

WORKING-TIME REDUCTION IN A MEXICAN PRECAST CONCRETE PLANT: PRODUCTIVITY AND WELLBEING OUTCOMES

Centre for Business Research, University of Cambridge
Working Paper No.554

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This research was initially conducted as part of a Masters programme in The Laing O'Rourke Centre for Construction Engineering and Technology at the University of Cambridge.

September 2026

Abstract

While debates surrounding reduced working hours and four-day working week models have expanded internationally, existing evidence remains concentrated in high-income countries and service-based sectors. Limited research has explored how working-time reduction operates within physically demanding industrial environments, particularly in Latin America, where long working hours and productivity concerns continue to shape organisational practices. This research examines the technical and social feasibility of phased working-time reduction within a Mexican industrial setting through a real-world intervention conducted in a precast concrete manufacturing plant in Monterrey. The study addresses this gap through a mixed-methods intervention implemented over three consecutive phases, gradually reducing the working week from 51 to 42 hours while maintaining operational continuity. Quantitative analysis combined objective operational indicators, including productivity, absenteeism and production costs, with repeated employee wellbeing surveys measuring stress, fatigue, recovery, sleep quality and work–life balance. Qualitative interviews further contextualised employees' experiences. The findings suggest that phased working-time reduction can be implemented without negatively affecting operational performance. Despite substantial reductions in working hours, labour productivity per hour increased across the intervention phases, while absenteeism and production costs remained stable or decreased. Employees also reported better wellbeing, sleep quality and work–life balance without corresponding increases in perceived workload pressure. Rather than supporting the assumption that productivity depends primarily on extending working hours, the intervention suggests that organisational performance may also be linked to enhanced recovery, greater motivation and more sustainable forms of work organisation.

Keywords: working time reduction; labour productivity; employee wellbeing; work–life balance; blue-collar labour; Mexico; organisational change.

JEL Codes: J22, J24, J28, J81

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1. Introduction

Over the last decade, working time reduction (WTR) has re-emerged as a central topic in international labour debates, not only in response to concerns about employee wellbeing, but also as part of a broader reassessment of how work is organised and productivity is generated. Rather than assuming a fixed relationship between hours worked and output, recent research and policy evidence increasingly emphasise that sustainable productivity growth depends on work organisation, skills and technological adoption, rather than on extending working hours (OECD, 2025; Brynjolfsson et al., 2025; Acemoglu & Restrepo, 2019).

The renewed interest in WTR has been particularly visible in recent trials associated with the so-called ‘four-day week’, often supported by organisations such as the 4-Day Week Foundation. These initiatives typically aim to maintain pay and productivity while reducing working hours, most commonly to around 32 hours per week. Large-scale pilot programmes conducted in countries such as the United Kingdom and Iceland have attracted considerable attention by reporting stable or improved productivity alongside reductions in employee stress and burnout and improvements in work–life balance (Haraldsson & Kellam, 2021; Autonomy, 2023).

Despite the growing interest in working time reduction, much of the existing evidence remains concentrated in high-income countries and in service-oriented or office-based sectors (Campbell, 2024). There is still limited understanding of how working time reduction operates in industrial and blue-collar settings, where work is often physically demanding, tightly scheduled and linked to production targets. Moreover, most published studies focus on relatively abrupt or standardised reductions in working time, such as the immediate adoption of a four-day week, leaving gradual reduction strategies comparatively underexplored.

Working time reduction is particularly relevant in industrial and construction-related environments, where production processes are closely tied to fixed schedules and operational coordination. In these contexts, concerns regarding productivity losses, labour costs and operational disruption often discourage firms from experimenting with shorter working hours (ILO, 2023).

One possible barrier to organisational experimentation is the limited availability of credible firm-level evidence showing that production can be maintained under shorter working hours. In competitive manufacturing environments, managers may be reluctant to alter established schedules unless the operational risks appear manageable.

The central challenge is therefore to determine whether working hours can be reduced in demanding industrial environments without compromising productivity, and under what conditions such reductions may improve employees' quality of life. Addressing this challenge requires context-specific evidence, particularly from regions and sectors characterised by long working hours, limited organisational experimentation, and persistent concerns about productivity losses, features that remain largely underexplored in the existing literature. Mexico provides a clear example of this. According to recent data, Mexico consistently ranks among the Organisation for Economic Co-operation and Development (OECD) countries with the longest average annual working hours, reflecting a labour market model in which extended working time continues to play a central role in production strategies (OECD, 2025).

Despite these long working hours, Mexico's labour productivity per hour remains relatively low compared to other OECD economies, suggesting that extended working time does not necessarily result in corresponding increases in output or efficiency (OECD, 2025). This gap between hours worked and productivity has prompted ongoing policy discussions around working time regulation, including recent debates on reducing the statutory working week to 40 hours. However, these discussions have largely centred on legal compliance and labour standards, rather than on organisational experimentation or evidence-based assessments of how working time reduction might operate in practice within firms.

While much of the academic and policy literature on WTR has been shaped by experiences in Northern Europe and other high-income economies, recent developments in Latin America suggest growing interest in alternative working time arrangements in contexts that may be more comparable to Mexico. Recent labour reforms in countries such as Chile, Colombia and Ecuador also reflect growing regional interest in shorter working weeks, although evidence regarding organisational implementation across the region remains limited.

The need for context-specific evidence is further reinforced by broader wellbeing research in Latin America. Despite lower average income levels and persistent structural inequalities, many countries in the region consistently report relatively high levels of subjective wellbeing and life satisfaction (Helliwell et al., 2024).

This suggests that wellbeing outcomes cannot be understood solely through economic indicators, making Mexico a particularly relevant context for examining how WTR may influence employees' quality of life (Rojas, 2015).

In the absence of evidence from industrial settings in Mexico, this study examines a working time reduction intervention implemented in partnership with an industrial firm located in Monterrey, Nuevo León. The intervention consisted of a gradual reduction of working hours implemented across three successive phases, each lasting four weeks. Rather than adopting an abrupt shift to a shorter working week, the phased design allowed both management and employees to adjust work processes incrementally and to monitor operational outcomes over time. This approach is particularly suited to industrial settings, where production processes are tightly coordinated and less adaptable to sudden changes.

The study focuses on operational performance and employee quality of life. Productivity is assessed using objective operational indicators provided by the firm, while employee experiences are examined through repeated survey measures capturing stress, fatigue, sleep quality and work–life balance across the intervention phases. Rather than seeking definitive causal conclusions, the study aims to provide context-sensitive evidence regarding the feasibility of implementing gradual working time reduction within a Mexican industrial setting.

Building on these two dimensions, the primary objective is to assess whether gradual working time reduction can be implemented without compromising production, while generating context-sensitive evidence on its implications for employees' quality of life.

Accordingly, the study addresses two research questions: (1) does a gradual reduction in working hours affect productivity within an industrial setting? and (2) how do employees experience changes in quality of life throughout the intervention phases?

This working paper is structured into six chapters. Chapter 2 reviews the literature on working time reduction, productivity and work-related wellbeing, with particular attention to industrial settings and Latin America. Chapter 3 presents the organisational context, research design, intervention and methods. Chapter 4 reports the operational and employee outcomes, which are interpreted in relation to the literature and implementation process in Chapter 5. Finally, Chapter 6 draws together the main conclusions and contributions.

2. Literature review

2.1 Working Time and the Productivity Debate

The relationship between working hours and productivity has long been a central topic in labour economics and organisational research. A common assumption is that longer working hours increase total output. However, research suggests that the relationship between working time and productivity is non-linear and characterised by diminishing returns (OECD, 2025; Pencavel, 2015). Although longer hours may increase total output in the short term, productivity per hour often declines as fatigue builds up and marginal efficiency falls.

Comparative international data reinforce this perspective. According to OECD Productivity Statistics (OECD, 2023), countries such as Luxembourg, Norway and Ireland combine relatively shorter average annual working hours with some of the highest levels of labour productivity per hour worked within the OECD area. By contrast, Mexico, Colombia and Costa Rica consistently record among the longest annual working hours while simultaneously exhibiting comparatively low productivity per hour. This inverse pattern challenges the assumption that extending working time automatically enhances output performance. Instead, comparative OECD data suggest that productivity performance depends less on the length of the working week and more on how effectively labour and capital are organised and deployed (Acemoglu & Restrepo, 2019; Brynjolfsson et al., 2025). These findings imply that productivity performance depends not solely on the duration of work, but on how work is structured and executed, raising the possibility that shorter working weeks can sustain or even enhance output per hour.

Recent experimental and quasi-experimental studies on working time reduction further contribute to this debate. Evidence from several four-day week trials indicates that organisations were generally able to maintain performance levels following reductions in working hours, with no consistent evidence of productivity decline (Fan et al., 2025; Autonomy, 2023). However, productivity outcomes in many of these studies rely partly on managerial self-reports and are concentrated in service-based or knowledge-intensive sectors. Systematic reviews of the literature therefore conclude that the overall impact of WTR on productivity remains context-dependent and, in some cases, inconclusive (Campbell, 2024).

More recent evidence has sought to address these limitations through longer observation periods and objective performance indicators. One example is the evaluation of the South Cambridgeshire District Council four-day week trial,

which analysed organisational performance over a 27-month period using a comprehensive set of key performance indicators (Pink et al., 2025). The study found that most performance indicators either improved or showed no statistically significant change during the trial period, suggesting that reduced working hours can be sustained over a longer timeframe without widespread declines in organisational performance. Importantly, the analysis relied on longitudinal data and regression methods to compare pre- and post-intervention outcomes, addressing some of the limitations associated with short-term trials and self-reported productivity measures highlighted in earlier studies. Nevertheless, as the intervention took place in a local authority, its findings may not transfer directly to manufacturing environments characterised by physical production and tightly interdependent tasks.

These limitations are particularly important in industrial and blue-collar environments, where output is physically measurable, work is often physically demanding, and labour input is closely linked to material production processes. In contrast to many office-based settings, production work typically depends on coordinated teams, fixed schedules and sustained physical effort. In such contexts, reducing working hours may directly influence levels of fatigue, physical strain and recovery time, as reductions in working time have been associated with improvements in fatigue, stress and sleep quality (Voglino et al., 2022). As a result, productivity outcomes may depend not only on the number of hours worked, but on how working time affects workers' energy levels, concentration and overall capacity to perform effectively.

2.2 Fatigue, Recovery and Work Intensity

Understanding whether reductions in working time can influence productivity requires examining the mechanisms through which working hours affect employee performance. One of the most widely discussed mechanisms in recent literature relates to fatigue and recovery. Prolonged working hours are consistently associated with higher levels of physical and mental fatigue, reduced sleep quality and increased stress (Voglino et al., 2022). Moreover, the World Health Organization and the International Labour Organization have reported that long working hours are associated with increased health risks, including cardiovascular disease, highlighting the physiological consequences of extended work exposure (Pega et al., 2021).

In physically demanding sectors such as construction and industrial manufacturing, extended working hours have also been linked to increased risk of occupational injuries and safety incidents. Working for long periods without sufficient rest can reduce alertness and concentration, increasing the likelihood of

errors (Dong et al., 2015). Over time, accumulated fatigue may therefore affect not only worker wellbeing but also operational reliability and effective hourly output.

The relationship between working time and performance can also be interpreted through recovery theory. According to effort–recovery models, employees require adequate non-work time to restore depleted physical and psychological resources (Sonnentag, 2018). When recovery is insufficient, strain accumulates and performance capacity declines. Conversely, additional rest time may enhance energy levels, concentration and task engagement during working hours. In this sense, reducing working hours does not simply remove labour input; it may also improve the quality and effectiveness of effort supplied during the hours that remain.

However, the potential productivity effects of working time reduction are not unambiguously positive. Some studies suggest that shorter working weeks may lead to work intensification, whereby employees attempt to complete the same volume of tasks within fewer hours, increasing perceived time pressure and workload (Eurofound, 2022; Campbell, 2024). In industrial settings, where production targets are often fixed, reduced hours may require a faster work pace or tighter coordination. Under such conditions, productivity per hour could rise in the short term, but at the cost of higher strain and potential sustainability concerns. This distinction is important when evaluating whether observed productivity gains reflect genuine efficiency improvements or simply compressed effort.

The Job Demands–Resources (JD–R) model provides a useful framework for analysing these dynamics. According to this model, employee wellbeing and performance depend on the balance between job demands and job resources (Bakker & Demerouti, 2017). Job demands include aspects of work that require sustained physical or mental effort, such as workload, time pressure and physical strain. Job resources, by contrast, include factors such as autonomy and social support that help employees manage these demands. Reducing working hours may lower exposure to job demands while creating greater opportunities for recovery outside work. If this balance shifts in favour of greater available resources, higher engagement and sustained performance may follow. However, if reduced hours are accompanied by increased work pace or pressure, the overall effect may be neutral or even negative.

These perspectives suggest that the effects of working time reduction on productivity are likely influenced by changes in fatigue, recovery and perceived work intensity. In industrial environments, where physical effort and team coordination are central to daily operations, these factors may play a particularly important role. For this reason, analysing how productivity per hour changes alongside indicators of stress, fatigue and sleep quality is important for assessing whether reduced working time reflects a genuine improvement in efficiency or simply a compression of effort into fewer hours.

2.3 Wellbeing, Quality of Life and Work–Life Balance

Beyond productivity and physiological strain, working time shapes how individuals organise their daily lives. Time allocation influences the balance between work and non-work roles. Research on the work–family interface shows that conflict between work and personal responsibilities is associated with lower job satisfaction and increased psychological strain (Allen et al., 2020). Working hours therefore affect not only output, but also how individuals experience role balance and everyday routines.

Quality of life is commonly understood as a multidimensional concept encompassing physical health, psychological wellbeing, social relationships and individuals' perceptions of their environment (WHO, 1998). Working conditions and schedules may influence several of these dimensions by shaping stress, recovery, daily routines and the balance between work and non-work roles.

Time outside work is also shaped by commuting demands. Evidence indicates that longer commuting duration is associated with lower satisfaction with the commute itself and can influence mood and performance through spillover effects into work and home domains (Chatterjee et al., 2020). Although commuting time does not show a consistent relationship with overall life satisfaction, it contributes to daily time pressure and perceived strain. Changes in working schedules may therefore alter how individuals experience their daily routines beyond the workplace.

Importantly, additional non-work hours do not automatically lead to improved wellbeing, as their benefits depend partly on how this time is experienced and used (Allen et al., 2020). Household responsibilities may limit opportunities for recovery, while employment insecurity is associated with poorer psychological wellbeing and adverse health outcomes (De Witte et al., 2016). In industrial settings, where shifts are structured and work is organised collectively, changes in working time may reshape both personal routines and workplace dynamics.

Assessing wellbeing in this context therefore requires examining specific dimensions, such as perceived stress, sleep quality, fatigue and work–life balance, rather than relying solely on general life satisfaction indicators. A multidimensional perspective provides a clearer framework for evaluating whether working time reduction improves employees’ overall quality of life.

2.4 Evidence from Working Time Reduction Trials

Over the past decade, working time reduction has gained renewed attention through a series of pilot programmes and organisational experiments, particularly in Europe and other high-income economies. Many of these initiatives have centred on the so-called four-day week, commonly involving a reduction of weekly working hours to around 32 hours without a proportional reduction in pay. In several recent trials coordinated by 4 Day Week Global (2023), this approach has been operationalised through what is commonly referred to as the 100–80–100 model, in which employees receive 100% of their pay while working 80% of their previous hours, with the expectation of maintaining 100% of previous output.

Large-scale trials conducted in the United Kingdom and Iceland provide some of the most frequently cited evidence. The Icelandic trials, conducted between 2015 and 2019 across public-sector workplaces, reported that productivity was maintained or improved in many participating workplaces, while employees experienced lower stress and better work–life balance (Haraldsson & Kellam, 2021). Similarly, the 2022 UK four-day week pilot, coordinated by the organisation Autonomy, found that the majority of participating firms reported stable performance outcomes and chose to continue the reduced-hours model after the trial period (Autonomy, 2023). However, in many cases productivity assessments relied partly on managerial reports rather than standardised operational metrics.

More recent research has examined the outcomes of reduced working weeks in greater depth. For example, Fan et al. (2025) analysed data from multiple organisations adopting a four-day week and found consistent improvements in employee wellbeing, including reductions in fatigue and stress. With respect to organisational performance, the study did not identify systematic evidence of productivity decline following the reduction in hours. However, the authors note that productivity indicators differed across organisations and were not uniformly based on objective output metrics. This variability highlights the difficulty of drawing firm conclusions about productivity effects across sectors and organisational types.

A further limitation of the existing literature is its strong concentration in service-based, administrative and knowledge-intensive sectors. In these environments, output is often less directly tied to physical production processes and may be more adaptable to flexible scheduling or digital coordination. Reviews of the four-day week literature acknowledge that much of the available evidence is drawn from office-based organisations, with comparatively limited analysis of manufacturing, construction or other physically demanding industries (Campbell, 2024). As a result, it remains uncertain whether findings from these contexts can be extended to environments where output is directly measurable and closely linked to labour hours.

Across the literature reviewed for this study, most documented interventions involved a relatively rapid transition to a shorter working week, while incremental reductions received comparatively little attention. More broadly, research comparing different forms and implementation models of working time reduction remains limited (Hanbury et al., 2023). This distinction matters because phased approaches may allow organisations to adjust workflows, coordinate teams and monitor operational performance more carefully than sudden schedule changes. However, phased designs may also make it difficult to separate the effect of shorter hours from learning, adaptation and other changes occurring over time.

2.5 Industrial and Blue-Collar Contexts: Structural Differences

Industrial and blue-collar environments differ in important ways from the service-based settings in which most WTR trials have been conducted. In manufacturing and construction, output is typically tangible and directly measurable, and production processes often depend on sequential activities that require coordination across teams. Unlike many knowledge-intensive tasks, industrial activities cannot always be reorganised flexibly or performed remotely without affecting workflow continuity. As a result, changes in working hours may interact directly with production schedules and operational planning (OECD, 2023).

Manufacturing and prefabrication processes also involve strong task interdependence. Mould preparation, reinforcement, casting, finishing and lifting occur in sequence, so delays or schedule misalignment in one activity can affect subsequent stages. Evidence from construction management similarly shows that coordination and communication across teams are central to productivity and operational reliability (Lingard & Turner, 2022). In such contexts, reducing working hours may introduce additional coordination challenges if not implemented collectively. Misalignment in schedules between teams or project

partners could increase delays or inefficiencies, particularly where timing is tightly constrained.

Industrial and construction work is also commonly physically demanding, requiring sustained manual effort and consistent attention to quality and safety standards. While long working hours have been associated with adverse health outcomes (Pega et al., 2021), the operational implications in these sectors extend beyond individual wellbeing. Variations in endurance, concentration or team synchronisation may translate into measurable effects on output, rework or schedule reliability. Productivity in these settings therefore depends not only on total labour hours but also on the stability and effectiveness of coordinated effort.

2.6 Mexico and Latin America: Long Hours and Informality

Research on WTR has largely focused on high-income economies, yet the conditions in Latin America differ in important ways. Mexico records among the highest average annual working hours among OECD countries, with approximately 2,193 hours worked per employee per year (OECD, 2023). At the same time, productivity per hour remains below that of many OECD peers. This contrast indicates that working hours alone cannot explain national productivity performance and points to the importance of technology, capital intensity, skills, informality and work organisation.

Recent reforms in Chile and Colombia reflect growing interest in shorter statutory working weeks. Chile approved a gradual reduction from 45 to 40 hours in 2023 (Ministerio del Trabajo y Previsión Social, 2023), and Colombia is phasing down from 48 to 42 hours (Congreso de la República de Colombia, 2021). Ecuador, where a 40-hour working week has long been the legal standard, provides a regional example of statutory working time regulation, although this does not by itself demonstrate how effectively shorter hours are implemented or what effects they have at establishment level (Asamblea Nacional del Ecuador, 2015). These reforms have generally adopted gradual implementation schedules, reflecting the need to allow employers and workers time to adjust working arrangements while pursuing improvements in wellbeing and labour conditions (Ministerio del Trabajo y Previsión Social, 2023).

Labour informality adds further complexity. In Mexico, more than half of workers are employed in informal arrangements (ILO, 2023). Informal employment refers to work that is, in law or practice, insufficiently covered by labour regulation, taxation or social protection (ILO, 2023). In such contexts, changes in statutory working hours do not automatically lead to uniform changes in actual working practices. Enforcement varies, firms differ widely in size and productivity, and

cost pressures may lead to uneven implementation. This makes it difficult to predict how working time reductions operate in practice.

Mexico's industrial sector is also experiencing technological change. Research on robotisation in Mexico points to uneven adoption of automation and challenges in managing productivity transitions (Ghys et al., 2020). This matters because the capacity to maintain output under shorter schedules may depend partly on technology and process organisation, which vary substantially across Mexican firms.

Finally, international surveys show that several Latin American countries report relatively high levels of life satisfaction despite economic constraints (Helliwell et al., 2024). This pattern has sometimes been described as a "Latin American happiness paradox" (Rojas, 2015), suggesting that wellbeing is shaped by social and cultural factors beyond material conditions alone. As a result, it complicates simple assumptions that fewer working hours will automatically improve wellbeing. In this context, the key issue may not only be how much people work, but how work is structured and experienced.

For Mexico in particular, the combination of long working hours, high informality, ongoing technological change and limited firm-level evidence creates a distinctive setting. Examining WTR within a formal industrial plant therefore can provide valuable evidence for a regional debate that has so far been driven more by policy reform than by detailed organisational analysis.

2.7 Research Gaps and Limitations in Existing Literature

Despite growing interest in working time reduction, important methodological limitations remain in the existing literature. Many documented trials rely partly on self-reported performance indicators or managerial perceptions rather than standardised operational productivity metrics (Campbell, 2024). This reliance on subjective assessments makes it difficult to compare results across organisations and sectors. In addition, existing studies provide limited evidence regarding the medium and long-term sustainability of productivity and wellbeing effects, leaving open questions about whether initial outcomes persist over time.

Empirical evidence also remains concentrated in service-based and knowledge-intensive sectors, where output measurement differs substantially from industrial production contexts. As a result, the extent to which findings can be generalised to manufacturing or construction environments, where productivity is directly measurable and closely tied to labour hours, remains uncertain (Campbell, 2024).

Research on workplace interventions suggests that outcomes are shaped not only by the intervention itself, but also by organisational conditions such as managerial support, workforce engagement and implementation readiness (Nielsen & Randall, 2013). However, relatively limited attention has been given to how these implementation dynamics influence working time reduction within industrial environments, particularly under gradual or phased reduction strategies.

Taken together, the literature reveals a specific empirical gap: limited firm-level evidence combining gradual implementation, objective measures of hourly productivity and repeated employee wellbeing data within a Latin American manufacturing context. The present study addresses this gap through a phased reduction in working hours within a Mexican precast concrete plant. It combines a standardised operational productivity metric, square metres produced per hour worked, with repeated measures of employee wellbeing and qualitative accounts of workers' experiences.

3. Methodology

3.1 Research Design and Intervention Structure

This study adopted a single-site, mixed-methods workplace intervention design, combining repeated operational measurements, repeated cross-sectional employee surveys and post-intervention qualitative interviews.

The intervention was conducted in a prefabrication plant operated by a local Mexican company, Arenko, with the support of the company's Chief Executive Officer and senior management team. The plant specialises in the manufacture of precast concrete wall panels for industrial buildings and perimeter boundary walls. As a prefabrication facility, structural components are manufactured off-site before transportation and installation. Production activities include steel reinforcement preparation, mould assembly, concrete casting, surface finishing and lifting operations. Although the wall panels use highly standardised materials, finishes and thicknesses, their dimensions and architectural detailing vary. The facility employs 55 male workers across operational roles including carpenters, rebar workers, polishers, patch workers, lifting crew members and other roles. Examples of the manufacturing process and finished products are presented in Figures 1, 2 and 3.

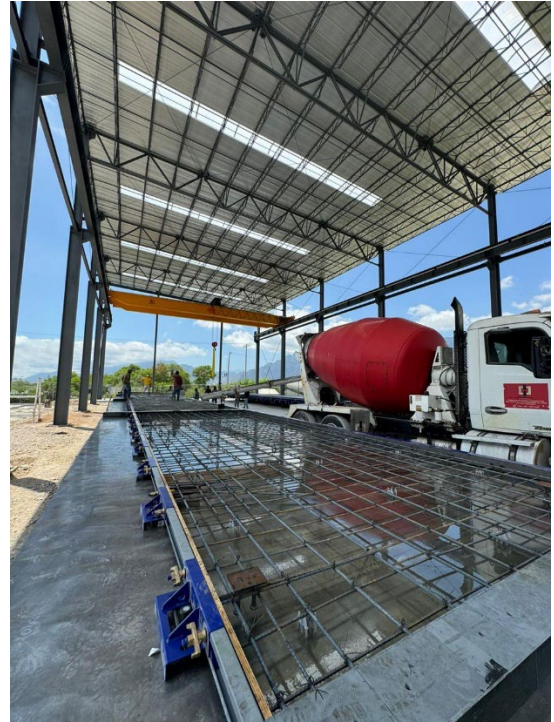


Figure 1: Main stages of the precast concrete wall panel manufacturing process at the Arenko prefabrication plant.



Figure 2: Finished precast concrete wall panels stored at the prefabrication plant prior to transportation and installation.



Figure 3: Examples of precast concrete wall panels installed in industrial buildings and perimeter boundary walls.

The initial stage of the project consisted of a series of meetings with senior management and plant supervisors, as well as individual interviews with team leaders. These discussions focused on identifying an appropriate implementation approach and ensuring mutual benefits for the organisation and its workforce.

One of the first strategic decisions concerned the method of working-hour reduction. An immediate reduction, or the implementation of a 100–80–100 model, was considered unsuitable given the operational and socio-economic context of the organisation. Management considered the preservation of the six-day production schedule necessary to meet existing customer commitments. A shift-based alternative was rejected because of concerns regarding absenteeism, workforce coordination and the potential requirement for additional personnel.

Consequently, the intervention was designed to take place over four stages: a baseline phase (Phase 0) followed by three consecutive phases, each lasting four weeks. During each phase, the working week was reduced by three hours. Phase 0 represented the baseline condition with a 50.5-hour working week. In Phase 1, weekly hours were reduced to 48; in Phase 2, to 45; and in Phase 3, to 42 hours

per week, as shown in Figure 4. Importantly, employees' regular pay was maintained throughout all intervention phases, ensuring that reductions in working time were not accompanied by proportional reductions in wages.

The 12-week duration of the intervention phases was selected principally due to the temporal constraints of this research project. Nevertheless, relatively short evaluation periods have frequently been employed in workplace intervention research to assess preliminary changes in behavioural, productivity, and wellbeing outcomes (Arrogi et al., 2017; Keeman et al., 2017).

Given the heterogeneity of working conditions across roles, the gradual reduction was implemented through two differentiated operational schemes, tailored to the specific working conditions of distinct employee groups. The first scheme applied to all study participants except the polishing team ($n = 37$). Under this model, working hours were reduced by progressively advancing the daily finishing time. For example, from Monday to Friday, employees left at 4:30 p.m. during Phase 1 instead of 5:00 p.m. in Phase 0, with further incremental reductions applied in subsequent phases. This approach was selected on the basis that it offered mutual benefits for both the organisation and its employees. An earlier finishing time was expected to reduce commuting hours, limit exposure to adverse climatic conditions, and serve as a motivational incentive for employees to complete daily production targets more efficiently in order to leave work earlier.

A second scheme was designed for the 13-member polishing team, whose schedules depended on concrete curing times and were therefore less predictable. Unlike the rest of the workforce, this group did not follow the phased reduction in weekly working hours. Instead, their working-time entitlement was reduced directly from 50.5 to 42 hours per week on an annualised basis, with the equivalent reduction accumulated as additional days away from the plant throughout the year. This arrangement preserved the operational flexibility required by the production process while providing longer periods for rest and family contact. The intervention was therefore gradual at the organisational level, but its implementation differed by occupational group: most employees experienced progressive reductions in daily working time, whereas the polishing team received the full reduction from the outset through an annualised-hours arrangement.

A further methodological decision involved the definition of the study sample. From the total workforce, five drivers were excluded from the study due to their substantially different working schedules, which would have introduced outliers into the dataset. Following the ethical approval process and informed consent

procedures described later in this chapter, all 50 employees ultimately agreed to participate voluntarily in the study. Table 1 summarises the principal demographic and occupational characteristics of the participants.

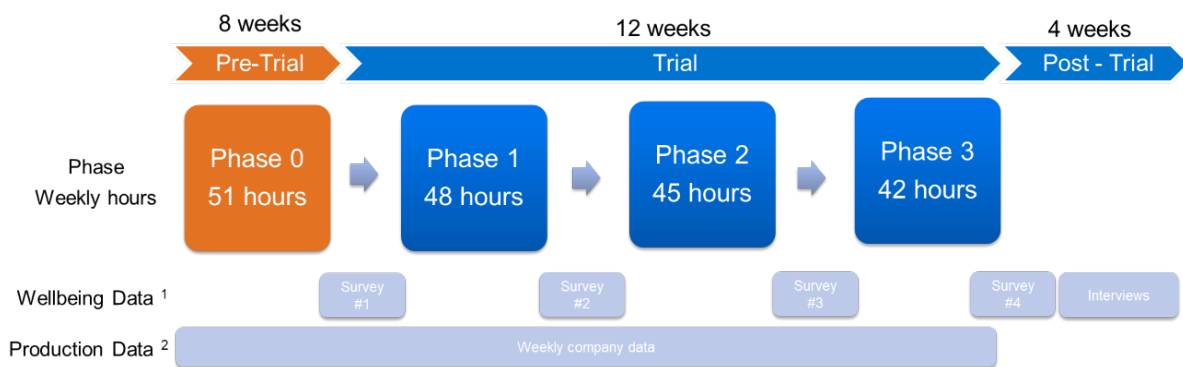
Table 1: Demographic Characteristics of Participants

<i>Variable</i>	<i>Category</i>	<i>n</i>	<i>%</i>
<i>Age</i>	18–24	8	16%
	25–34	14	28%
	35–44	15	30%
	45–54	4	8%
	55–64	9	18%
	> 64	0	0%
<i>Tenure</i>	< 1 year	9	18%
	1–3 years	23	46%
	4–7 years	14	28%
	8–12 years	0	0%
	> 12 years	4	8%
<i>Crew</i>	Carpenters	10	20%
	Rebar workers	12	24%
	Lifting crew	5	10%
	Polishers	13	26%
	Patch workers	4	8%
	Other	6	12%
<i>Commute mode</i>	Driver	5	10%
	Passenger	14	28%
	Company vehicle	12	24%
	Bus	11	22%
	Motorcycle	2	4%
	Bicycle	1	2%
	Walking	1	2%
	Other	4	8%

3.2 Data Collection and Research Instruments

Following formal approval from Arenko’s management, the research methodology was developed in detail. A mixed-methods approach was adopted, combining both quantitative and qualitative data collection techniques. In collaboration with plant supervisors, the following operational variables were measured on a weekly basis: total hours worked, square metres of prefabricated elements produced, crew-level production costs, staff turnover, absenteeism, and quality issues.

In parallel, a structured survey was administered at the end of each phase to assess employees' perceived quality of life. The first survey was conducted at the end of Phase 0, and the same instrument was subsequently administered at the conclusion of Phases 1, 2 and 3, allowing for comparisons across successive intervention phases. An overview of the methodology is presented in Figure 4.



Notes:

1- Wellbeing data was based on self-assessed indicators such as fatigue, stress, anxiety, commuting time, sleep quality, among others.

2- Production data included production rates, hours worked, costs, absenteeism, turnover, and quality-related metrics.

Figure 4: Study Design and Timeline of Data Collection

The employee survey was developed using materials shared by the 4-Day Week Foundation, drawing on survey instruments that have been previously validated in related research, as well as selected items from the World Health Organization Quality of Life questionnaire (WHOQOL). Where available, official Spanish-language versions were used. Remaining items were translated and reviewed for clarity and conceptual consistency.

The survey predominantly employed Likert-type scales and focused on capturing employees' perceptions and experiences over the preceding four-week period. The instrument was structured into five thematic sections. Section A assessed perceived work pace and workload demands. Section B focused on employee wellbeing, including perceived stress levels, fatigue, anxiety, sleep quality, and related indicators. Section C examined work–life balance and the use of personal time outside of work, with particular attention to how employees allocated any additional free time resulting from the reduced working hours. Section D aimed to capture broader aspects of perceived quality of life, including economic sufficiency and the perceived availability of time for non-work-related activities. Finally, Section E collected demographic information and data related to

commuting patterns, transportation modes, and travel time to and from the workplace.

This structure allowed for a multidimensional assessment of both work-related demands and subjective wellbeing outcomes, facilitating group-level comparisons across the different phases of the intervention. However, to preserve anonymity, participants were not tracked individually across phases. Missing data were minimal, and analyses therefore focused on group-level comparisons rather than individual longitudinal trajectories.

Once the final sample had been confirmed, baseline measurements were collected during the eight weeks preceding Phase 1, using the quantitative indicators previously described, together with the initial survey. Surveys were administered in printed form in Spanish, following supervisors' recommendations that a paper-based format would reinforce trust and anonymity among employees. Crew leaders distributed the surveys, participants were given time to complete them, and responses were deposited anonymously before being transcribed into an Excel database for analysis. The same procedure was repeated across all intervention phases.

Following survey completion, twelve semi-structured interviews were conducted with participants from different operational roles. The interviews explored employees' experiences of the intervention and perceptions of its effectiveness. The data were analysed using thematic analysis (Braun & Clarke, 2006), which involves a structured yet flexible process of familiarising with the data, generating initial codes, and iteratively identifying and refining themes that capture recurring patterns across participants' accounts.

3.3 Index Construction and Statistical Analysis

To support the quantitative analysis of employee wellbeing and organisational outcomes throughout the intervention, several composite indices were constructed from the survey instrument described in the previous section. The objective of these indices was to reduce fragmentation across individual survey items and to capture broader multidimensional constructs associated with workload intensity, recovery, wellbeing, work-life balance, and perceived quality of life.

All items included in the composite indices were measured using five-point Likert-type scales. To ensure interpretative consistency across the dataset, items representing negative outcomes (such as stress, fatigue, burnout, anxiety, and

perceived work pressure) were reverse coded prior to analysis. Consequently, higher values across all constructed indices consistently represented more favourable conditions or outcomes. A full description of all survey variables and questionnaire items is available from the authors.

The indices were constructed using arithmetic averages of conceptually related variables informed by the literature on working time reduction, occupational wellbeing, recovery, and work-life balance. The principal indices used in the study, including their component variables, conceptual interpretation, and reliability coefficients, are summarised in Table 2.

Table 2: Constructed Indices

<i>Index</i>	<i>Variables Included</i>	<i>Conceptual Interpretation</i>	<i>Cronbach's α</i>
<i>A_Demandas</i> (<i>Work Demands</i>)	a_fast, a_tight	Perceived work intensity and workload pressure	0.79
<i>A_Recuperacion</i> (<i>Work Recovery</i>)	a_breaks, a_recover, a_manage	Recovery opportunities and work manageability	0.72
<i>B_Bienestar</i> (<i>Employee Wellbeing</i>)	b_stress, b_tired, b_sleepprb, b_burnem, b_wornout, b_anx	Overall psychological wellbeing	0.88
<i>C_Balance_1</i> (<i>Work-Life Balance</i>)	c_balance, c_timefun, c_moretime	Work-life balance and time availability	0.57
<i>D_CalidadVida</i> (<i>Quality of Life</i>)	d_qol, d_recreation, d_finance	Quality of life and personal wellbeing	0.56

The *A_Demandas* and *A_Recuperacion* indices were constructed to capture perceived workload intensity and employees' recovery opportunities within the plant environment. The *B_Bienestar* index represented the principal psychological wellbeing construct used throughout the study, integrating dimensions commonly associated with occupational strain and fatigue, including stress, tiredness, burnout, emotional exhaustion, sleep-related difficulties, and anxiety. The *C_Balance_1* and *D_CalidadVida* indices focused respectively on work-life balance, time availability outside work, and perceptions of quality of life.

Cronbach's alpha analyses indicated acceptable reliability for most indices, particularly *B_Bienestar* ($\alpha = 0.88$), *A_Demandas* ($\alpha = 0.79$), and *A_Recuperacion* ($\alpha = 0.72$). *C_Balance_1* and *D_CalidadVida* showed lower internal consistency, possibly reflecting the small number of items and the multidimensional nature of these constructs. Results based on these two indices were therefore interpreted cautiously and alongside their component items and qualitative evidence.

Following index construction, quantitative analyses were conducted using Minitab statistical software. The intervention *wave* variable was treated as a categorical factor rather than as a continuous time variable, as each implementation phase reflected distinct operational conditions. One-way analyses of variance (ANOVA) were used to evaluate differences across intervention phases for both operational indicators and employee wellbeing variables. Where appropriate, Tukey post-hoc comparisons were conducted to identify pairwise differences between phases.

General Linear Models (GLMs) were subsequently employed to examine potential interaction effects between intervention phases and demographic or organisational variables, including age, tenure, and household characteristics. These analyses aimed to determine whether the effects of WTR differed across employee groups.

To further explore relationships between organisational and wellbeing variables, Pearson correlation analyses and multiple regression models were conducted. Correlation analyses were used to identify associations between perceived demands, recovery, wellbeing, work-life balance, and quality of life. Regression analyses were subsequently employed to examine the extent to which recovery, wellbeing, and perceived work intensity predicted work-life balance and quality of life outcomes.

Throughout the quantitative analysis, statistical significance was assessed at $p < 0.05$. Given the exploratory nature and small sample, results with p-values between 0.05 and 0.10 were noted descriptively as suggestive patterns rather than treated as statistically significant.

In addition to the quantitative analysis, qualitative interview data were used to contextualise and interpret employee experiences throughout the intervention. The integration of operational indicators, survey responses, and qualitative insights aimed to provide a more comprehensive understanding of how working

time reduction influenced both organisational outcomes and employee wellbeing within the industrial setting.

3.4 Ethical Considerations

Ethical approval was obtained through the University of Cambridge. Information sheets and informed consent forms were translated into Spanish with the assistance of artificial intelligence tools and approved by the University's Ethics Committee. Printed copies were distributed during an in-person meeting, and participants were given time to review the materials and ask questions before providing voluntary consent. The same procedures were applied to interview participants.

Given the first author's managerial role, participants were explicitly informed that participation was voluntary, that declining would have no employment consequences and that managers would not receive access to individual responses.

Survey data were collected without names or employee identifiers and stored securely. Interview transcripts were pseudonymised and potentially identifying details were removed from quotations.

4. Results and Findings

4.1 Operational Outcomes

Table 3 presents a summary of the principal operational indicators observed throughout the intervention. Overall, the results suggest that the gradual reduction in working hours did not negatively affect organisational performance. On the contrary, several operational indicators displayed stable or improving trends across the intervention phases.

Table 3: Operational Outcomes Across Intervention Phases
Indicator

	Phase 0	Phase 1	Phase 2	Phase 3
<i>Planned weekly hours</i>	50.50	48.00	45.00	42.00
<i>Actual hours worked¹</i>	46.50	44.00 ²	45.00	38.25
<i>Total labour hours³</i>	2301.75	2200.00	2250.00	1912.50
<i>m² produced per week</i>	1430.54	1382.05	1671.30	1663.76
<i>Productivity m² per hour</i>	0.62	0.63	0.74	0.87
<i>Total cost per m²</i>	\$229.39	\$256.96	\$216.54	\$195.83
<i>Employee turnover</i>	0.51% ⁴	0.00%	0.00%	0.00%
<i>Absenteeism rate</i>	1.89%	1.17%	0.75%	0.83%

As seen in Figure 5, planned weekly working hours decreased by approximately 17%, from 50.5 hours in Phase 0 to 42 hours in Phase 3. Despite this reduction, production levels remained stable throughout the intervention, while total labour hours declined. Labour productivity increased by approximately 40%, from 0.62 m²/hour in Phase 0 to 0.87 m²/hour in Phase 3, consistently remaining above baseline levels following the reduction in working hours.

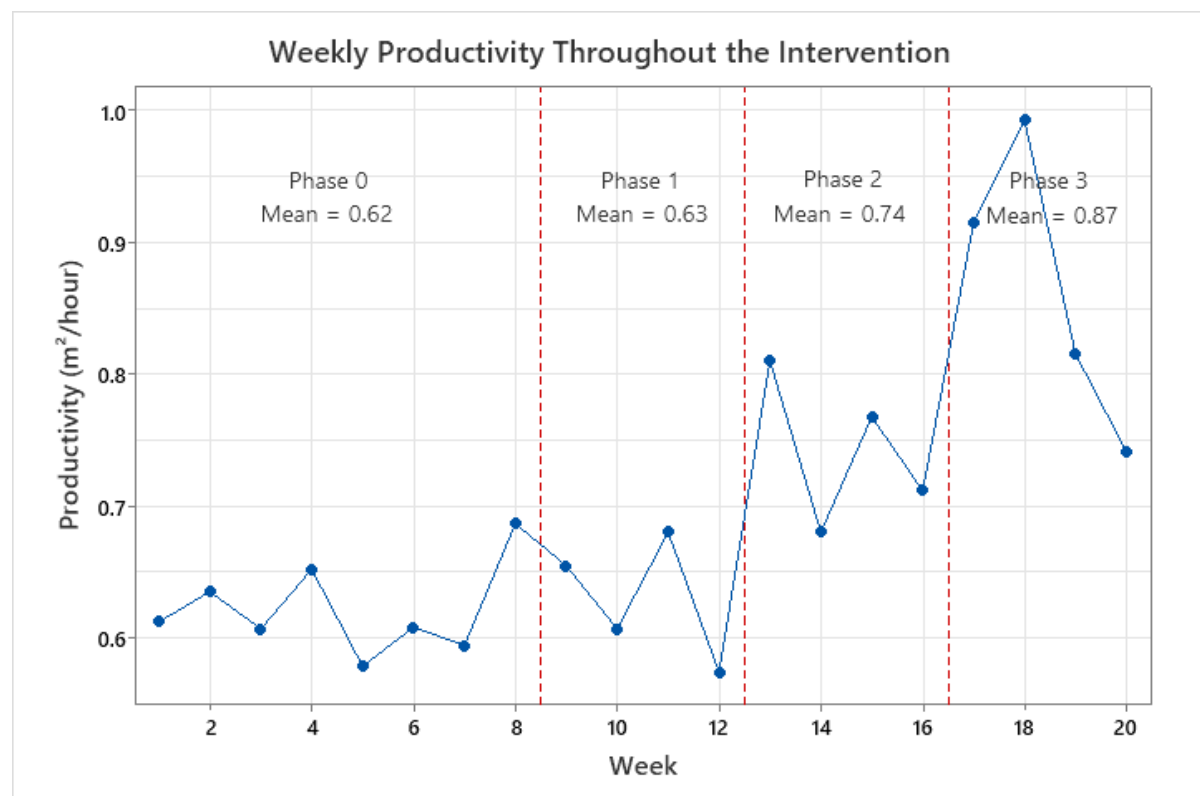


Figure 5: Weekly Productivity Across Intervention Phases

As summarised in Table 4, one-way ANOVA results further confirmed statistically significant differences in labour productivity across intervention phases ($F(3,16) = 16.10, p < 0.001$). Similarly, total production costs per square metre also differed significantly across phases ($F(3,16) = 6.43, p = 0.005$). After an initial increase during Phase 1, production costs declined during Phases 2 and 3 to levels below baseline conditions. These findings suggest that the reduction in working hours did not generate immediate operational inefficiencies and may have contributed to improvements in labour utilisation over time.

Table 4: Statistical Comparison of Key Operational Indicators Across Intervention Phases

<i>Indicator</i>	<i>F-value</i>	<i>p-value</i>
<i>Productivity (m^2/hour)</i>	16.10	<0.001
<i>Total cost per m^2</i>	6.43	0.005
<i>Absenteeism rate</i>	2.13	0.137

As shown in Figure 6, absenteeism rates also displayed a downward trend across intervention phases, decreasing from 1.89% during Phase 0 to below 1% during later stages. Although these differences were not statistically significant ($F(3,16) = 2.13, p = 0.137$), absenteeism patterns appeared more variable during Phases 0 and 1, whereas Phases 2 and 3 showed comparatively lower and more stable levels over time.

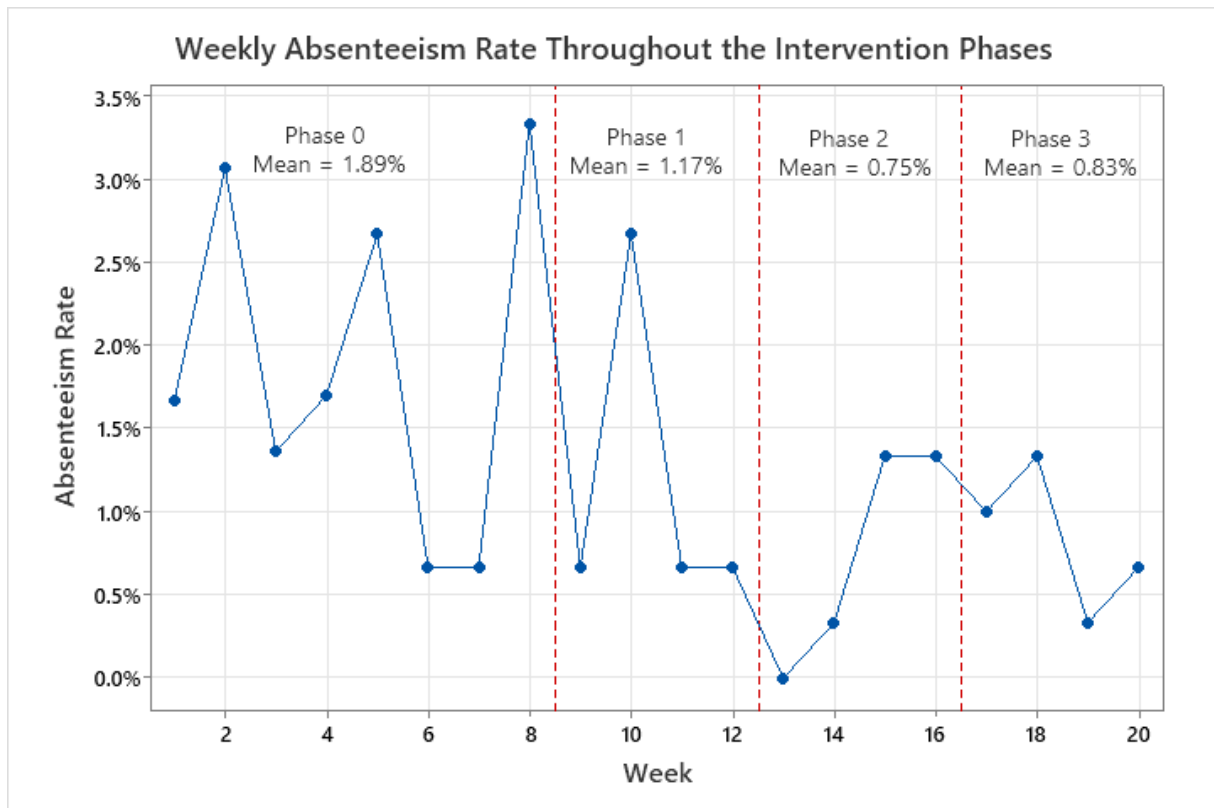


Figure 6: Weekly Absenteeism Rate Throughout the Intervention Phases

During the intervention, supervisors' weekly records did not identify any notable changes in quality issues, workplace accidents or safety conditions relative to the baseline period. Although weekly fluctuations in production and working hours were influenced by public holidays, weather conditions and temporary disruptions. Nevertheless, the overall trends indicate that substantial reductions in working hours were achieved without major declines in production performance or organisational stability.

4.2 Work Intensity and Recovery

The *A_Demandas* index measured perceived workload intensity and production pressure, while the *A_Recuperacion* index captured recovery opportunities and work manageability. Higher values represented more favourable perceptions.

Table 5 summarises the average values observed for both indices across the intervention phases. Overall, the results suggest that the reduction in working hours was not accompanied by substantial changes in either perceived work intensity or perceived recovery opportunities.

Table 5: Changes in Perceived Work Demands and Recovery Across Intervention Phases

<i>Index</i>	<i>Phase 0</i>	<i>Phase 1</i>	<i>Phase 2</i>	<i>Phase 3</i>	<i>F-value</i>	<i>p-value</i>	<i>R² (%)</i>
<i>A_Demandas (Work Demands)</i>	3.07 (0.94)	3.29 (1.00)	3.24 (0.95)	3.30 (1.00)	0.60	0.615	0.91%
<i>A_Recuperacion (Work Recovery)</i>	3.71 (0.84)	3.76 (0.83)	3.77 (0.76)	3.77 (0.90)	0.05	0.984	0.08%

Values are reported as mean (SD)

Perceived work demands and recovery remained highly stable throughout the intervention. Although average demand scores increased slightly relative to baseline levels, differences were not statistically significant and effect sizes were very small ($R^2 = 0.91\%$ and 0.08% , respectively).

These findings are particularly relevant when considered alongside the operational results presented in the previous section. Despite the statistically significant increase in labour productivity observed during the intervention, employees did not report corresponding increases in perceived workload pressure or deteriorations in recovery opportunities.

Additional regression analyses further indicated that perceived work demands were strongly associated with employee wellbeing outcomes, particularly stress and fatigue levels. Higher perceived demands were significantly associated with both perceived stress ($\beta = 0.601$, $p < 0.001$) and fatigue ($\beta = 0.578$, $p < 0.001$). However, because perceived work demands did not increase across intervention phases, the productivity gains observed during the intervention do not appear to have been primarily driven by harmful forms of work intensification.

4.3 Wellbeing and Work-Life Balance

Table 6 summarises the average values observed across the intervention phases where higher values represented more favourable perceptions. The largest observed effects were associated with work-life balance ($R^2 = 7.14\%$) and sleep duration ($R^2 = 3.94\%$), whereas the remaining indicators showed comparatively limited variation across phases.

Table 6: Employee Wellbeing, Work–Life Balance and Quality of Life Across Intervention Phases

<i>Indicator</i>	<i>Phase 0</i>	<i>Phase 1</i>	<i>Phase 2</i>	<i>Phase 3</i>	<i>F-value</i>	<i>p-value</i>	<i>R² (%)</i>
<i>B_Bienestar</i> (Employee Wellbeing)	3.51 (0.78)	3.79 (0.90)	3.78 (0.85)	3.64 (0.87)	1.22	0.304	1.83%
<i>C_Balance 1</i> (Work-Life Balance)	3.24 (0.97)	3.65 (0.69)	3.76 (0.67)	3.74 (0.70)	5.00	0.002	7.14%
<i>D_CalidadVida</i> (Quality of Life)	3.51 (0.70)	3.53 (0.59)	3.45 (0.60)	3.58 (0.59)	0.35	0.790	0.53%
<i>Sleep hours</i>	7.00 (1.44)	7.72 (1.26)	7.39 (1.10)	7.47 (1.42)	2.15	0.097	3.94%

Values are reported as mean (SD)

The most notable changes were observed in the *C_Balance_1* index, which displayed statistically significant differences across intervention phases ($F(3,195) = 5.00$, $p = 0.002$, $R^2 = 7.14\%$). Average work–life balance scores increased progressively from 3.24 during the baseline phase to 3.74 during Phase 3, indicating improved perceptions regarding the availability of personal time and balance between work and non-work activities throughout the intervention. In contrast, *B_Bienestar* and *D_CalidadVida* indicators remained relatively stable across phases, with only minor fluctuations over time.

Additional changes were observed in average sleep duration. As illustrated in Figure 7 and Table 6, average reported sleep duration increased from 7.0 hours at baseline to between 7.4 and 7.7 hours during the intervention phases. Although this difference was not statistically significant at the 0.05 level, it represented a suggestive descriptive pattern ($F(3,157) = 2.15$, $p = 0.097$, $R^2 = 3.94\%$).

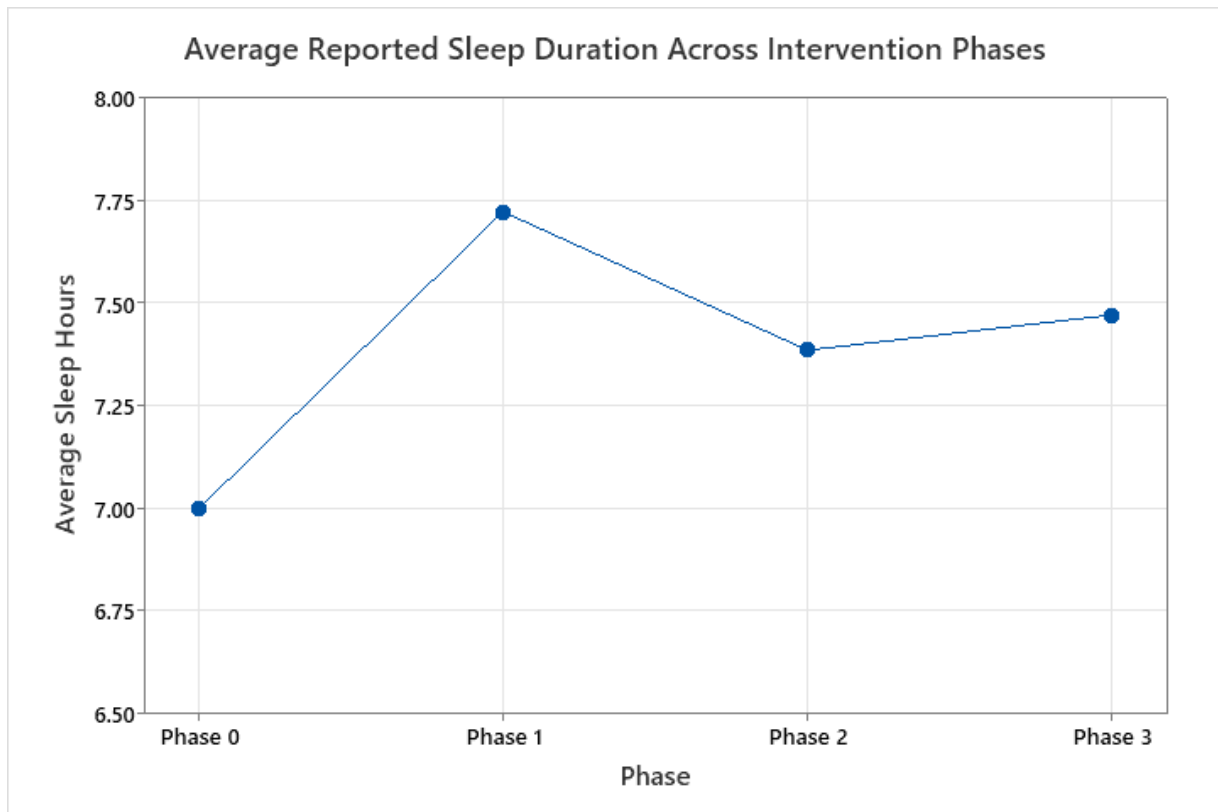


Figure 7: Average Reported Sleep Duration Across Intervention Phases

Survey responses regarding perceived changes in commuting time also reflected similar patterns. Across the intervention phases, approximately 23% of participants reported that their commuting time had decreased, while only 5% reported increases. Interview responses suggested that these reductions were primarily associated with earlier finishing times, which allowed employees to avoid heavier traffic conditions during peak commuting hours. The positive association between intervention phase and work–life balance remained statistically significant even after controlling for commuting duration ($p = 0.001$).

Overall, the intervention appeared primarily associated with improvements in work–life balance and time availability, alongside stable recovery opportunities, rather than broader changes in perceived quality of life.

Correlation analyses further revealed moderate positive associations among recovery opportunities, work–life balance, and quality-of-life indicators. Specifically, perceived recovery was positively associated with perceived quality of life ($r = 0.453$), whereas perceived work intensity was positively related to employee wellbeing ($r = 0.617$). In addition, work–life balance showed a moderately strong positive association with quality of life ($r = 0.529$).

Additional regression analyses further indicated that perceived recovery was the strongest predictor of work–life balance ($\beta = 0.311$, $p < 0.001$), while work–life balance emerged as the strongest predictor of perceived quality of life ($\beta = 0.358$, $p < 0.001$). These findings reinforce the close relationship between recovery opportunities, time availability, and perceptions of wellbeing observed throughout the intervention.

4.4 Demographic and Subgroup Differences

Additional analyses were conducted to examine whether the effects of the intervention on work–life balance differed across operational crews and employee demographic characteristics. General Linear Models (GLMs) and complementary ANOVA analyses were estimated using *C_Balance_1* as the principal outcome variable.

Table 7 summarises the principal subgroup analyses conducted throughout the intervention. Significant effects were observed for intervention phase and operational crew, as well as for the interaction between both variables. In contrast, parental status and tenure did not display statistically significant effects on work–life balance outcomes. Age groups, however, showed moderate but statistically significant differences in average work–life balance scores.

Table 7: Subgroup Analyses of Work–Life Balance Across Intervention Phases

<i>Variable</i>	<i>Main Finding</i>	<i>p-value</i>
<i>Phase</i>	Significant differences across intervention phases	0.043
<i>Crew (e_crew)</i>	Significant differences between operational crews	<0.001
<i>Phase × Crew</i>	Intervention effects varied significantly across crews	0.020
<i>Children at home (e_kids_home)</i>	No significant differences observed	0.354
<i>Phase × Children at home</i>	No significant interaction observed	0.392
<i>Age (e_age)</i>	Significant differences between age groups	0.017
<i>Phase × Age</i>	Marginally significant interaction across phases and age groups	0.096
<i>Tenure (e_tenure)</i>	No significant differences observed	0.829

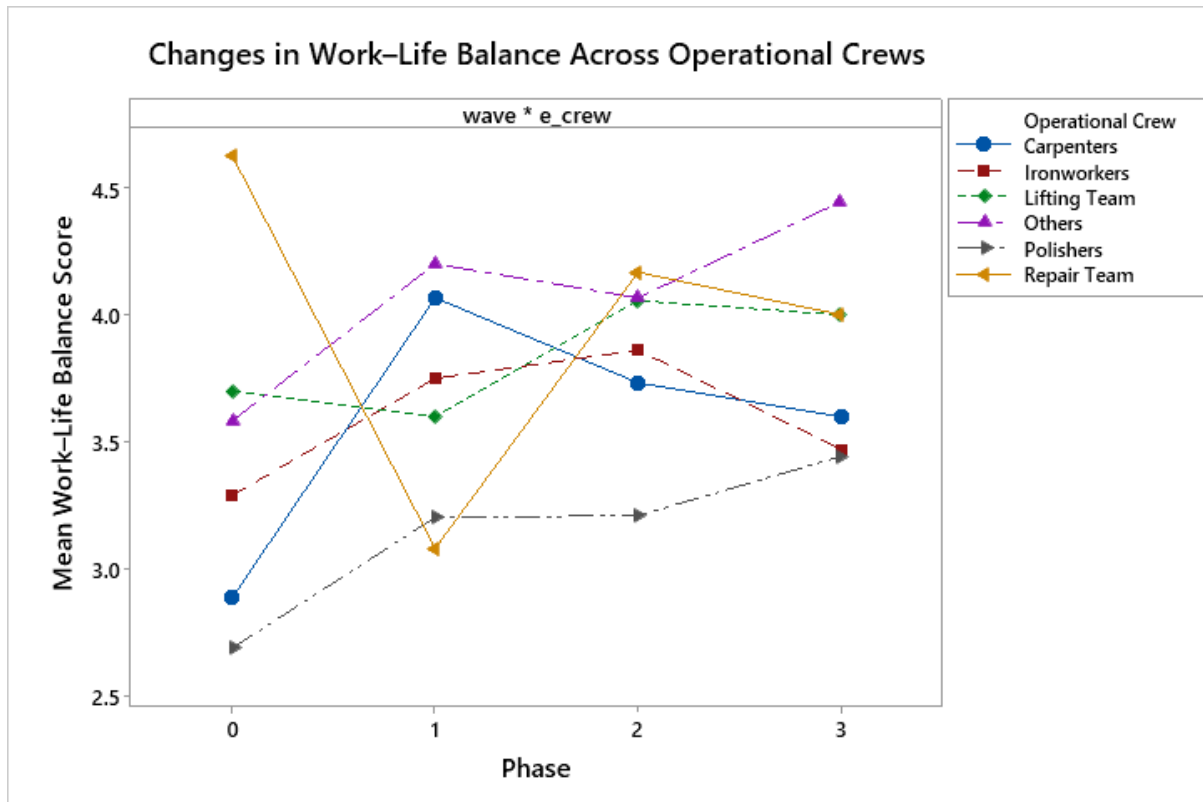


Figure 8: Changes in Work-Life Balance Across Operational Crews

Figure 8 presents the interaction plot for fitted mean work-life balance scores across intervention phases by crew. Although some variation can be observed between operational groups, the patterns across crews appear heterogeneous and should be interpreted cautiously given the relatively small subgroup sizes and variability across phases. While certain groups, such as the *Lifting Team* and the category of *Others*, displayed generally positive trends over time, other crews showed less consistent patterns throughout the intervention. These results may suggest that the effects of the intervention differed across operational roles; however, additional research with larger samples would be required to confirm these differences more robustly.

No statistically significant differences were observed for parental status or tenure, suggesting that the effects of the intervention were broadly consistent across these employee groups.

Significant differences in work-life balance were observed across age groups, with older employees generally reporting more favourable perceptions. However,

the interaction between age and intervention phase was only marginally significant ($p = 0.096$).

These findings indicate that variation in work–life balance outcomes were more strongly associated with operational role differences across crews than with individual demographic characteristics.

4.5 Employee Perceptions of the Intervention

To complement the quantitative analyses, twelve semi-structured interviews were conducted with employees from different operational areas of the plant. While the survey results helped identify overall trends in productivity, wellbeing, and work–life balance, the interviews provided additional insight into how employees experienced the intervention in practice and which operational factors may have contributed to the observed outcomes.

Table 8: Summary of Main Qualitative Themes Identified in Employee Interviews

<i>Theme</i>	<i>Main Findings</i>
<i>Personal time and family life</i>	Employees consistently reported greater availability of time for family activities, household responsibilities, rest, and personal interests.
<i>Motivation and productivity</i>	Participants commonly associated maintained productivity with the motivation generated by leaving work earlier, teamwork, and better coordination.
<i>Leadership and operational organisation</i>	Employees repeatedly emphasised the importance of leadership, communication, planning, logistics, and material availability for maintaining production performance.
<i>Recovery and wellbeing</i>	Most participants did not perceive substantial increases in stress or exhaustion and commonly associated earlier finishing times with improved recovery opportunities.

Many participants described spending more time with their families, resting, completing household responsibilities, or engaging in hobbies and personal activities. One employee explained: “*Before, I arrived home and my son was already asleep; now I can spend time with him in the afternoons.*”

Many employees associated the intervention’s success with the motivation generated by leaving work earlier, stronger teamwork, and improved operational

coordination. Several participants explained that crews became more focused during working hours and made better use of available time in order to maintain production targets.

Employees repeatedly mentioned that maintaining productivity depended heavily on material availability, communication between crews, and effective coordination across different production stages. Some participants specifically referred to the role of operational tools and equipment. Ironworkers highlighted the importance of rebar tying tools in improving efficiency, while lifting crews frequently mentioned crane coordination and logistics as critical factors for maintaining workflow continuity.

Although most participants viewed the intervention positively, several interviewees indicated that the success of the scheme depended on maintaining strong operational organisation and leadership. Some employees also suggested that the 4:00 pm finishing schedule tested during Phase 2 represented a more practical balance than the earlier 3:30 pm schedule implemented later in the intervention. According to several participants, leaving too early occasionally created transportation inconveniences due to overlapping traffic from nearby industrial facilities and collective transport routes.

Employee perceptions were consistent with the survey results. Approximately 87% of respondents expressed positive support for continuing the intervention, while the remaining participants generally reported neutral rather than negative perceptions.

5. Discussion and Analysis

5.1 Working Time Reduction and Operational Performance

The findings indicate that the gradual reduction in working hours did not result in the operational decline commonly associated with reduced labour time in industrial environments. Despite the progressive reduction in weekly labour hours across the intervention phases, overall production levels remained relatively stable while hourly productivity increased, suggesting that the relationship between labour time and operational output was less linear than conventional assumptions within industrial production might imply. Although weekly production fluctuated at certain points due to external operational factors such as weather conditions, public holidays and supply dependencies, reduced working hours remained operationally viable within the plant throughout the intervention. In this sense, the findings support previous research questioning the

assumption that longer working hours necessarily result in higher productive output (Pencavel, 2015; OECD, 2025).

However, the productivity improvements observed throughout the intervention did not emerge immediately. The results from Phase 1 suggest that both employees and supervisors initially went through a period of adjustment as they adapted to the modified schedules and new production dynamics. Rather than reflecting an immediate productivity effect, the intervention appeared to trigger a process of organisational adaptation. This suggests that the productivity gains observed later in the intervention were linked less to the reduction in hours alone than to the organisation's ability to adapt workflows, coordination practices and operational routines over time. This pattern is particularly relevant in production environments where continuity depends on coordinated activities.

One interpretation of these patterns is that the intervention altered not only the quantity of labour time available, but also the way production time was structured and coordinated within the plant. As discussed in the literature review, previous research has suggested that excessively long working hours may generate diminishing productivity returns due to fatigue, reduced concentration and lower marginal efficiency (Pencavel, 2015; Voglino et al., 2022). The findings are more consistent with an improvement in how working time was organised and utilised than with a simple increase in labour intensity alone. Earlier finishing times also appeared to reshape employees' relationship with working time itself, potentially reinforcing motivation, task focus and the perceived value of completing production targets efficiently.

Interviews and operational observations suggested stronger collaboration between crews during the later stages of the intervention. These observations appear consistent with the improvements in operational stability and productivity observed during Phases 2 and 3, as well as with previous construction management research highlighting the importance of coordination and communication across teams for maintaining productivity and operational performance within complex production environments (Lingard & Turner, 2022).

The operational findings also showed that absenteeism and total labour-related costs remained comparatively stable throughout the intervention despite the reduction in working hours. Although these indicators did not demonstrate substantial improvements overall, some variability was observed during the earlier intervention stages, particularly during Phase 1, where labour-related costs temporarily increased and absenteeism patterns remained less stable before gradually stabilising during later phases of the trial.

Nevertheless, the absence of major negative operational or financial disruption remains relevant within the context of industrial working time reduction, where concerns regarding labour costs, staffing pressures and productivity losses are often central organisational barriers. In this sense, the findings may suggest that gradual WTR can potentially be implemented without generating immediate operational instability or disproportionate cost escalation, at least within the organisational conditions examined in this study.

Importantly, these operational improvements occurred without corresponding increases in perceived work intensity across the intervention phases. This complicates interpretations suggesting that productivity gains under reduced working hours necessarily emerge through intensified labour effort alone. Instead, the findings are more consistent with the idea that organisational coordination, motivation and recovery processes played a greater role than simple work compression alone.

These outcomes should be interpreted cautiously. Previous research on organisational interventions has highlighted that implementation processes and organisational context can significantly influence intervention outcomes (Nielsen & Randall, 2013). From this perspective, part of the operational stability observed during the intervention may also reflect pre-existing conditions within the plant itself, including workforce stability, accumulated process improvements and prior operational investments that potentially facilitated adaptation to the reduced-hours arrangement, rather than the direct effect of reduced working hours alone. It is also possible that some of the operational improvements observed during the intervention resulted from process adaptations and organisational changes introduced alongside the reduction in working hours. Because these developments occurred simultaneously, their relative contribution cannot be fully separated within the present study.

The possibility of a Hawthorne or novelty effect should also be considered when interpreting the results. Employees were aware that the intervention was experimental and temporary, which may have influenced motivation and short-term behavioural responses. Nevertheless, a one-year follow-up of the UK four-day week pilot found that many positive outcomes were sustained over time, suggesting that such effects cannot be attributed solely to novelty (Autonomy, 2024). However, as the present study did not include a long-term follow-up period, it remains unclear to what extent the observed outcomes reflect sustained behavioural change rather than temporary responses. Encouragingly, as of June

2026, the organisation continues to operate under the 45-hour schedule introduced following the trial, with no major changes reported.

Furthermore, while hourly productivity increased across the intervention phases, the findings do not necessarily imply that reduced working hours universally generate productivity gains across all industrial settings. It remains possible that part of the observed improvement reflected a temporary intensification or compression of work effort rather than a permanent increase in operational efficiency. If the productivity gains had been driven primarily by intensified labour effort, stronger deteriorations in perceived recovery and workload pressure would likely have emerged more clearly across the intervention phases. This distinction is especially important given the relatively short duration of the intervention and the absence of long-term follow-up data.

Overall, the findings suggest that the relationship between working time and productivity in industrial environments depends less on the absolute number of hours worked than on organisational adaptation, workforce coordination and operational management. Rather than supporting the assumption that longer schedules necessarily sustain higher output, the intervention indicates that productivity outcomes may emerge through the interaction between recovery opportunities, motivation, workflow organisation and the organisational conditions under which reduced working hours are implemented.

5.2 Gradual Implementation as an Organisational Strategy

The earlier intervention phases appeared to involve a period of operational adjustment before productivity, absenteeism and labour-related costs stabilised during later stages of the trial. This pattern is particularly relevant in production environments where even minor disruptions can affect production processes. In this context, one of the most distinctive characteristics of the intervention was its phased structure. Rather than functioning solely as a reduction in labour hours, the intervention also operated as a transition process intended to minimise operational disruption while allowing employees and supervisors time to adapt to changing production dynamics.

This distinction is important because much of the existing working time reduction literature has focused on relatively abrupt reductions in weekly hours, often implemented through four-day week models within administrative or knowledge-intensive sectors. By contrast, the present intervention maintained a six-day operational structure while progressively reducing total weekly hours over time. The findings therefore suggest that working time reduction within industrial

settings may depend less on the adoption of a specific schedule model than on the organisation's ability to introduce temporal change without disrupting production continuity. In this sense, gradual reduction strategies may represent a more operationally adaptable form of WTR for physically demanding sectors. However, because the study did not include an abrupt-reduction comparison group, it cannot determine whether gradual implementation was more effective than an immediate reduction.

The phased nature of the intervention may also have reduced organisational resistance during implementation. Prior to the intervention, concerns existed that substantial reductions in working hours could negatively affect productivity, operational coordination and workforce discipline within the plant. Although senior leadership generally supported the intervention, some uncertainty remained regarding the long-term operational feasibility of reduced working hours within a manufacturing environment. In this context, the gradual structure of the intervention may have functioned as a form of organisational risk management allowing the company to evaluate operational outcomes gradually rather than implementing an immediate large-scale schedule reduction. At the same time, the gradual nature of the intervention likely moderated some of the organisational disruption that more abrupt working time reductions can generate, potentially limiting both resistance and the visibility of operational tensions during the transition process. The continuation of the 45-hour schedule following the formal intervention period may partially reflect this cautious organisational approach.

Although the present study cannot determine whether gradual implementation strategies are universally more effective than abrupt reductions in working hours, the findings indicate that implementation dynamics themselves may play a central role in shaping organisational responses to working time reduction. Within this intervention, the phased structure appeared to provide operational flexibility while allowing production routines, coordination practices and workforce expectations to adjust progressively over time.

5.3 Recovery, Wellbeing and the Experience of Work

While the operational findings discussed in previous sections are important, productivity outcomes alone provide only a partial explanation of how employees experienced the intervention in practice. Across the intervention phases, most wellbeing-related indicators showed gradual positive trends, including perceived stress, fatigue, sleep quality and overall employee wellbeing. Although not all changes reached conventional levels of statistical significance, the consistency

observed across multiple indicators suggests that employees generally experienced the intervention positively. In particular, the improvements observed in reported sleep duration and wellbeing patterns appear consistent with previous WTR research highlighting the relationship between long working hours, fatigue and recovery (Voglino et al., 2022; Pega et al., 2021).

These findings can be interpreted through recovery theory and the Job Demands–Resources (JD–R) framework. Recovery theory proposes that employees require sufficient time outside work to restore depleted physical and psychological resources (Sonnentag, 2018), while the JD–R model suggests that employee wellbeing depends on the balance between work demands and available resources (Bakker & Demerouti, 2017). Within the context of this study, the quantitative patterns appear more consistent with changes in employees’ perceptions of work strain and recovery opportunities than with a simple reduction in labour exposure alone. Indicators related to sleep duration and overall wellbeing generally improved across the intervention phases, while perceptions of workload pressure remained stable despite the increase in hourly productivity.

This distinction is particularly important because it complicates the assumption that improvements in employee wellbeing necessarily require substantial reductions in work intensity itself. The findings appear broadly consistent with the JD–R framework, suggesting that wellbeing outcomes may emerge not only through lower demands, but also through changes in how employees perceived and responded to work-related pressures. Within this study, the combination of gradual improvements in wellbeing indicators alongside more favourable perceptions of workload demands indicates that the intervention influenced employees’ everyday work conditions rather than simply reducing labour exposure. Importantly, these productivity gains were not accompanied by corresponding increases in perceived workload pressure or deteriorations in recovery opportunities, complicating interpretations of reduced working hours as merely a mechanism for compressing labour effort into shorter operational windows.

These findings should nevertheless be interpreted cautiously. Some of the positive wellbeing patterns observed during the intervention may partly reflect short-term behavioural responses associated with participation in a highly visible organisational initiative. Similarly, although employees did not report clear increases in perceived workload pressure, some degree of intensified effort during the remaining working hours cannot be fully excluded, particularly given previous concerns within the literature regarding work intensification under reduced-hours arrangements (Eurofound, 2022; Campbell, 2024).

These limitations may be particularly relevant within physically demanding construction and manufacturing environments, where long working hours and cumulative physical strain have been associated with fatigue, occupational injuries and long-term health risks (Lan et al., 2026; Dong et al., 2015; Pega et al., 2021). Although no major workplace incidents or accidents were reported during the intervention period, the relatively short duration of the trial limits the ability to assess whether the positive wellbeing patterns observed throughout the intervention would translate into sustained long-term health and safety outcomes. The wellbeing patterns observed during the intervention should therefore be interpreted primarily as short-term indicators rather than evidence of sustained long-term occupational health outcomes.

The relatively moderate magnitude of the wellbeing improvements observed throughout the intervention suggests that reductions in working hours may influence certain dimensions of employee experience more rapidly than others. While sleep patterns and perceptions of daily balance appeared to improve comparatively quickly, broader perceptions of wellbeing remained more stable across phases. This may indicate that temporal gains alone are insufficient to transform wider structural conditions shaping employee wellbeing, particularly within industrial and economically constrained contexts where financial pressures, commuting demands and long-term physical strain remain significant.

The findings suggest that reduced working hours influenced employee wellbeing not only through the reduction of labour time itself, but also through changes in how manageable employees experienced daily work demands and recovery opportunities throughout the intervention.

5.4 Work–Life Balance and Quality of Life Beyond the Workplace

Beyond recovery within the workplace itself, the intervention also appeared to influence how employees experienced and organised time outside work. Rather than depending solely on the quantity of non-work time created by the intervention, the perceived benefits of reduced working hours were closely connected to how employees were able to use and integrate that time within their everyday routines. Although work–life balance showed the clearest quantitative improvement, this finding should be interpreted cautiously because the composite index had comparatively low internal consistency.

Previous research has shown that working time shapes not only physical workload exposure, but also employees' ability to manage personal

responsibilities, maintain social relationships and exercise greater control over non-work time. Tensions between work schedules and non-work responsibilities may also significantly influence overall wellbeing and perceptions of quality of life (Pega et al., 2021; Allen et al., 2020). Within this study, the organisation and perceived usability of non-work time appeared to shape employees' experience of work–life balance more strongly than the absolute quantity of additional free time alone.

The results also suggest that the perceived value of reduced working hours depended not only on the quantity of non-work time generated by the intervention, but also on how that time aligned with employees' daily routines, commuting patterns and family responsibilities. Even during the earlier stages of the intervention, where reductions in weekly working hours remained comparatively moderate, employees already described more favourable perceptions regarding personal time availability and everyday routines outside work. Interview responses reinforced these patterns, particularly among workers who described greater opportunities to organise family responsibilities, personal activities and non-work routines during the intervention period.

In many cases, the perceived benefits of reduced working hours emerged less from substantial reductions in commuting time itself and more from employees arriving home earlier and having more usable time for household and family activities. These differences reinforce the idea that reductions in working hours do not automatically translate into improved wellbeing outcomes, as the value of non-work time remains shaped by household responsibilities, commuting conditions, schedule structure and forms of social and economic stability (De Witte et al., 2016; Chatterjee et al., 2020). Within this study, the relatively high levels of employee tenure and workforce familiarity may have contributed to this sense of stability, potentially facilitating employees' ability to reorganise routines and make practical use of additional non-work time outside the workplace.

At the same time, employees did not experience the benefits of reduced working hours uniformly. The practical value of earlier finishing times depended on individual commuting patterns, household routines and daily responsibilities outside the workplace. A minority of workers reported that the earlier finishing times associated with the 42-hour schedule generated additional pressure to complete production targets within shorter operational windows, while others noted that leaving work earlier occasionally coincided with peak traffic periods generated by nearby industrial plants. As a result, improvements in commuting conditions appeared to depend heavily on employees' specific travel distances and daily routines. These differences suggest that the practical benefits of reduced

working hours were shaped not only by schedule reduction itself, but also by the temporal organisation of employees' everyday lives.

The findings also highlight the subjective and context-dependent nature of work–life balance itself. Employees may experience the value of additional non-work time differently depending on personal and socioeconomic circumstances outside the workplace. As a result, some of the variability observed across work–life balance and quality-of-life indicators may reflect factors that extend beyond the intervention itself, and which are difficult to fully capture within organisational research settings.

Taken as a whole, the intervention appeared to influence not only the amount of time employees spent outside work, but also how that time was experienced and organised within everyday life. However, these improvements were neither uniform nor unlimited. The intervention improved temporal autonomy and perceptions of daily balance more clearly than evaluations of overall life quality, reinforcing the idea that the relationship between working time and wellbeing remains shaped by wider structural and socioeconomic conditions beyond the workplace itself.

5.5 Contextualising the Intervention Findings

The findings suggest that the effects of reduced working hours are shaped by the organisational, social and economic contexts in which they are implemented.

The subgroup analyses further suggested that employees did not interpret, or experience reduced working hours uniformly. Differences in work–life balance appeared more strongly associated with operational roles and personal expectations regarding non-work time than with household characteristics. Although employees generally responded positively to the intervention, some differences emerged across operational roles and age groups. Older employees tended to report more favourable perceptions of work–life balance and non-work time than younger workers throughout the intervention. This suggests that employees may have attached different meanings and expectations to additional non-work time, while the overall direction of the intervention remained positive across the workforce.

The findings also contrast with some of the initial organisational concerns surrounding the intervention. Prior to the trial, management expressed concerns that employees might use additional non-work time to seek secondary employment opportunities, particularly within the Mexican context, where long

working hours, informal employment and supplementary income activities remain relatively common across many sectors of the economy. Similar concerns regarding “moonlighting” under reduced working hour arrangements have also been discussed in previous literature examining overtime and secondary employment dynamics across different labour contexts (Renna, 2006). However, neither the survey responses nor the qualitative findings suggested clear evidence of widespread secondary employment activity during the intervention period.

Instead, employees more frequently described using additional time for family responsibilities, household activities and personal routines. This becomes particularly relevant when considering that several wellbeing-related indicators already showed comparatively positive baseline perceptions prior to the intervention itself, despite the physically demanding nature of the work environment. Although the study did not include external benchmarks, these findings may also reflect the complexity of wellbeing in Latin American contexts, where perceptions of quality of life do not always correspond directly to objective economic or workload conditions (Helliwell et al., 2024).

The findings are consistent with previous working-time reduction studies reporting stable productivity alongside improvements in employee wellbeing. Similar to the Icelandic and UK trials, employees reported better recovery, work–life balance and wellbeing, while operational performance was maintained. However, evidence on working-time reduction remains concentrated in high-income economies and service-sector occupations, making the present study a valuable contribution from a Mexican manufacturing environment characterised by physically demanding work, long baseline working hours and a phased implementation strategy.

Although the present study was not designed to evaluate long-term effects, future improvements remain plausible. Longer-term benefits may potentially emerge through lower turnover, recruitment savings and accumulated organisational learning.

The findings from this study should therefore be interpreted within the organisational and socioeconomic conditions under which the intervention took place. While the intervention produced relatively positive operational and wellbeing outcomes within this particular environment, the results also suggest that the effects of WTR are unlikely to emerge uniformly across different labour and organisational contexts.

6. Conclusions

This working paper examined two principal research questions: first, whether a gradual reduction in working hours could be implemented within a Mexican industrial setting without compromising productivity; and second, how employees experienced these changes in relation to wellbeing and quality of life. The study analysed a phased working-time reduction intervention implemented within a precast concrete manufacturing plant in Monterrey. Overall, the findings suggest that substantial reductions in working hours can be introduced within labour-intensive industrial environments while maintaining operational performance and generating positive employee responses across several dimensions of daily life.

In relation to the first research question, the study found that the gradual reduction in working hours did not produce evidence of operational decline during the intervention period. Production levels were maintained throughout the intervention despite the progressive reduction in total labour hours, while labour productivity per hour increased across successive phases. Production costs per square metre also declined during the later stages of the intervention, and absenteeism rates showed a downward trend over time. Although the study does not claim definitive causal relationships, these findings nevertheless challenge assumptions that long working hours are inherently necessary to sustain productivity within industrial production environments.

The positive operational outcomes observed throughout the intervention were consistent with the gradual implementation strategy adopted by the organisation. Unlike many working-time reduction experiments centred on abrupt transitions towards a four-day week, this intervention reduced working hours incrementally across successive phases, allowing supervisors and employees to progressively adjust workflow coordination, production planning and daily routines over time. Within a highly coordinated industrial environment, where production activities depend on sequential and physically interdependent tasks, this gradual adaptation appears to have played an important role in maintaining operational continuity throughout the intervention. However, the study cannot determine whether the phased approach was more effective than an immediate reduction.

These patterns highlight the importance of implementation processes within working-time reduction interventions. The findings suggest that organisational feasibility depends not only on the reduction of working hours itself, but also on how operational adjustments are managed within existing production systems. In this sense, the study supports previous organisational intervention research

emphasising the role of managerial support, workforce engagement and contextual adaptation in shaping intervention outcomes.

Beyond operational performance, we also examined how employees experienced the intervention in relation to wellbeing, recovery and quality of life. In relation to the second research question, the findings suggest that employees generally experienced the reduction in working hours positively, particularly regarding rest, family time and the organisation of daily routines outside work. Several wellbeing-related indicators displayed moderate improvements across the intervention phases, including reported sleep duration, stress-related measures and perceptions of work–life balance. Importantly, these improvements emerged without substantial increases in perceived workload intensity or reductions in perceived recovery opportunities.

These findings are particularly relevant within ongoing debates surrounding work intensification and shorter working weeks. Some critiques of working-time reduction argue that productivity gains may simply reflect the compression of the same workload into fewer hours, potentially increasing pressure and fatigue among employees. However, the present study found relatively stable perceptions of workload demands throughout the intervention despite the increase in productivity per hour. While the study cannot fully exclude the possibility that certain forms of work intensification occurred, the overall patterns observed across both survey responses and qualitative interviews suggest that employees did not generally experience the intervention as producing unsustainable increases in work pressure.

Instead, the findings appear more consistent with perspectives emphasising the importance of recovery and sustainable work organisation. Additional non-work time appeared to influence not only employees' opportunities for rest, but also how they organised family responsibilities, commuting routines and personal activities outside work. Interview participants frequently described the earlier finishing times as valuable because they created greater flexibility within everyday life rather than simply increasing leisure time in abstract terms. In this sense, the intervention influenced not only working schedules themselves, but also employees' experience of time beyond the workplace.

Although employees generally reported positive experiences, the overall pattern of positive responses was accompanied by some differences across operational groups and personal circumstances. Variations in commuting conditions, crew structures and family responsibilities suggest that the practical value of additional non-work time depends partly on broader social and organisational conditions.

Employees facing long commuting times or substantial family responsibilities often appeared to perceive greater benefits from earlier finishing times than those whose routines were already comparatively flexible. These patterns reinforce the multidimensional nature of wellbeing and suggest that the effects of working-time reduction cannot be understood exclusively through standard productivity or satisfaction indicators alone.

We also contribute evidence from a region and sector that remain comparatively underrepresented within existing working-time reduction literature. Much of the current evidence on shorter working weeks continues to originate from office-based organisations and high-income economies, particularly within Europe and other service-oriented sectors. By contrast, this study examined a physically demanding industrial environment within Mexico, a context characterised by long average working hours, comparatively low productivity per hour and limited organisational experimentation with reduced working schedules. This broadens the range of contexts in which working-time reduction has been shown to produce positive organisational and employee outcomes.

In this regard, the results suggest that concerns regarding productivity losses may not necessarily prevent reduced working hours from being operationally viable within industrial contexts when implementation strategies are adapted carefully to organisational conditions. At the same time, the study also illustrates that reduced working hours alone are unlikely to transform organisational wellbeing independently of other factors shaping employees' working and personal lives. The outcomes observed throughout the intervention emerged through the interaction between operational organisation, recovery opportunities, commuting realities, family responsibilities and employees' perceptions of how non-work time could actually be used in practice.

Taken together, the findings suggest that working-time reduction within industrial environments cannot be understood solely as a numerical reduction in labour hours. Rather, the intervention functioned as an organisational process through which production routines, recovery opportunities and employees' experience of non-work time were simultaneously reshaped.

Notes

1 Differences between planned and actual hours mainly reflect public holidays and weather-related disruptions.

2 Phase 1 actual hours were particularly affected by weather-related disruptions.

3 Calculated by multiplying average weekly hours worked by the average number of employees.

4 Phase 0 turnover corresponds to one employee leaving during the eight-week baseline period.

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