. They've implemented regular family outings, luncheons, and holiday potlucks for their operators. Notably, Georgia found that recognition from senior DOT leadership significantly boosts morale. The contractor who manages TMC operations has made efforts to communicate all recognition from the DOT directly to operators as promptly as possible.

North Carolina DOT has taken a similar approach, organizing employee outings such as minor league baseball games, and recognizing birthdays and work anniversaries. They've introduced creative, low-cost recognition initiatives, such as personalized birthday treats based on operators' favorite snacks. North Carolina also provides Christmas bonuses, typically ranging from $500 to $1000, which operators view favorably.

The value of holiday bonuses was also highlighted in our Virginia study. Operators expressed a strong desire for predictable and meaningful holiday bonuses, preferably disbursed early in the holiday season. The perceived value of these bonuses was found to be as important as the actual amount, with bonuses below $150 often viewed as inadequate or even insulting when accounting for taxes.

These findings underscore the complex interplay between workplace environment, recognition, and operator morale. They suggest that relatively small changes, such as more thoughtful use of observation rooms, timely and meaningful recognition, and increased engagement from senior leadership, could significantly improve operator satisfaction and potentially reduce turnover.

RECOMMENDATIONS

Based on the comprehensive analysis of TMC operations, several key recommendations emerge to address the challenges identified in data management, compensation, scheduling, and workplace environment.

To improve data management, TMCs could implement a formal process for operators to report software issues and feature requests for traffic management systems. This process should

include regular meetings between TMC managers, operators, and software developers to prioritize and track the resolution of identified problems. Such a system could significantly reduce operator frustration and improve the efficiency of data input and output processes.

Addressing compensation and career development is crucial for improving retention. TMC management could review and adjust operator salaries to ensure they are competitive with similar industries. Implementing a tiered operator system with clear paths for advancement and associated pay increases could help address the high turnover rates observed around the one-year mark of employment. Additionally, establishing a consistent and meaningful performance-based award system would ensure that recognition is timely, public, and presented by senior leadership.

Scheduling practices in TMCs require optimization to enhance operator satisfaction and performance. Developing more robust systems for managing short-notice absences, such as implementing dedicated on-call roles or cross-training programs, can reduce stress on both managers and operators. TMCs could reevaluate shift assignment practices, particularly for new operators, to avoid burnout by distributing challenging shifts more equitably. Offering higher compensation for less desirable shifts could serve as an effective incentive to staff these periods adequately.

Enhancing the workplace environment is essential for operator well-being and productivity. TMCs should address concerns about observation areas by implementing privacy measures such as frosted glass or adjustable blinds. This can help reduce operator stress while still allowing for necessary oversight. Fostering a more inclusive organizational culture by increasing direct communication between contract operators and departmental leadership can significantly improve operator morale and sense of belonging.

Training and onboarding processes could be refined to better prepare new operators for the demands of the job. Developing a more gradual transition process for new operators moving from training to floor duties could be beneficial. This might include a mentorship program or a phased approach to shift assignments, helping new operators acclimate to the demands of the job more effectively and potentially reducing early turnover.

By implementing these recommendations, TMCs can create a more supportive, efficient, and satisfying work environment for their operators. This holistic approach addresses the multiple factors influencing operator performance and retention, potentially leading to improved TMC operations and reduced turnover rates. However, it’s important to note that the effectiveness of these recommendations may vary based on the specific context of each TMC, and ongoing evaluation and adjustment of implemented strategies will be crucial for long-term success.

CONCLUSIONS

This study has examined challenges facing TMCs regarding operator workload, job satisfaction, and retention. The study identified several areas where potential improvements could enhance TMC operations and operator well-being.

The findings presented suggest a complex interplay of factors affecting TMC effectiveness, including data management systems, compensation structures, scheduling practices, and workplace environment. While these challenges were observed across multiple TMCs, the extent and specific manifestations may vary between centers.

The recommendations proposed in this study offer potential strategies for TMCs to consider in improving their operations and operator retention. These include implementing processes for software issue reporting, reviewing compensation structures, assessing scheduling

practices, considering workplace environment enhancements, and evaluating training and onboarding processes. The applicability and effectiveness of these recommendations may vary based on individual TMC contexts and resources.

This research indicates the important role that TMC operators play in managing complex transportation networks. As traffic patterns change and new technologies emerge, the role of skilled operators may continue to evolve. Strategies to mitigate workload and improve retention could potentially benefit both operators and overall TMC effectiveness.

Future research opportunities in this area include quantitative studies on the impact of operational improvements on performance and retention rates. Additionally, investigating the potential of emerging technologies in supporting TMC operations while managing operator workload could provide useful insights for future traffic management strategies.

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AUTHOR CONTRIBUTION STATEMENT

N.J. Goodall was sole author and is responsible for the entirety of this paper.

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