

Employee Well-being as a Competitive Edge: HR Interventions in High Stress Industries

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Abstract

Even though employee well-being is now at the core of human resource management (HRM) discussion, the idea that well-being is a source of competitive advantage is not well developed or widely substantiated, especially in sectors that are prone to chronic, structurally embedded strain. This paper proposes a conceptual framework on how Well-being becomes a strategic asset rather than a welfare provision in high-stress occupations like healthcare, aviation, emergency, extraction/construction, financial trading or always-on technology occupations. Building on the integration of job demands-resources theory, conservation of resources theory and the resource-based and dynamic-capabilities perspectives of the firm, we develop the Well-being Capability Cascade (WBCC): a five-stage model that connects the proposed HR well-being architecture with experienced HR well-being, to the pool of HR resources, to the reliability and adaptive capacity of operations, and lastly to the advantage that is difficult to imitate, due to having a causal ambiguity, a social complexity and a path dependency. Seven propositions are inferred, a three-by-three typology of interventions by prevention level, and locus of action are presented, and boundary conditions for the primacy of primary (demand-side) interventions over secondary and tertiary ones are specified. As credible effect estimates for this relationship require primary data that is not gathered in this paper, we refrain from reporting invented statistics, providing instead a clear and reproducible simulation harness to formalise the resource-stock dynamics implied by this model, and a measurement and estimation template with placeholder notation that can later be filled in by empirical data. The paper provides a theoretically grounded response to the "when" (not "if") question of well-being paying and a framework for HR practitioners to use for prioritizing scarce intervention dollars in contexts where strain can't be eliminated entirely.

Keywords: employee well-being; strategic human resource management; high-stress industries; job demands-resources; conservation of resources; occupational health interventions; competitive advantage; burnout

1. Introduction

Perhaps the most taken for granted and least carefully constrained statement in the current management literature is that a healthy, active workforce leads to better organisational outcomes. It's very user friendly. It is more complex with regards to its evidentiary status. Although decades of research have established a strong relationship between HRM and firm outcomes, from the beginning, the mechanism of this relationship through employee well-being has been challenged (Becker & Gerhart, 1996; Jiang et al., 2012). Another tradition sees HRM's value added as occurring via its mediating effect on the well-being of employees (Nielsen et al., 2017; Peccei & Van De Voorde, 2019). Work systems that achieve high performance are also said to achieve high performance because they increase the intensity of work, which can result in gains in performance and losses in well-being (Godard, 2004; Ramsay et al., 2000). Further correlational studies cannot easily be added to the two positions as they have different causal structure arguments, not different magnitude of an agreed causal effect. This conflict is exacerbated in those sectors in which psychological, physical, and temporal demands are features of the job that are not the result of managements shortcomings but rather the essential characteristics of the industry, i.e., "high stress industries." There are some structural features of these areas that separate them from normal white-collar work, and make critical care nursing, air traffic control, equipment response, deep-shaft mining, offshore energy, front office trading and always-on infrastructure engineering impossible without giving up the service: the demands cannot be eliminated without giving up the service. Night shifts can't be eliminated from a hospital and

vigilance requirements from an air navigation service provider. In these contexts, the typical recipe for improving well-being – cut demands – hits a hard limit, and the strategic issue becomes not only what to do about demands, but how to manipulate the resource side of the equation to enable workers to produce at high levels of demand.

That change is consequential as these are the areas in which the costs to the human capital of strain are most costly. The large replacement cost of the marginal employee is disproportionate to their salary, and lies with the most experienced employees in the organisation (Hancock et al., 2013; Park & Shaw, 2013). Fatigue and burnout are directly linked to safety incidents where errors have consequences, but not necessarily slow down the work (Dembe et al., 2005; Nahrgang et al., 2011). When the service quality is co-produced with the clients while under the emotional load, then the employees provide a different service (Salanova et al., 2005). The economic case for investing in well-being is thus strongest in the very places where the operational case for requiring a worker to do his or her job is strongest: this is where the pressure is most acute this paper aims to formalize. There are three gaps which motivate the analysis. First, the theories from strategic literature and the occupational health literature have evolved more or less independently, with the former theorizing the advantage without a psychological mechanism and the latter theorizing the strain without an account of appropriability. Second, there are many documented instances of interventions having less and weaker effects than organisational level redesign, but still being seen by organisations as worthy of more investment, which no current framework of thinking can explain strategically. Second, there are numerous cases of interventions having less and weaker effectiveness than an organisational-level redesign of the process, but still being deemed by organisations to be worthwhile of investment, which none of the extant thinking explains strategically. Third, the field does not have a disciplined formulation of the boundary conditions and circumstances needed for the investment in well-being to pay off, not just in terms of cost recovery, but in terms of an advantage.

The paper is a contribution in four ways. In theory, it brings together two literatures, that of the strategic approach to human capital and that of the appropriability logic, that have so far taken on the same phenomenon without addressing the other. In theory, it provides the psychological mechanism missing from the strategic approach to human capital and the appropriability logic missing from the occupational health approach. It provides an overview of the Well-being Capability Cascade conceptually which details the intermediate transformations in which architecture of HR evolves to advantage, and where value is frequently lost. From an analytical point of view, it provides an explicit and non-rhetorical formal dynamic depiction of well-being as a resource stock, thus making the non-explicit implications of the model inspectable and the assumptions rhetorical instead of explicit. Methodologically it provides an estimation template which, step by step, says what kinds of data would be needed to refute the argument and an explicit rejection of using illustrative numbers as evidence before any data has been gathered.

The paper goes on to discuss the following. The construct of employee well-being and its dimensionality are explained in section 2. The term "high stress industries," as defined in section 3, is not intended to be a random grouping of industries, but is meant to be a group of industries of theoretical interest. In Section 4, the strategic argument is developed, incorporating the job demands-resources theory, conservation of resources theory, and resource-based view. The Well-being Capability Cascade, along with seven propositions, is in Section 5. Section 6 outlines the intervention taxonomy, and summarizes the current evidence in each cell. Section 7 provides details on the analytical procedure, simulation harness and estimation template with placeholder notation. Implications, limitations and a research agenda are highlighted in the two sections 8 and 9, followed by the conclusion in section 10.

2. Conceptualising Employee Well-being

2.1 From absence of illness to a multidimensional construct

Early occupational health scholarship was a negative focus on well-being, which was defined as "no strain, no illness, no injury" (Danna & Griffin, 1999). This definition is measurable and has the drawback of cutting off the construct at zero: If an employee is not ill, then he or she is not thriving. A two dimensional model, based on pleasure and arousal, was introduced by Warr (1990) which has been found to be important for performance research, as it allows differentiation between contentment and enthusiasm. Since then, there have been additional scholarships that have expanded the construct. Grant et al. (2007) suggest a three-part definition that includes

psychological, physical and social well-being and note that the very nature of managerial practice often has a causal effect on which of these is strengthened and which weakened, thus denying any automatic complementarity.

Most HRM practices in the present focus on four dimensions. Psychological well-being includes affective responses, engagement, meaning and the lack of burnout (Maslach et al., 2001). Physical wellness includes musculoskeletal health, heart and lung health, sleep quality and exposure to injury. Social well-being encompasses quality of relationships in the workplace, belonging and psychological safety (Edmondson, 1999). Financial well-being is a relatively new component and refers to the stability and certainty of income, something which is materially significant in shift work and contingent situations where income is volatile and is a stressor on its own. This structure, its main historical origins and the measurements associated with each dimension are described in Table 1.

Table 1. Dimensional structure of employee well-being, principal antecedents, and measurement traditions

Dimension	Core content	Principal job-design antecedents	Established measurement traditions
Psychological	Affective balance, engagement, meaning, exhaustion and cynicism	Autonomy, role clarity, feedback, challenge-hindrance demand mix	Burnout inventories; engagement scales; affective well-being scales (Warr, 1990)
Physical	Sleep sufficiency, fatigue, musculoskeletal and cardiometabolic status, injury exposure	Shift architecture, hours, physical load, environmental hazard	Actigraphy and sleep diaries; fatigue-risk indices; injury registers
Social	Belonging, relational quality, psychological safety, perceived support	Team stability, supervisory behaviour, just-culture norms	Psychological safety scales (Edmondson, 1999); support scales
Financial	Income adequacy, earnings predictability, buffer against shocks	Pay structure, overtime dependence, scheduling stability	Financial-strain and income-volatility indices
Eudaimonic (cross-cutting)	Purpose, competence, relatedness, autonomy satisfaction	Task significance, skill variety, participation in decisions	Basic psychological need satisfaction scales (Deci et al., 2017)

2.2 Well-being as stock rather than state

One of the concepts that plays a key role in this paper is that of "well-being" as a "stock" and not a "state". Conservation of resources theory suggests that people seek to acquire, preserve and defend resources and that stress is caused by the loss of resources or a threat to losing resources (Hobfoll, 1989; Hobfoll et al., 2018). Resources are transported in caravans, and are not shared equally among the people and places, and resources create spirals: Loss begets more loss faster than gain begets more gain faster. For organisations, it means that wellbeing at any one time is dependent upon the whole demand-exposure and resource-replenishment history, rather than just on current exposures. The strategic counterpart is provided by the analysis of asset stock accumulation of Dierickx and Cool (1989). Stocks that have to be built up over time as a consistent flow of resources can't be bought on a factor market; they have a time-compression diseconomy; and can therefore be a

candidate for sustained advantage. This stock idea has three implications for the argument that is developed below. First, it provides a reason why, across an entire group of studies, cross-sectional studies of well-being and performance systematically underestimate the relationship: they watch a level of well-being and performance without watching the path of its accumulation. Second, it suggests that the recovery paradox exists: the ones most in need of psychological detachment are least likely to be able to do so given the effects of depletion on the very behaviours necessary for recovery (Sonnentag, 2018; Sonnentag et al., 2017). Third, it explains why well-being advantage is imitation-proof: it takes 10 years to build a trust, which a competitor can copy overnight.

2.3 The measurement problem

Any communication of a strategic message of well-being will inherit the measurement challenges of the well-being construct. There are three consequential here. The first is what we call “reference-group bias”—that is, employees compare and rate themselves in terms of the norms of their particular profession, and thus, the same objective circumstances result in different subjective ratings by employees in different units within the same profession, and worse, across different professions. The direction of the inversion is reversed in a critical care unit that has a culture of endurance, as opposed to, say, a unit that has more strict norms of disclosure. In a critical care unit where there is a culture of endurance, it may be reporting lower strain than another unit that has norms that are more permissive. The second is being out of the picture; well-being surveys which are cross-sectional only consider people who have not been very badly affected by the strain and effectively exclude those who have been very badly affected, meaning that estimates of the demand-strain relationship tend to be closer to zero in the very sectors where the strain is most severe. The third is that the majority of evidence collected in the workplace is common-source in nature, causing observed links between psychological states and self-reported operational outcomes to be greater than observed links between psychological states and actual operational outcomes (Podsakoff et al., 2012). These problems call for a triangulated measurement approach, using self-report measures with behavioural and administrative measures: absence spells, sickness certificate patterns, voluntary turnover among staff with long service commitments, absences on shifts, overtime dependency, reporting of incidents and near-misses, and physiological and/or actigraphic sleep measures where available. None of these indicators are standalone and several are confounded and often increase alongside other indicators of incidents decreasing, such as reporting of incidents, which increases with psychological safety. The methodological implication is that well-being measurement in high stress industries should be considered a multi-indicator inference problem and not a problem of administering the survey.

3. High-Stress Industries as a Theoretical Category

3.1 Defining features

A high stress industry is an industry meeting at least three out of the following five structural stressors, which are not mutually exclusive, and could not be eliminated without changing the nature of the core service: (1) The industry has at least one structural temporal demand that is inescapable, such as having a night-shift or a long duty day; (2) The industry has a high degree of consequence of error, meaning that the error causes harm to third parties, not just to output; (3) The industry exposes the worker to sustained emotional or cognitive strain, such as witnessing suffering, hostility, or continuous surveillance; (4) The industry exposes the worker to a hazard of a physical, chemical or biological nature; and (5) There is a chronic supply constraint in the relevant labour market, i.e. load cannot be reduced by simply adding workers. The last one makes an occupational health issue a strategic one, since it eliminates the possibility of tackling demand pressure with people. This "structural" definition was chosen because it is not based on the individual's perception of the vibration. It does not include a classification of sectors based on the typical level of reported stress, which blends the objectivity of the stress with reporting norms and occupational identity. Occupations that glorify suffering tend to under-report strain and any typology that relies on self-report will miss out on just the part of the field that interests them most. Table 2 uses the definition to the six representative sectors to define the prevailing stressor profile, the major irreducible demand, and the human-capital exposure that provides the power to the strategic argument.

Table 2. Structural stressor profiles across representative high-stress sectors

Sector	Dominant stressor profile	Irreducible demand	Principal human-capital exposure	Characteristic failure signature
Acute and critical care health services	Emotional labour, moral distress, circadian disruption, staffing shortfall	Continuous 24-hour coverage of unpredictable demand	Long training lead times; licensure constraints; specialty scarcity	Burnout, presenteeism, clinical error, exit from the profession
Aviation operations and air traffic management	Sustained vigilance, high error consequence, rostered fatigue	Real-time safety-critical monitoring	Highly specific certification; very long replacement cycles	Attention lapses, incident reporting suppression, early retirement
Emergency and first-response services	Traumatic exposure, unpredictability, physical risk	Immediate response to critical events	Experience-dependent judgement; small trained pools	Post-traumatic stress, sickness absence, medical retirement
Extraction, offshore energy and heavy construction	Physical hazard, isolation, extended rosters, family separation	Site-bound continuous operations	Skilled trades scarcity; remote-site premium	Injury, substance misuse, high voluntary turnover
Investment banking and front-office trading	Time pressure, performance volatility, long hours culture	Market-hour coverage and transaction deadlines	Firm-specific relational capital; deal-team continuity	Attrition of mid-tier talent, risk-taking under fatigue, reputational events
Always-on technology operations and cybersecurity	On-call interruption, alert fatigue, boundaryless work	Continuous system availability and threat monitoring	Scarce specialised skills; tacit system knowledge	Alert desensitisation, incident-response degradation, resignation clustering

3.2 Why the standard prescription underperforms here

The prevailing prescription for the problem of occupational health is to decrease demands and enhance resources. The first half of the above instructions is only partially available in high stress industries. If demand reduction is actually possible, it is often prevented by a second order constraint, such as the staffing ratio that must be kept under control, the level of service, or the roster pattern that cannot be changed without going back to an industrial agreement. The practical implication is that it seems that the system of the organisation drifts toward interference with the employee's response to the demands, which the HR function can intervene on individually without the need for operational, financial and sometimes regulatory coordination, while the interference with the demands can only be achieved through such a coordination. It's a commonly noted drift. The literature review of job stress interventions all agree that there are more individual focused interventions being practiced, and that organisational level interventions and combined interventions are more likely to have longer-lasting impacts (Cooper & Cartwright, 1997; LaMontagne et al., 2007; Semmer, 2006). Results from physician burnout studies are similar:

Individual and structural interventions result in significant decreases in burnout markers, although there is substantial variation across studies and many studies have limited power (Panagioti et al., 2017; West et al., 2016). The findings of Cochrane evidence on stress prevention in healthcare workers are similar, but also highlight the fact that many of the studies on which the evidence is based are of low quality (Ruotsalainen et al., 2015). But it is not that interventions are not working, it is that they are being asked to do something their mechanism can't do when the demand structure is left the same.

4. Theoretical Foundations of the Strategic Argument

4.1 Job demands-resources theory and the dual-pathway structure

The micro-foundation is given in terms of the Job Demands-Resources (JD-R) model. It suggests two seemingly independent processes: a health-impairment process which involves the depletion of energy resources by demands and the resulting burnout; and a motivational process which involves the utilization of energy resources in the drive for engagement and performance (Bakker & Demerouti, 2007; Demerouti et al., 2001). Resources mediate the effects of demands on strain and demands can magnify the effects of resources on motivation. This flexibility of the model, where any demand or resource could be specified for any occupation, makes it suitable for sectors where the demand profile is very different from other settings where a lot of well-being research takes place, mainly offices. There are two points which it is necessary to emphasize for the present purpose. The challenge-hindrance distinction is that not all demands are the same: challenge demands such as workload and responsibility can increase motivation without sacrificing energy, while hindrance demands like role ambiguity, administrative hassles and organisational politics detract from motivation without providing the benefit that is sacrificed. (Crawford et al., 2010; LePine et al., 2005). Frequently in high stress industries, it is the intrinsic demands of the work that are felt as challenges, and the increased administrative and organisational demands, around the work, that are felt as hindrances. This is what has managerial implications – the most efficient primary intervention is frequently not simply reducing clinical / operational load but eliminating hindrance demands on top of it. The second refinement is to do with safety outcomes. Recent meta-analytic research that combines the JD-R model with safety research indicates that the relationship between job resources and burnout, and the relationship between job demands and safety participation and failures in safety compliance and accidents, respectively, are mediated by the relationships between the two constructs and engagement (Nahrgang et al., 2011). This is the link between mental and business factors and forces where the operational results that competitive advantage is built. The extended dual-pathway structure in the high stress situation is shown in figure 1.

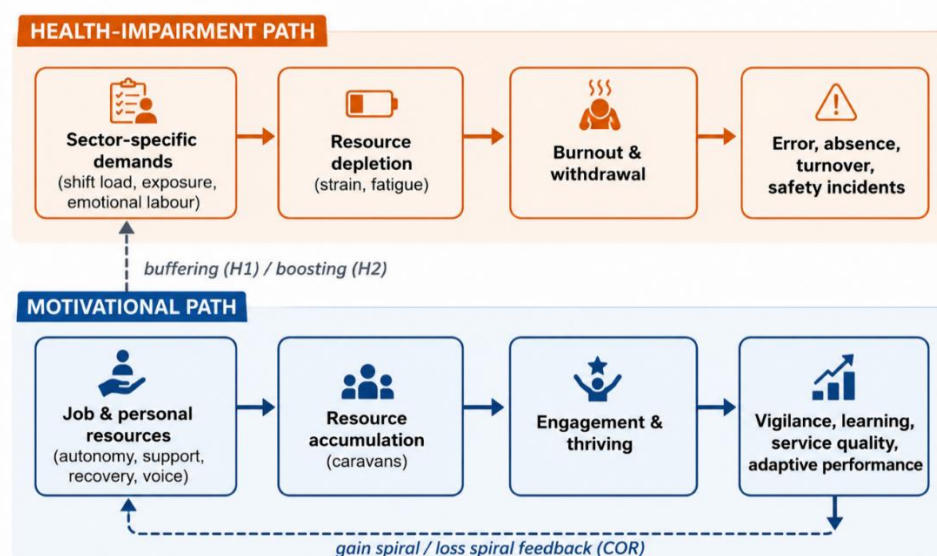


Figure 1. Extended dual-pathway job demands-resources structure adapted to high-stress industry contexts, incorporating conservation-of-resources spiral feedback.

4.2 Conservation of resources and the dynamics of depletion

JD-R is about structure while conservation of resources (COR) is about dynamics. COR's spiral propositions suggest that the more a person loses a resource the greater their loss becomes, and the more a person gains the more he/she can lose. COR's spiral propositions indicate that as a person loses a resource, the resource loss increases, and as the person gains a resource, the resource gain increases (Halbesleben et al., 2014; Hobfoll et al., 2018). The organisational implication is a divergence dynamics. If the two units experience the same shock in their demands, they will start to differ over time, with the more well-resourced unit being able to take the shock and the less well-resourced unit going down the slippery slope of losses. When performance-managing weaker units, it will be important to note that observed inter-unit performance dispersion within an organisation could be due to accumulated resource history, not to current management quality.

There is yet another mechanism, recovery research. Experiences outside work such as detachment, relaxation, mastery and control replenish depleted resources and their absence is a predictor of ongoing strain, alongside workload (Sonnentag & Fritz, 2007; Sonnentag, 2003). The recovery paradox is the challenge for designing interventions: recovery need is greatest when recovery capacity is lowest (Sonnentag, 2018). This means that programs that depend on employee voluntary participation (e.g., wellness programs, mindfulness training) will be most utilized by the least at-risk employees, and least utilized by the at-risk employees, resulting in an inverse-care pattern of program uptake that may benefit the overall program evaluation scores but not the risk population.

4.3 The resource-based view and the appropriability of well-being

To account for the strategic step one must have a description of the reason why well-being advantage is not competed away. The resource-based view posits that resources that are valuable, rare, imperfectly imitable, and non-substitutable (Barney, 1991) are those that create sustained competitive advantage. Strategic HRM scholarship has long suggested that it is not the individual human resources but the system of HR resources that is valuable, rare, imperfectly imitable, and non-substitutable (Wright et al., 2001). Ployhart and Moliterno's (2011) multilevel model of human capital resource emergence describes how individual attributes combine to form a human capital resource at the unit level via the processes of tasks and socialization; these are the processes in which well-being becomes manifest: even if an individual has well-being, its presence at the unit level is not guaranteed by task or social processes.

Well-being-based advantage is fully safeguarded by three isolating mechanisms. Causal ambiguity occurs because the connection between a particular practice and an operational outcome involves psychological states or activities that are not directly observable or easily associated with the practice; as a result, there is no clear picture for the competitors about what they can copy. Social complexity is created when the operating asset is a social network of relationships, norms, and trust instead of a policy, and this can't be "transplanted" (Barney, 1991). The time-compression diseconomies (Dierickx & Cool, 1989) that result from the stock nature of well-being described above, explain the path-dependency issue: If a competitor tries to replicate the network quickly, it will have to cover the time involved in building the stocks. To these we add a fourth which is specific to well being: attributional dependence. The motives behind HR practices are interpreted by employees and practices that are perceived as being motivated by concern for employees leads to different outcomes than when they are perceived as being motivated by cost control and exploitation (Nishii et al., 2008). A competitor can thus copy the practice and not the effect and yet not be considered to have copied the effect, as the effect requires a history of practice that establishes the attribution.

Finally, the advantage is important when volatility is high (Teece et al., 1997) according to the dynamic capabilities view. In volatile work settings, it's essential to be able to discover, capture and reconfigure, and that requires employees who have cognitive slack, a willingness to voice concerns and discretionary energy to invest in adapting. Trained, experienced staff are not only less productive, they are less adaptable and when stressed, fall back on routine, when routine is not enough. In this way, this relationship ties in with the high reliability organising literature, which requires the psychological capacity of employees to 'see' and report on anomalies and to take action upon them (Weick & Sutcliffe, 2007; Vogus & Sutcliffe, 2007).

5.1 Model structure

We integrate the foregoing into the Well-being Capability Cascade (WBCC), presented in Figure 2. The model traces five sequential stages. The intended HR well-being architecture comprises the designed system of practices, resourcing, and governance. Experienced well-being is the employee-level stock realised from that architecture, which may diverge substantially from intent depending on implementation. The human-capital resource pool is the unit-level emergent property comprising retention of experienced staff, depth of tacit expertise, and available discretionary effort. Operational reliability and adaptive capacity constitute the capability layer: error rates, incident frequency, service consistency, and the capacity to reconfigure under disruption. Sustained competitive advantage is the outcome layer, protected by the isolating mechanisms identified above.

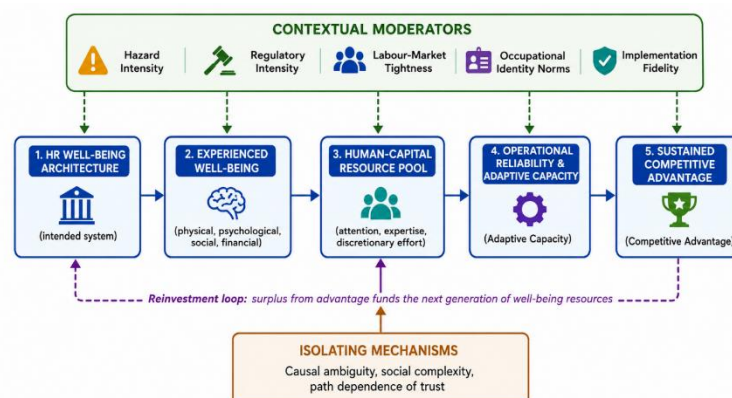


Figure 2. The Well-being Capability Cascade (WBCC), showing the five-stage conversion of HR architecture into sustained advantage, contextual moderators, isolating mechanisms, and the reinvestment loop.

Two features of the model deserve emphasis. First, the reinvestment loop makes the cascade recursive rather than linear: advantage generates surplus, and the allocation of that surplus to the next generation of well-being resources determines whether the cascade compounds or decays. Organisations that harvest the surplus without reinvestment convert a durable advantage into a temporary one. Second, the transition from stage one to stage two is the principal site of failure. The gap between intended and experienced practice is governed by HR system strength, that is, the distinctiveness, consistency, and consensus of the signals the system sends (Bowen & Ostroff, 2004), and by employee attributions of managerial motive (Nishii et al., 2008). A well-designed architecture that employees read as instrumental produces cynicism rather than well-being, which is why well-being programmes introduced alongside redundancy exercises reliably fail.

5.2 Propositions

Seven propositions follow from the model. They are stated at a level of generality that permits testing across sectors while retaining the boundary conditions specific to high-stress work. Table 3 summarises the propositions and the constructs they implicate.

Table 3. Propositions derived from the Well-being Capability Cascade

Proposition	Statement	Primary theoretical warrant	Focal constructs
P1	The relationship between the intended HR well-being architecture and experienced well-being is moderated by HR system strength and by employee attributions of	HR process theory; attribution theory	System strength; commitment vs. control attributions

Proposition	Statement	Primary theoretical warrant	Focal constructs
	managerial motive, such that identical architectures produce divergent well-being where attributions differ.		
P2	In high-stress industries, primary (demand-side) interventions exhibit larger and more durable effects on experienced well-being than secondary or tertiary interventions, and the differential widens as hazard intensity increases.	JD-R; intervention evaluation literature	Demand structure; intervention level; effect durability
P3	The removal of hindrance demands yields greater well-being return per unit of managerial effort than the reduction of challenge demands, whose reduction may simultaneously suppress motivation.	Challenge-hindrance framework	Hindrance load; challenge load; engagement
P4	Well-being stock mediates the relationship between HR architecture and unit-level operational reliability, and this mediation is stronger for outcomes requiring vigilance and discretionary reporting than for outcomes requiring routine compliance.	JD-R safety pathway; HRO theory	Well-being stock; safety participation; safety compliance
P5	Advantage derived from well-being is more imitation-resistant than advantage derived from equivalent investment in technology or compensation, because of causal ambiguity, social complexity, path dependence, and attributional dependence.	RBV; asset stock accumulation	Isolating mechanisms; imitation lag
P6	The performance return to well-being investment is convex in environmental volatility: returns are modest under stable operating conditions and increase sharply under disruption, because adaptive capacity is drawn from discretionary psychological resources.	Dynamic capabilities	Volatility; adaptive performance; cognitive slack
P7	Voluntary-participation interventions exhibit inverse-care uptake, whereby employees with the greatest resource depletion participate least, biasing programme evaluations upward and leaving the at-risk population unaffected.	COR; recovery paradox	Uptake selection; depletion; evaluation bias

6.1 Organising logic

Occupational health practice has long distinguished primary interventions, which alter the source of strain; secondary interventions, which build capacity to cope with strain; and tertiary interventions, which treat and rehabilitate those already harmed (Cooper & Cartwright, 1997; LaMontagne et al., 2007). Crossing this prevention dimension with the locus of action, that is, whether the intervention operates at organisational, team or job, or individual level, generates a nine-cell taxonomy that clarifies both the mechanism and the political economy of intervention choice. Figure 3 presents the taxonomy populated with representative practices for high-stress sectors.

	Primary (demand & design)	Secondary (capability & coping)	Tertiary (recovery & return)
Organisational level	 Rostering & fatigue-risk management; staffing floors; workload caps	 Psychological-safety norms; just-culture reporting systems	 Return-to-work protocols; critical-incident stress management
Team / job level	 Job crafting & task redesign; team autonomy over schedules	 Peer-support & Schwartz-round style forums; leader well-being training	 Graded duty re-entry; case conferencing; team debriefs
Individual level	 Predictable time off; protected recovery windows; right to disconnect	 Resilience, mindfulness & recovery-skills training; financial-wellness coaching	 EAP counselling; clinical referral; disability & trauma support

Shading indicates decreasing leverage over the source of strain (left to right) and decreasing systemic reach (top to bottom).

Figure 3. Nine-cell taxonomy of HR well-being interventions, crossing prevention level with locus of action, populated with representative practices for high-stress industries.

The taxonomy makes visible a systematic asymmetry. Cells in the upper-left quadrant, organisational-level primary interventions, offer the greatest leverage over the source of strain but require cross-functional authority that HR functions frequently lack. Cells in the lower-right quadrant, individual-level tertiary interventions, are the easiest to procure, the simplest to evaluate on utilisation metrics, and the least capable of altering the conditions that generated the need. The observed concentration of organisational spending in the lower-right is therefore explicable as a rational response to internal authority constraints rather than as an analytical error, which suggests that correcting it requires governance change rather than better evidence alone.

6.2 Primary interventions: engineering the demand structure

The industries with high stress level have the following 4 families of primary interventions. Aside from the fact that hours limits are not the most effective method for controlling fatigue, evidence-based connections between extended hours and increased injury rates (Dembe et al., 2005) as well as between hours limits and performance impairment comparable to that of alcohol intoxication (Dawson & Reid, 1997) make fatigues systems based on biomathematical modelling of roster patterns, forward rotation, and predictable recovery windows more compelling. Architecture interventions for staffing ensure that the ratio of staff to children is maintained and that there is enough 'float' for high demand to not become mechanically an individual overload. Work redesign interventions reconfigure task allocation, decision latitude and schedule control; the highest level of evidence is the organisational work-redesign trials in which an increase in schedule control, in conjunction with increased supervisor support, led to an increase in well-being outcomes without a decrease in performance (Moen et al., 2016). In clinical contexts, documentation burden, duplicative reporting and administrative friction are important topics that come with hindrance-demand removal, as they are a direct threat to the core of what is intrinsically valuable. The unique characteristic of this family is that it alters the behaviors of the workers, not the feelings they

have toward them. This is also why it can be tricky: HR is not just responsible for operational decisions with clinical, engineering or trading leadership but also has to share responsibility for these decisions, and when made, they are reflected in the operating budget line and not in a programme line for discretionary well-being spending.

6.3 Secondary interventions: building capacity under sustained demand

Secondary interventions take for granted the demand structure and reinforce the ability of the individual and collective to maintain the demand structure. The greatest number of sessions, by volume, are in the form of resilience and stress-management training, programmes involving mindfulness and recovery-skills training. On average, studies of workplace stress management interventions have yielded reliable but small increases in stress-management effectiveness, with psychological outcomes showing greater improvement in the cognitive-behavioural stress-management approaches compared to relaxation-only approaches and with effects fading with follow-up time (Richardson & Rothstein, 2008); workplace mindfulness studies show improved psychological outcomes such as reduced emotional exhaustion and increased job satisfaction (Hülshager et al., 2013). The approach is repeated in family-supportive supervisor behaviour training, with the idea that the most proximal factors to experienced demands and resources are the behaviours of supervisors; results of this intervention are presented and shown to be conditional, with those having higher initial conflict benefiting the most (Hammer et al., 2011; Kossek et al., 2011). A third family, which are also very important in sectors with traumatic exposure, are peer-support structures which work on a social level rather than individual.

There are two warnings associated with this category: First, the first and secondary interventions in an unaltered demand setting risk conveying the message that it is a strain that is a lack and is thus a hindrance demand. Secondly, one of the ways that the uptake of interventions is skewed is that the people who opt in are not necessarily the ones most likely to come close to collapse, as P7 put it: "Those who volunteer to do resilience training are not people who are most likely to come close to collapse".

6.4 Tertiary interventions: containment and return

Tertiary interventions include employee assistance programmes, clinical referral pathways, critical incident stress management, graded return-to-work protocols, and disability case management. Their function is containment of harm already sustained and restoration of capacity. They are necessary in any high-stress sector and should not be judged by a preventive standard they are not designed to meet. The strategic risk is substitution: because tertiary provision is procurable, measurable, and visibly compassionate, it can crowd out the primary work that would reduce the caseload. A defensible portfolio treats tertiary provision as a floor rather than a strategy.

Table 4. Intervention families, hypothesised mechanism, evidentiary status, and implementation constraint

Intervention family	Prevention level	Hypothesised mechanism	Evidentiary status in high-stress settings	Principal implementation constraint
Fatigue risk management and roster redesign	Primary	Restores physiological recovery capacity; reduces vigilance decrement	Strong basic-science warrant; fewer controlled organisational trials	Industrial agreements; coverage economics
Staffing architecture and float capacity	Primary	Decouples demand spikes from individual overload	Observational and quasi-experimental; endogeneity concerns	Operating cost visibility; labour supply

Intervention family	Prevention level	Hypothesised mechanism	Evidentiary status in high-stress settings	Principal implementation constraint
Work redesign and schedule control	Primary	Increases decision latitude and predictability	Controlled organisational trials available in some sectors	Cross-functional authority; supervisory capability
Hindrance-demand reduction	Primary	Removes depleting load without reducing meaningful work	Emerging; strong theoretical warrant	Process ownership dispersed across functions
Stress-management and resilience training	Secondary	Builds appraisal and coping capacity	Meta-analytically supported; modest and decaying effects	Uptake selection; time release
Mindfulness and recovery-skills programmes	Secondary	Improves detachment and attentional regulation	Positive but heterogeneous; short follow-up horizons	Recovery paradox; voluntary participation
Leader well-being and supportive-supervision training	Secondary	Alters proximal demand-resource delivery	Supported, with conditional effects by baseline need	Supervisor workload; cascade fidelity
Peer support and structured reflective forums	Secondary	Provides social resource and normalises disclosure	Promising; evaluation designs often weak	Confidentiality; professional stigma
Employee assistance and clinical referral	Tertiary	Treats manifest disorder; restores function	Established clinical basis; workplace-level evidence limited	Utilisation stigma; access latency
Return-to-work and graded re-entry protocols	Tertiary	Prevents relapse; preserves accumulated expertise	Supported in disability management literature	Line-manager capability; role adaptation

6.5 Sequencing, dosage, and the portfolio problem

Framing intervention choice as a portfolio problem rather than a menu of options exposes three design parameters that are usually left implicit. Sequencing determines the attributional context into which each subsequent intervention is received: because employees infer managerial motive from the order in which problems are addressed, a resilience programme launched while a known and remediable rostering problem persists is read as displacement of responsibility, and by P1 this attribution degrades the effect not only of that programme but of the surrounding architecture. Dosage determines whether an intervention crosses the threshold at which the underlying mechanism can operate; brief, single-session training delivered to employees who cannot protect time to practise is unlikely to alter recovery behaviour, and evaluations of such interventions are better read as tests of dosage than as tests of the approach. Fidelity determines whether the intervention as delivered resembles the intervention as designed, and the organisational intervention literature has repeatedly found that variation in implementation process accounts for more outcome variance than variation in intervention content (Nielsen & Miraglia, 2017; Nielsen & Randall, 2013).

These parameters interact with the taxonomy in a specific way. Primary interventions are relatively insensitive to employee-level fidelity because they change conditions regardless of individual behaviour, but they are highly sensitive to managerial fidelity, since a roster policy applied inconsistently by unit managers ceases to be a policy. Secondary interventions invert this dependence: they require employee engagement to work at all, which is why uptake selection is their characteristic failure mode. A coherent portfolio therefore does not simply allocate budget across cells; it matches each cell's dominant failure mode to a corresponding governance control, monitoring managerial compliance for primary interventions and participation representativeness for secondary ones. Evaluation designs that ignore this distinction routinely misattribute implementation failure to conceptual failure, retiring approaches that were never actually delivered.

7. Analytical Protocol

7.1 Evidence synthesis design

The conceptual argument above is intended to be testable. We specify a two-part protocol: a systematic evidence synthesis and a formal dynamic model. The synthesis follows PRISMA reporting conventions, searching Scopus, Web of Science, PsycINFO, and Business Source Complete for peer-reviewed studies evaluating HR or occupational health interventions in sectors meeting the structural definition in Section 3.1, restricted to studies reporting well-being and at least one organisational or operational outcome. Inclusion requires a comparison condition or a repeated-measures design; purely cross-sectional correlational studies are excluded from the effect synthesis and retained only for construct mapping. We note explicitly that this paper reports no yield counts, pooled effect sizes, or moderator estimates, because the search has not been executed for the present manuscript and substituting illustrative values would misrepresent the evidentiary status of the argument. Bracketed notation is used throughout in place of numbers that would require primary data. Readers extending this work should treat Table 6 as executable templates rather than as results.

7.2 A simulation harness for resource-stock dynamics

Because the WBCC posits stock dynamics rather than static associations, its behavioural implications are not obvious from the verbal statement alone. We therefore formalise the well-being stock as a discrete-time process in which the stock of unit i at time t is a function of its prior level, a strain flow proportional to effective demand, a recovery flow proportional to the gap between current and baseline stock, and a stochastic shock. Primary interventions enter by scaling effective demand downward, secondary interventions by attenuating the conversion of demand into strain, and tertiary interventions by accelerating recovery. Table 5 sets out the parameters, their interpretation, and the values declared for the illustrative runs. These values are declared rather than estimated; they are chosen to expose the qualitative behaviour of the system, and no claim is made that they correspond to any empirical population.

Table 5. Simulation harness: parameters, interpretation, and declared values

Parameter	Interpretation	Declared value	Role in the model
d0	Baseline effective demand intensity	1.00 (normalised)	Scales the strain flow
lambda	Natural recovery rate toward baseline stock	0.055 per period	Governs mean reversion
kappa	Conversion of demand into resource depletion	0.45	Governs strain severity
phi	Marginal contribution of tertiary provision to recovery rate	0.30	Accelerates restoration
theta_P	Primary-intervention efficacy (proportional demand reduction)	0.00 to 0.40 by scenario	Reduces effective demand
theta_S	Secondary-intervention efficacy (attenuation of demand-to-strain conversion)	0.00 or 0.35 by scenario	Reduces kappa multiplicatively
theta_T	Tertiary-intervention efficacy	0.00 or 0.35 by scenario	Enters recovery via phi
sigma	Standard deviation of period shocks	0.10	Represents demand and life-event volatility
T, n	Horizon and replications	60 periods, 200 replications	Determines simulated distribution

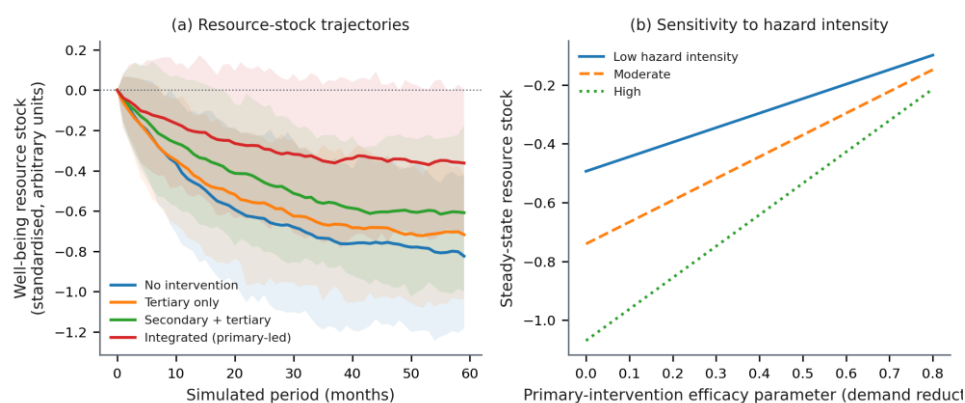


Figure 5. Output of the simulation harness. Panel (a) shows mean resource-stock trajectories with 10th-90th percentile bands across four intervention scenarios; panel (b) shows steady-state stock as a function of primary-intervention efficacy at three levels of hazard intensity. Values are generated from declared parameters and are illustrative of model behaviour only; they are not empirical estimates.

Three qualitative results emerge and are worth stating precisely because they are properties of the model rather than findings about the world. First, tertiary provision alone raises the equilibrium stock but does not alter the depletion gradient, producing a permanently lower steady state than any configuration including primary action; this is the formal counterpart of P2. Second, the marginal value of primary intervention is increasing in hazard

intensity, visible in panel (b) as the steeper gradient for the high-hazard curve; organisations facing the most severe demand structures gain most from demand-side action, which is also where such action is hardest. Third, the percentile bands widen under low-intervention scenarios, indicating that intervention reduces not only mean depletion but dispersion, which matters operationally because reliability failures are driven by the tail rather than the mean.

7.3 Estimation template for empirical validation

Table 6 specifies the measurement and estimation strategy for testing the propositions with primary data. Coefficients are denoted in placeholder notation throughout. The design assumption is a multi-wave, multi-unit panel permitting within-unit identification, since between-unit comparisons in these sectors are severely confounded by case mix, geography, and labour market conditions.

Table 6. Measurement and estimation template with placeholder notation

Proposition	Focal predictor	Outcome and measurement	Estimator	Parameter of interest
P1	HR system strength index; attribution scale scores	Experienced well-being stock (composite of four dimensions)	Multilevel model, individuals in units	Interaction coefficient [b1], expected sign positive
P2	Intervention level indicator (primary, secondary, tertiary)	Change in well-being stock, waves t to t+k	Difference-in-differences with unit fixed effects	Contrast [b2P - b2S], expected sign positive
P3	Hindrance-demand load; challenge-demand load	Engagement and exhaustion, modelled jointly	Seemingly unrelated regression	Coefficient pair [b3H], [b3C], opposite signs expected
P4	Lagged well-being stock	Safety participation; safety compliance; incident counts	Mediation with lagged predictors; count models for incidents	Indirect effect [b4], larger for participation
P5	Investment allocation across asset classes	Persistence of performance differential over horizon h	Survival or persistence-decay model	Decay parameter [b5], slower for well-being investment
P6	Environmental volatility index x well-being stock	Adaptive performance; recovery time after disruption	Panel model with interaction and unit fixed effects	Interaction coefficient [b6], expected sign positive
P7	Baseline depletion score	Probability of voluntary programme uptake	Selection model with inverse probability weighting	Selection coefficient [b7], expected sign negative

Two methodological cautions are essential. Common method variance is a serious threat where both well-being and outcome measures derive from employee self-report; wherever possible, outcomes should be drawn from administrative or operational records such as incident registers, absence data, and payroll-derived turnover (Podsakoff et al., 2012). Reverse causality is equally serious: units performing well may find it easier to sustain well-being, and only within-unit longitudinal designs with plausible exogenous variation in intervention timing can address this convincingly.

8. Discussion

8.1 Theoretical implications

The paper's central theoretical contribution is a reframing of the well-being-performance question. The productive question is not whether well-being pays but under what configuration of demand structure, intervention level, volatility, and attributional history it pays, and in what currency. The WBCC supplies that configuration logic. It also reconciles the mutual gains and conflicting outcomes traditions that have divided HRM scholarship (Peccei & Van De Voorde, 2019; Van De Voorde et al., 2012). Both are correct within their respective boundary conditions: intensification-based performance gains are real but draw down a stock, producing an initial period of apparent mutual gains followed by deterioration as the stock depletes, whereas resource-based gains accumulate. Cross-sectional research cannot distinguish these because it observes a single point on two different trajectories.

The framework also extends the human capital resource literature by identifying well-being as a necessary condition for emergence. Ployhart and Moliterno (2011) specify how individual attributes aggregate into unit-level resources through task and social processes; we argue that depletion disrupts precisely those processes, since exhausted employees withdraw from the discretionary coordination and knowledge-sharing on which emergence depends. Well-being is thus not merely a correlate of human capital quality but a condition for its aggregation.

A third implication concerns the strategic status of hindrance demands. If P3 holds, then a substantial portion of the well-being deficit in high-stress industries is generated not by the intrinsically demanding core of the work but by the accumulated administrative sediment surrounding it. This reframes well-being management as an operational excellence problem, and it suggests that process simplification initiatives, ordinarily justified on efficiency grounds, may generate their largest returns through a well-being channel that their business cases do not measure.

8.2 Practical implications

Four practical implications follow. First, portfolio balance should be assessed explicitly. HR functions in high-stress sectors should map current well-being expenditure onto the nine cells of Figure 3 and examine the distribution; concentration in the lower-right quadrant is a diagnostic warning rather than evidence of activity. Second, governance must match ambition. Primary interventions require joint authority over operational design, which implies that well-being accountability cannot sit with HR alone; where it does, the function will predictably default to interventions within its unilateral control. Third, evaluation should be redesigned around the tail rather than the mean, given that the simulation indicates dispersion reduction as a principal benefit and that operational failures originate in depleted outliers. Utilisation and average satisfaction metrics are close to uninformative for this purpose. Fourth, sequencing matters: introducing secondary or tertiary provision before addressing visible and remediable demand problems invites the attribution that management prefers treating symptoms to changing conditions, which by P1 degrades the effect of the entire architecture.

A fifth, more uncomfortable implication concerns honesty about limits. In sectors where demands are genuinely irreducible, the achievable objective is not the elimination of strain but its sustainable management across a career, which may require rethinking career architecture itself: rotation out of high-exposure roles, planned intensity cycling, and explicit recognition that certain roles cannot be performed at full intensity for thirty years. Organisations that design for realistic exposure durations may retain expertise that competitors burn through.

8.3 Implications for the HR function

If the argument holds, the capability requirements of the HR function change. Delivering primary interventions demands fluency in operational analytics of a kind that HR functions have rarely developed: roster modelling,

queueing and capacity analysis, incident data interpretation, and the ability to construct a business case in the currency of the operating unit rather than in engagement scores. It also demands a different negotiating posture, since demand-side change is redistributive and will be resisted by managers whose targets assume the current demand structure. Functions that lack these capabilities will continue to select interventions from within their unilateral authority, not from misunderstanding but from a realistic assessment of what they can actually deliver, and no volume of additional evidence about intervention efficacy will change that calculus.

A related implication concerns the internal evidence infrastructure. The estimation template in Table 6 presumes linked longitudinal data connecting employee measures to operational records at unit level. Most organisations in these sectors hold both datasets but do not link them, often for defensible confidentiality reasons and often simply because no one owns the linkage. Building that infrastructure is a precondition for the well-being argument to be made in operational terms at all, and it is plausibly the highest-return investment available to an HR function that wishes to shift its portfolio leftward and upward in Figure 3.

8.4 Boundary conditions

The argument is bounded in four respects. It applies to sectors meeting the structural definition in Section 3.1; in low-demand settings the depletion mechanism is weak and returns to well-being investment will be correspondingly modest. It assumes labour market conditions in which replacement is costly; where labour is abundant and skills are general, a strategy of high demand and high turnover may be economically rational for the firm even where it is socially undesirable, and the competitive argument for well-being weakens accordingly, which is itself an argument for regulation rather than persuasion. It assumes a time horizon long enough for stock dynamics to operate, which excludes organisations managed to short liquidity or exit horizons. Finally, it assumes measurement infrastructure sufficient to detect the operational outcomes through which the value flows.

9. Limitations and Future Research

Three limitations should be stated plainly. First, this is a conceptual paper. Its propositions are derived rather than tested, and the simulation demonstrates internal consistency of the model, not correspondence with any empirical population; its parameters are declared, and the trajectories in Figure 5 should not be read as forecasts. Second, the evidence characterisations in Section 6 summarise the direction and general strength of published syntheses without reproducing numerical estimates, since accurate reporting of effect magnitudes requires direct verification against source records; readers should consult the cited syntheses for exact values and confidence intervals. Third, the framework is developed primarily from research conducted in high-income economies, and its transferability to settings with different labour institutions, informal employment prevalence, and regulatory enforcement capacity requires explicit examination rather than assumption.

Table 7 sets out a research agenda organised by the propositions. The most valuable near-term contributions are likely to come from three directions: natural experiments exploiting exogenous variation in roster regulation or staffing mandates, which offer identification that observational designs cannot; linkage studies connecting well-being measures to administrative operational records, which break the common-method dependence that weakens much existing work; and long-horizon panel designs capable of observing the stock dynamics that the framework asserts and that short studies structurally cannot detect.

Table 7. Research agenda by proposition

Proposition	Priority research design	Data requirement	Principal identification challenge
P1	Multi-site survey with attribution measures nested in units	HR system documentation plus employee perception data	Separating system strength from prior climate

Proposition	Priority research design	Data requirement	Principal identification challenge
P2	Natural experiment on roster or staffing regulation change	Pre- and post-regulation panel across affected and unaffected units	Anticipation effects; simultaneous policy change
P3	Task-level time-and-motion study linked to daily diary measures	Granular activity classification; experience sampling	Classifying demands as challenge or hindrance without circularity
P4	Linkage of well-being panels to incident and safety records	Administrative operational data with unit identifiers	Reporting rate confounded with psychological safety
P5	Long-horizon comparison of investment portfolios and performance persistence	Firm-level investment allocation and multi-year outcomes	Endogenous investment choice
P6	Event-study around operational disruptions	High-frequency performance data spanning shocks	Isolating volatility from concurrent management change
P7	Uptake analysis with baseline depletion measured before programme launch	Census baseline measurement; full uptake records	Consent and confidentiality constraints on linkage

10. Conclusion

The claim that employee well-being confers competitive advantage is defensible, but not in the unconditional form in which it is usually asserted. This paper has argued that well-being functions as an accumulated stock whose conversion into advantage runs through the human-capital resource pool and the operational reliability and adaptive capacity it sustains, and that the advantage is durable because it is causally ambiguous, socially complex, path dependent, and attributionally authenticated. In high-stress industries, where demands are structurally irreducible and skilled labour is scarce, these conditions are met more completely than in most other settings, which is why the strategic argument is strongest precisely where the operational pressure against it is greatest.

The corresponding managerial conclusion is uncomfortable. The interventions that are easiest to buy are the ones least capable of producing the effect, and the interventions capable of producing it require HR to contest operational decisions it does not currently own. Closing that gap is less a matter of further evidence than of governance and of a willingness to make the cost of sustainable work visible in the operating budget rather than hidden in attrition, error, and the quiet exit of experienced people. The framework, taxonomy, simulation harness, and estimation template offered here are intended to make that argument specifiable, testable, and therefore contestable on evidence rather than on conviction.

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