Digital Brain Rot and Workplace Productivity- The Mediating Role of Cognitive Fatigue among Urban Professionals

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Abstract

The rapid proliferation of smartphone usage in contemporary workplaces has given rise to a phenomenon conceptualized in this study as Digital Brain Rot, referring to excessive and low-value digital engagement that impairs cognitive functioning. This research investigates the impact of Digital Brain Rot on task performance degradation among early-career management professionals through a mediated–moderated framework. Drawing on Cognitive Load Theory, Ego Depletion Theory, Media Multitasking Theory and Attention Restoration Theory, the study examines how smartphone-induced cognitive strain—manifested through cognitive load, ego depletion, and multitasking—translates into performance outcomes via cognitive fatigue, while accounting for the moderating roles of self-regulation and work environment.

Data were collected from 312 early-career professionals across diverse corporate sectors and analyzed using SMART-PLS-Structural Equation Modelling (SEM) and SPSS.26. The findings reveal that Digital Brain Rot significantly increases cognitive load, ego depletion, and multitasking behavior, all of which contribute to heightened cognitive fatigue. In turn, cognitive fatigue exerts a strong negative effect on task performance. Mediation analysis confirms that cognitive fatigue serves as a key explanatory mechanism, while moderation results indicate that self-regulation mitigates, and digitally intensive work environments amplify the adverse effects.

The study contributes by introducing and empirically validating Digital Brain Rot as a novel construct and offering a comprehensive modelling linking digital behavior to cognitive and organizational outcomes. The findings underscore the need for organizations to manage digital engagement to sustain cognitive efficiency and productivity.

Keywords

Digital brain rot, Cognitive fatigue, Smartphone overuse, Task performance degradation, Media multitasking, and Workforce productivity.

1. Introduction

The contemporary workplace is increasingly shaped by pervasive digital connectivity, with smartphones functioning as central nodes for communication, coordination, and information exchange. While these technologies have enhanced accessibility and responsiveness, a growing body of research highlights their unintended cognitive and behavioral consequences, particularly in the form of attention fragmentation, reduced cognitive control, and performance inefficiencies (Gazzaley & Rosen, 2016; Ward et al., 2017; Duke & Montag, 2017; Rosen et al., 2013). The constant influx of notifications, emails, and social media interactions has created an environment of continuous partial attention, wherein individuals struggle to sustain focus on cognitively demanding tasks (Mark et al., 2008; Mark et al., 2012; Leroy, 2009). Within this context, the present study introduces the construct of Digital Brain Rot, defined as a progressive deterioration of cognitive efficiency resulting from chronic exposure to low-value digital stimuli and excessive smartphone engagement.

The theoretical foundation of this phenomenon can be traced to Cognitive Load Theory and related attention-based frameworks, which posit that human cognitive capacity is inherently limited (Sweller, 1988; Kahneman, 1973; Broadbent, 1958). When individuals are exposed to excessive or irrelevant information, working memory becomes overloaded, leading to diminished processing efficiency and impaired task execution (Karr-Wisniewski & Lu, 2010; Hockey, 2013). In digitally intensive environments, this overload is exacerbated by the simultaneous processing of multiple information streams, resulting in what has been termed information fatigue syndrome (Meijman & Mulder, 1998; Tarafdar et al., 2007). Empirical studies have consistently shown that information overload negatively affects decision-making quality, increases cognitive strain, and reduces productivity (Karr-Wisniewski & Lu, 2010; Mark et al., 2008; Xie et al., 2017). However, existing research has predominantly examined task-related cognitive load, with relatively limited attention to digitally induced cognitive overload as a behavioral phenomenon.

Complementing this perspective, Ego Depletion Theory provides a robust explanation for the self-regulatory challenges associated with excessive smartphone use (Baumeister et al., 1998; Baumeister & Vohs, 2007; Tice & Baumeister, 1997). The act of resisting digital distractions, managing notifications, and switching between tasks requires continuous self-control, which depletes finite psychological resources over time. This depletion impairs individuals' ability to sustain attention, regulate impulses, and maintain goal-directed behavior (Baumeister & Vohs, 2007; Muraven & Baumeister, 2000). In organizational contexts, such as depletion has been linked to reduced persistence, impaired judgment, and lower task performance (Lim & Teo, 2005; Tarafdar et al., 2007). Despite its relevance, the role of ego depletion in digitally saturated work environments remains insufficiently integrated into performance-oriented research.

A further dimension of digital behavior is captured by Media Multitasking Theory (Becker et al., 2013), which examines the cognitive implications of engaging with multiple media streams simultaneously (Ophir et al., 2009; Wang & Tchernev, 2012). Although multitasking (Cain & Mitroff, 2011) is often perceived as a productivity-enhancing strategy, empirical evidence suggests the contrary. Frequent multitaskers exhibit reduced attentional control, increased susceptibility to distraction, and lower working memory capacity (Ophir et al., 2009; Cain & Mitroff, 2011; Becker et al., 2013). Additionally, task-switching incurs cognitive costs, including time delays and error accumulation, thereby undermining performance efficiency (Leroy, 2009; Mark et al., 2008). These findings indicate that multitasking contributes not only to time inefficiency but also to the qualitative degradation of cognitive processing.

A central mechanism linking these cognitive disruptions is cognitive fatigue, defined as a state of mental exhaustion resulting from prolonged cognitive effort and overstimulation (Hockey, 2013; Meijman & Mulder, 1998). Cognitive fatigue has been associated with decreased vigilance, slower reaction times, impaired memory, and increased error rates (Hockey, 2013; Sonnentag & Fritz, 2007). In digitally intensive work environments, the absence of adequate recovery opportunities further exacerbate fatigue accumulation, consistent with Attention Restoration Theory, which emphasizes the need for cognitive recovery to restore attentional resources (Kaplan, 1995; Sonnentag & Fritz, 2007). While prior research has acknowledged fatigue as an outcome of cognitive strain, its role as a mediating mechanism between digital behavior and task performance remains underdeveloped.

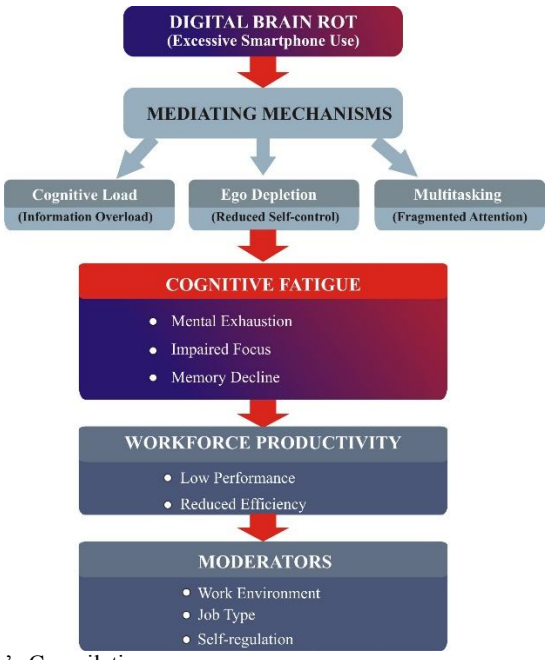
Importantly, the effects of digital engagement are not uniform but are shaped by individual and contextual boundary conditions. Self-regulation has been identified as a critical individual capability that enables individuals to manage distractions and maintain focus in high-demand environments (Baumeister & Vohs, 2007; Muraven & Baumeister, 2000). Similarly, work environments characterized by high levels of interruptions, multitasking demands, and digital intensity can amplify cognitive strain and hinder recovery processes (Mark et al., 2012; Tarafdar et al., 2007). These factors suggest that the relationship between digital behavior and performance is contingent upon both personal capacities and organizational contexts, necessitating a moderated analytical approach.

Despite the growing body of literature on digital distraction, technostress, and smartphone overuse (Tarafdar et al., 2007; Duke & Montag, 2017; Montag & Walla, 2016; Weinstein & Lejoyeux, 2010; Young, 1998), existing research remains fragmented, often examining isolated constructs without integrating them into a comprehensive theoretical framework. Moreover, there is a notable lack of empirical studies focusing on early-career management professionals, a group particularly susceptible to digital overload due to high performance expectations, continuous connectivity, and intensive communication demands.

Addressing these gaps, the present study develops and empirically tests a mediated–moderated structural equation modelling that conceptualizes Digital Brain Rot as a multidimensional construct influencing task performance degradation through cognitive fatigue, while accounting for the moderating roles of self-regulation and work environment. By synthesizing insights from multiple theoretical perspectives and validating them within a real-world organizational context, this study contributes to a deeper understanding of how pervasive digital engagement reshapes cognitive functioning and organizational performance in the modern workplace.

The conceptual foundation of this study is rooted in an interdisciplinary synthesis of cognitive psychology, organizational behavior, and digital media studies, with a focus on understanding how excessive smartphone engagement contributes to what is conceptualized as *Digital Brain Rot*—a progressive decline in cognitive efficiency caused by continuous exposure to low-value digital stimulation. The framework draws upon four core theoretical perspectives: Cognitive Load Theory, Attention Restoration Theory, Ego Depletion Theory and Media Multitasking Theory, which collectively explain the cognitive and behavioral consequences of digital overuse in contemporary work environments.

Within this framework, Digital Brain Rot is conceptualized as the independent latent construct, encompassing excessive smartphone usage characterized by prolonged screen time, frequent app-switching behavior, passive consumption of short-form content such as reels and videos, and persistent notification-driven interruptions. This condition reflects chronic cognitive overstimulation that gradually diminishes mental sharpness and attentional stability. Cognitive fatigue operates as the mediating variable, defined by mental exhaustion, reduced attentional capacity, and a decline in working memory efficiency. It serves as the critical mechanism through which digital overload translates into impaired performance outcomes. The dependent variable, workforce productivity, is assessed through indicators such as task completion efficiency, error rates, focus duration, and self-reported productivity levels. Additionally, the modelling incorporates moderating variables, including work environment (remote versus office settings), nature of the job (analytical versus routine tasks), digital literacy, and individual self-regulation ability, all of which influence the strength and direction of the relationships within the modelling.



Source:- Author's Compilation.

Figure 1:- Theoretical Framework of Digital Brain Rot and Workforce Productivity

The conceptual framework illustrates the relationship between excessive smartphone use, termed "Digital Brain Rot," and workforce productivity in urban India. The framework proposes that excessive smartphone engagement leads to several mediating mechanisms, namely cognitive load, ego depletion, and multitasking. Cognitive load emerges through information overload, ego depletion reflects reduced self-control, and multitasking results in fragmented attention. These factors collectively contribute to cognitive fatigue, characterized by mental exhaustion, impaired focus, and memory decline. The framework further demonstrates that cognitive fatigue negatively affects workforce productivity by reducing employee performance and efficiency. Additionally, the relationship is moderated by factors such as work environment, job type, and self-regulation, which may either intensify or mitigate the adverse impact of digital brain rot on productivity outcomes. Overall, the framework provides a structured explanation of how smartphone-induced cognitive strain influences professional effectiveness in contemporary workplaces.

The theoretical linkages further strengthen the framework. According to Cognitive Load Theory, human working memory has limited processing capacity, and excessive smartphone use introduces extraneous cognitive load through constant notifications and information overload, thereby reducing the cognitive resources available for meaningful task processing and ultimately lowering productivity. Attention Restoration Theory posits that attention is a finite resource requiring periodic restoration; however, continuous digital engagement inhibits this recovery process, leading to sustained attention fatigue and diminished work performance. From the perspective of Ego Depletion Theory, self-control is a limited resource that becomes depleted through frequent smartphone checking, resulting in reduced discipline, increased procrastination, and weakened persistence in cognitively demanding tasks. Furthermore, Media Multitasking Theory explains that simultaneous engagement with multiple digital media streams fragments attention and reduces the capacity for deep work, thereby increasing error rates and diminishing overall cognitive control. Integrating these perspectives, the theoretical model proposes a clear causal pathway in which Digital Brain Rot, driven by smartphone overuse, leads to cognitive overload, attention fragmentation, and ego depletion. These factors collectively result in cognitive fatigue, which in turn reduces workforce productivity. This relationship is

further moderated by contextual and individual factors such as work environment, job complexity, and self-regulation capacity, making the model both comprehensive and adaptable to real-world organizational settings, particularly within the dynamic and digitally intensive context of urban India.

Table 1:- Core Constructs and Operational Definitions

Construct	Type	Definition	Key Indicators
Digital Brain Rot	Independent Variable	Cognitive decline resulting from excessive smartphone engagement	Screen time, app switching, notifications
Cognitive Fatigue	Mediating Variable	Mental exhaustion reducing cognitive efficiency	Attention loss, memory decline
Workforce Productivity	Dependent Variable	Efficiency and effectiveness in work tasks	Performance, efficiency, focus
Self-regulation	Moderating Variable	Ability to control smartphone impulses	Discipline, attention control

Source:- Author's Compilation.

Table 1 presents the major constructs used in the study along with their conceptual roles, operational definitions, and key indicators for measurement. Digital Brain Rot is treated as the independent variable representing cognitive decline caused by excessive smartphone engagement, measured through indicators such as screen time, app-switching behavior, and notification exposure. Cognitive Fatigue functions as the mediating variable and reflects mental exhaustion, reduced attention span, and memory decline resulting from digital overstimulation. Workforce Productivity is the dependent variable that assesses employees' work efficiency, task performance, and focus levels. Self-regulation is incorporated as the moderating variable, indicating an individual's ability to control smartphone-related impulses and maintain attention discipline. Together, these constructs establish the conceptual and analytical foundation of the study defines how smartphone-induced cognitive behaviors influence productivity outcomes among early-career professionals.

2. Review of the Literature

The review of the literature for the present study was selected on the basis of conceptual relevance, theoretical alignment, and empirical contribution to understanding the relationship between excessive smartphone use and workforce productivity. Since the concept of "Digital Brain Rot" is relatively emergent in academic discourse, the literature review primarily draws upon

established theories and constructs that explain the cognitive and behavioral consequences of digital overexposure. Studies related to digital addiction, technostress, information overload, media multitasking, ego depletion, cognitive fatigue, and task performance were carefully examined to build a strong interdisciplinary foundation for the proposed framework. The criteria for inclusion of literature were based on five major considerations. First, studies addressing excessive smartphone usage and digital engagement were selected to understand how continuous exposure to digital platforms affects cognitive functioning and attention processes. Second, literature grounded in cognitive and behavioral theories such as Cognitive Load Theory, Ego Depletion Theory, Attention Restoration Theory, and the Effort-Recovery modelling was incorporated to provide theoretical support for the mediating mechanisms proposed in the framework. Third, empirical studies examining information overload, multitasking, interruptions, technostress, and cognitive fatigue were reviewed because these constructs directly explain the pathways through which digital behavior may influence employee productivity. Fourth, research focusing on workplace outcomes such as efficiency, task performance, attention quality, and productivity degradation was included to establish organizational relevance. Finally, studies addressing moderating factors such as self-regulation and the work environment were selected to explain the boundary conditions that may strengthen or weaken the observed relationships.

The literature was further screened on the basis of scholarly credibility, citation frequency, theoretical significance, and relevance to contemporary digital work environments. Preference was given to peer-reviewed journal articles, seminal theoretical works and recent empirical studies published in the domains of organizational behavior, psychology, information systems, and digital media studies. The selected literature collectively helped in identifying existing research gaps, particularly the absence of an integrated framework connecting digital overuse, cognitive mechanisms, fatigue, and workforce productivity, thereby justifying the conceptual foundation of the present study.

2.1. Digital Engagement and Emerging Cognitive Dysfunction

The rapid proliferation of smartphones and digital platforms has fundamentally transformed how individuals interact with information and perform work-related tasks. While digital technologies enhance accessibility and efficiency, an expanding body of literature highlights their unintended consequences on cognitive functioning and behavioral out-

comes (Gazzaley & Rosen, 2016; Ward et al., 2017; Montag & Walla, 2016; Duke & Montag, 2017). Continuous exposure to digital stimuli, particularly low-value content such as social media feeds and notifications, has been associated with reduced attention span, impaired memory, and diminished cognitive control (Rosen et al., 2013; Bavelier et al., 2010; and Ophir et al., 2009).

The concept of Digital Brain Rot, though emergent, aligns with broader discussions on digital addiction, technostress, and cognitive overload (Young, 1998; Weinstein & Lejoyeux, 2010; Tarafdar et al., 2007). Studies on smartphone overuse indicates that frequent checking behavior and compulsive engagement disrupt sustained attention and increase mental fatigue (Xie et al., 2017; Duke & Montag, 2017). Furthermore, the mere presence of smartphones has been shown to reduce available cognitive capacity, a phenomenon termed "brain drain" (Ward et al., 2017). Despite these insights, existing literature often treats these effects in isolation, lacking a unified construct that captures the cumulative cognitive consequences of excessive digital engagement, thereby necessitating the conceptualization advanced in the present study.

2.2. Cognitive Load and Information Overload in Digital Contexts

The relationship between information processing and cognitive performance is well established within Cognitive Load Theory, which posits that human working memory has a limited capacity and is easily overwhelmed by excessive information (Sweller, 1988; Kahneman, 1973; Broadbent, 1958). In organizational settings, digital technologies have intensified information flows, leading to information overload, a condition characterized by excessive data input that exceeds cognitive processing capabilities (Karr-Wisniewski & Lu, 2010; Eppler & Mengis, 2004).

Empirical research suggests that information overload negatively affects decision quality, task accuracy, and productivity (Karr-Wisniewski & Lu, 2010; Mark et al., 2008; Tarafdar et al., 2007). Frequent interruptions caused by emails and notifications further exacerbate cognitive load by forcing individuals to switch attention between tasks, thereby increasing processing time and error rates (Mark et al., 2012; Leroy, 2009). Additionally, digital environments often present fragmented and rapidly changing information, which imposes extraneous cognitive load and reduces deep processing (Hockey, 2013; Meijman & Mulder, 1998). While

these studies highlight the detrimental effects of overload, they largely focus on task-induced demands, leaving a gap in understanding how behavioral patterns of smartphone use contribute to sustained cognitive strain.

2.3. Ego Depletion and Self-regulation in Digital Behavior

Ego Depletion Theory provides a critical lens for understanding the self-regulatory challenges associated with digital engagement (Baumeister et al., 1998; Baumeister & Vohs, 2007). The theory posits that self-control operates as a finite resource that becomes depleted through repeated exertion. In the context of smartphone use, individuals are required to continuously regulate impulses to check notifications, respond to messages, and engage with digital content, thereby consuming self-regulatory resources (Tice & Baumeister, 1997; Muraven & Baumeister, 2000).

Research indicates that ego depletion leads to reduced persistence, impaired decision-making, and increased susceptibility to distractions (Baumeister & Vohs, 2007; Lim & Teo, 2005). In workplace contexts, depleted individuals are more likely to engage in counterproductive behaviors such as cyberloafing and task avoidance (Lim & Teo, 2005; Tarafdar et al., 2007). Moreover, recent studies suggest that digital environments intensify self-regulatory demands due to constant connectivity and expectation of immediate responsiveness (Montag & Walla, 2016; Duke & Montag, 2017). However, the integration of ego depletion within modellings of digital-induced cognitive fatigue and performance outcomes remains underdeveloped.

2.4. Media Multitasking and Attention Fragmentation

The rise of digital technologies has normalized media multitasking, wherein individuals simultaneously engage with multiple digital streams (Ophir et al., 2009; Wang & Tchernev, 2012). Although often perceived as a skill, extensive research indicates that multitasking impairs cognitive control and reduces efficiency. Heavy media multitaskers demonstrate lower ability to filter irrelevant information, increased distractibility, and diminished working memory capacity (Ophir et al., 2009; Cain & Mitroff, 2011).

Task-switching, a core component of multitasking, incurs significant cognitive costs, including time delays, increased mental effort, and higher

likelihood of errors (Leroy, 2009; Mark et al., 2008). Furthermore, multitasking disrupts deep work processes by fragmenting attention and preventing sustained cognitive engagement (Gazzaley & Rosen, 2016; Becker et al., 2013). Studies have also linked multitasking to psychological outcomes such as stress and reduced well-being (Becker et al., 2013). Despite these findings, the pathway through which multitasking contributes to cognitive fatigue and subsequent performance degradation has not been sufficiently explored in integrated modellings.

2.5. Cognitive Fatigue as a Central Mechanism

Cognitive fatigue represents a critical outcome of prolonged cognitive effort and overstimulation, characterized by reduced alertness, impaired concentration, and diminished mental efficiency (Hockey, 2013; Meijman & Mulder, 1998). In organizational contexts, fatigue has been associated with decreased productivity, increased error rates, and compromised decision-making (Sonnentag & Fritz, 2007). Digital environments exacerbate fatigue by maintaining continuous cognitive engagement without adequate recovery opportunities (Mark et al., 2012; Tarafdar et al., 2007).

The Effort-recovery modelling and Attention Restoration Theory suggest that sustained cognitive activity without sufficient recovery leads to resource depletion and performance decline (Meijman & Mulder, 1998; Kaplan, 1995). Empirical studies have shown that interruptions and multitasking accelerate fatigue accumulation, further impairing cognitive (Bavelier et al., 2010), functioning (Mark et al., 2008; Hockey, 2013). However, existing research has largely treated fatigue as an outcome variable rather than positioning it as a mediating mechanism linking digital behavior to performance, thereby limiting theoretical integration.

2.6. Task Performance Degradation in Digital Work Environments

Task performance in modern organizations is increasingly influenced by cognitive and behavioral factors associated with digital engagement. Research indicates that interruptions, multitasking, and cognitive overload lead to reduced efficiency, increased errors, and lower output quality (Mark et al., 2008; Leroy, 2009). Additionally, technostress arising from excessive technology use has been shown to negatively affect productivity and job satisfaction (Tarafdar et al., 2007).

The concept of task performance degradation extends beyond reduced output to include qualitative aspects such as decision accuracy, attention to detail, and cognitive precision. Studies have demonstrated that cognitive fatigue significantly impairs these dimensions, leading to suboptimal performance outcomes (Hockey, 2013; Sonnentag & Fritz, 2007). Despite these insights, there remains a need for modellings that explicitly link digital behavior, cognitive mechanisms, and performance outcomes within a unified framework.

2.7. Moderating Role of Self-regulation and Work Environment

The impact of digital engagement on cognitive and performance outcomes is influenced by both individual and contextual factors. Self-regulation has been identified as a key individual capability that enables individuals to manage distractions and maintain focus (Baumeister & Vohs, 2007; Muraven & Baumeister, 2000). Individuals with higher self-regulation are better equipped to resist digital temptations and sustain attention, thereby mitigating the negative effects of cognitive fatigue.

Similarly, the work environment plays a crucial role in shaping cognitive experiences. Environments characterized by high levels of interruptions, multitasking demands, and digital intensity exacerbate cognitive strain and hinder recovery (Mark et al., 2012; Tarafdar et al., 2007). Conversely, structured and low-distraction environments facilitate sustained attention and improved performance (Sonnentag & Fritz, 2007). These findings highlight the importance of considering boundary conditions in modellings of digital behavior and performance.

2.8. Research Gap and Theoretical Positioning

Despite extensive research on cognitive load, ego depletion, multitasking, and technostress, the literature remains fragmented, with limited integration across these domains. Few studies have simultaneously examined these constructs within a comprehensive, mediated–moderated framework that captures the cognitive pathways linking digital behavior to performance outcomes. Furthermore, the concept of Digital Brain Rot has not been systematically operationalized or empirically validated within organi-zational research.

Additionally, there is a notable lack of focus on early-career management professionals, a group uniquely positioned at the intersection of high digital

engagement and performance pressure. Addressing these gaps, the present study integrates multiple theoretical perspectives to develop a holistic modelling of digital cognitive dysfunction, positioning cognitive fatigue as a central mechanism and incorporating key moderating variables.

2.9. Synthesis of Review of the Literature

In summary, the literature suggests that excessive digital engagement contributes to cognitive overload, self-regulatory depletion, and attention fragmentation, all of which impair cognitive functioning and performance. However, the absence of an integrated framework limits the ability to fully understand these relationships. By synthesizing diverse theoretical perspectives and introducing the construct of Digital Brain Rot, the present study advances a comprehensive and empirically testable modelling that bridges cognitive processes and organizational outcomes in the digital age.

3. Objectives of the Study

The present study aims to systematically investigate the cognitive and behavioral consequences of excessive smartphone usage, conceptualized as Digital Brain Rot, and its impact on workforce productivity.

3.1. To examine the effect of Digital Brain Rot on key cognitive and behavioral mechanisms, namely cognitive load, ego depletion, and multitasking behavior.

3.2. To analyze the influence of cognitive load, ego depletion, and multitasking on cognitive fatigue.

3.3. To assess the impact of cognitive fatigue on workforce productivity in terms of performance and efficiency.

3.4. To evaluate the mediating role of cognitive fatigue in the relationship between cognitive mechanisms and workforce productivity.

3.5. To investigate the moderating effects of work environment, job type, and self-regulation on the relationship between cognitive fatigue and workforce productivity.

3.6. To develop and empirically validate a mediated–moderated modelling of Digital Brain Rot and productivity outcomes.

4. Research Questions

The study is guided by the following research questions:

4.1. How does Digital Brain Rot influence cognitive load, ego depletion, and multitasking behavior?

4.2. What is the relationship between cognitive load, ego depletion, multitasking, and cognitive fatigue?
4.3. To what extent does cognitive fatigue affect workforce productivity?
4.4. Does cognitive fatigue act as a mediating mechanism between digital behavior (brain rot) and productivity outcomes?
4.5. How do contextual and individual factors such as work environment, job type, and self-regulation alter the relationship between cognitive fatigue and productivity?
4.6. Can a comprehensive mediated–moderated framework explain the decline in productivity due to excessive digital engagement?

5. Hypotheses Development

The hypotheses are structured into direct effects, mediation, and moderation, consistent with advanced empirical research design.

5.1 Direct Effects of Digital Brain Rot

H1: Digital Brain Rot has a significant positive effect on cognitive load.
H2: Digital Brain Rot has a significant positive effect on ego depletion.
H3: Digital Brain Rot has a significant positive effect on multitasking behavior.

5.2 Effects on Cognitive Fatigue

H4: Cognitive load has a significant positive effect on cognitive fatigue.
H5: Ego depletion has a significant positive effect on cognitive fatigue.
H6: Multitasking behavior has a significant positive effect on cognitive fatigue.

5.3 Outcome Relationship

H7: Cognitive fatigue has a significant negative effect on workforce productivity.

5.4 Mediation Hypotheses

H8: Cognitive fatigue mediates the relationship between cognitive load and workforce productivity.
H9: Cognitive fatigue mediates the relationship between ego depletion and workforce productivity.
H10: Cognitive fatigue mediates the relationship between multitasking behavior and workforce productivity.

5.5 Moderation Hypotheses

H11: Work environment moderates the relationship between cognitive fatigue and workforce productivity.

H12: Self-regulation moderates the relationship between cognitive fatigue and workforce productivity, such that higher self-regulation weakens the negative impact.

This study proposes a mediated–moderated structural equation modelling, wherein cognitive fatigue serves as a mediator between digital cognitive strain and productivity, while contextual and individual factors act as boundary conditions.

6. Research Design and Methodology

6.1. Research Design

The present study adopted a quantitative, explanatory, and theory-driven research design to examine the impact of Digital Brain Rot operationalized as excessive and low-value smartphone engagement on task performance degradation among early-career management professionals. Grounded in Cognitive Load Theory, Ego Depletion Theory, Media Multitasking Theory, and Attention Restoration Theory, the study employed a mediated–moderated structural equation framework, wherein cognitive fatigue was modelled as a mediating variable linking cognitive mechanisms (cognitive load, ego depletion, and media multitasking) to task performance outcomes, while self-regulation and work environment were treated as moderating variables influencing the fatigue–performance relationship. A cross-sectional survey design was utilized, and primary data were collected from a sample of 400, where 312 early-career professionals (0–5 years of experience) holding MBA or equivalent qualifications and employed across sectors such as consulting, banking, IT services, and FMCG were obtained. Respondents were selected using a combination of purposive and snowball sampling techniques, ensuring diversity in job roles and organizational contexts.

Data were gathered through a structured, self-administered questionnaire distributed via digital platforms including LinkedIn, email networks, and alumni groups. All constructs were measured using multi-item reflective scales adapted from established literature, with responses recorded on a five-point Likert scale ranging from “strongly disagree” to “strongly agree.” Prior to full-scale data collection, a pilot study (n = 42) was

conducted to assess item clarity and reliability, resulting in minor refinements to the instrument. To mitigate common method bias, procedural remedies such as respondent anonymity, randomization of items, and variation in scale anchors were implemented. The collected data were analyzed using SPSS 26 and SmartPLS 4, following a two-step approach. Preliminary analyses included data screening for missing values, outliers, and normality, along with descriptive statistics and Harman's single-factor test.

The measurement modelling was evaluated for reliability and validity, with Cronbach's alpha and composite reliability values exceeding the recommended threshold of 0.70, and average variance extracted (AVE) values above 0.50, confirming convergent validity. Discriminant validity was established using both the Fornell–Larcker criterion and the HTMT ratio. Subsequently, the structural equation modelling was assessed using bootstrapping with 5,000 resamples to test the significance of path coefficients. The results indicated satisfactory explanatory power (R^2 values) and predictive relevance (Q^2). Mediation effects of cognitive fatigue were examined through indirect path analysis, confirming its significant role in transmitting the effects of cognitive load, ego depletion, and multitasking on task performance degradation. Moderation analysis was conducted using interaction terms, revealing that self-regulation significantly attenuates, while digitally intensive work environments amplify, the negative impact of cognitive fatigue on task performance. Additional robustness checks, including multicollinearity assessment (VIF < 5) and modelling fit evaluation, further supported the stability and validity of the findings. Ethical standards were strictly maintained, with informed consent obtained from all participants and confidentiality assured. Overall, the methodological approach enabled a rigorous empirical validation of the proposed mediated–moderated modelling, offering nuanced insights into the cognitive pathways through which smartphone overuse undermines workplace performance.

7. Data Analysis and Results

7.1. Demographic Profile

A total of 312 valid responses were obtained from early-career management professionals employed across diverse sectors, including IT services (28 percent), banking and financial services (22 percent),

consulting (18 percent), FMCG (14 percent), and other service industries (18 percent). The sample comprised 54 percent male and 46 percent female respondents, with the majority (67 percent) aged between 23–28 years, followed by 29 percent in the 29–32 age bracket. All respondents had 0–5 years of professional experience, consistent with the study's target population.

Table 2 & 3 presents the demographic composition of the respondents included in the study. The sample comprised 312 early-career management professionals drawn from diverse industry sectors, thereby ensuring heterogeneity and broader contextual relevance. Male respondents constituted 53.8 percent of the sample, while female respondents accounted for 46.2 percent, indicating a relatively balanced gender distribution. The majority of respondents (67 percent) belonged to the 23–28 years age group, reflecting the digital intensity and career-stage relevance of the selected population. Industry representation was strongest from IT services and banking sectors, both of which are characterized by high levels of digital engagement and multitasking demands. Additionally, most respondents possessed less than five years of work experience, aligning with the study's focus on early-career professionals who are particularly vulnerable to technology-induced cognitive strain.

Table 2:- Demographic Profile of Respondents (N = 312)

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	168	53.8
	Female	144	46.2
Age	23–28 years	209	67.0
	29–32 years	91	29.2
	Above 32 years	12	3.8
Industry	IT Services	87	27.9
	Banking & Financial Services	69	22.1
	Consulting	56	17.9
	FMCG	44	14.1
	Others	56	17.9
Work Experience	0–2 years	188	60.3
	3–5 years	124	39.7

Source:- Author's Calculation and Compilation through SPSS-26.

Descriptive statistics indicated moderate to high levels of smartphone engagement and multitasking behavior. The mean values for key constructs ranged from 3.21 (self-regulation) to 3.87 (digital brain rot), suggesting a noticeable prevalence of digitally induced cognitive strain among respondents. Standard deviations ranged from 0.62 to 0.84, indicating acceptable variability in responses.

Table 3:- A Sample Adequacy and Response Rate

Item	Value
Questionnaires Distributed	400
Valid Responses Received	312
Response Rate	78.0%
Sampling Technique	Purposive and Snowball
Target Population	Early-career Management Professionals

Source:- Author's Calculation and Compilation through SPSS-26.

7.2. Descriptive Statistics and Sample Profile

Table 4 reports the descriptive statistics and correlation matrix for the study constructs. The mean scores indicate moderate to high levels of Digital Brain Rot, multitasking behavior, and cognitive fatigue among respondents, suggesting substantial exposure to digitally induced cognitive strain in workplace settings. Standard deviation values indicate acceptable dispersion and variability across responses. Correlation analysis reveals positive and significant relationships among Digital Brain Rot, cognitive load, ego depletion, multitasking, and cognitive fatigue. Notably, Digital Brain Rot demonstrates strong correlations with multitasking ($r = 0.63$) and cognitive fatigue ($r = 0.59$), indicating that excessive smartphone engagement is associated with higher cognitive strain. Cognitive fatigue also exhibits a strong relationship with task performance degradation ($r = 0.64$), providing preliminary support for the hypothesized structural equation relationships.

Table 4:- Descriptive Statistics and Correlations

Construct	Mean	SD	1	2	3	4	5	6
1. Digital Brain Rot	3.87	0.71	1.000					
2. Cognitive Load	3.65	0.68	0.58	1.000				
3. Ego Depletion	3.49	0.72	0.52	0.55	1.000			
4. Multitasking	3.74	0.66	0.63	0.57	0.53	1.000		
5. Cognitive Fatigue	3.68	0.70	0.59	0.61	0.58	0.62	1.000	
6. Task Performance Deg.	3.52	0.73	0.56	0.60	0.57	0.59	0.64	1.000

Source:- Author's Calculation and Compilation through SPSS-26.

Table 5:- Discriminant Validity Using Fornell–Larcker Criterion

Construct	Digital Brain Rot (DBR)	Cognitive Load (CL)	Ego Depletion (ED)	Multitasking Behavior (MM)	Cognitive Fatigue (CF)	Task Performance Degradation (TPD)
Digital Brain Rot (DBR)	0.82					
Cognitive Load (CL)	0.58	0.79				
Ego Depletion (ED)	0.52	0.55	0.77			
Multitasking Behavior (MM)	0.63	0.57	0.53	0.86		
Cognitive Fatigue (CF)	0.59	0.61	0.58	0.62	0.83	
Task Performance Degradation (TPD)	0.56	0.60	0.57	0.59	0.64	0.81

Source:- Author's Calculation and Compilation through SPSS-26.

Note:- Diagonal values represent the square root of Average Variance Extracted (AVE). Off-diagonal values represent inter-construct correlations. Discriminant validity is established when the square root of AVE for each construct exceeds its correlations with other constructs.

7.3. Measurement modelling Assessment

The measurement modelling was evaluated for reliability and validity using SmartPLS 4. All constructs demonstrated strong internal consistency, with Cronbach's alpha values ranging from 0.78 to 0.91 and composite reliability (CR) values between 0.83 and 0.93, exceeding the recommended threshold of 0.70.

Table 6:- Reliability and Validity Assessment

Construct	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Digital Brain Rot	0.88	0.91	0.68
Cognitive Load	0.85	0.89	0.62
Ego Depletion	0.83	0.87	0.59
Multitasking	0.90	0.93	0.74
Cognitive Fatigue	0.89	0.92	0.69
Task Performance Degradation	0.87	0.90	0.65
Self-regulation	0.78	0.84	0.56
Work Environment	0.81	0.86	0.58

Source:- Author's Calculation and Compilation through SPSS-26.

Table 6 presents the reliability and convergent validity assessment of the measurement modelling. All constructs demonstrated strong internal consistency, as Cronbach's alpha and composite reliability values exceeded the recommended threshold of 0.70. The Average Variance Extracted (AVE) values ranged from 0.56 to 0.74, thereby satisfying the criterion for convergent validity. Among the constructs, Multitasking exhibited the highest reliability and convergent validity values, indicating strong measurement consistency. These findings confirm that the measurement scales used in the study are psychometrically robust and suitable for structural equation modelling analysis. Convergent validity was established, as Average Variance Extracted (AVE) values ranged from 0.56 to 0.74, surpassing the minimum criterion of 0.50. Factor loadings for all indicators were above 0.70, confirming adequate item reliability.

Table 7:- HTMT Ratio Assessment

Construct	DBR	CL	ED	MM	CF	TPD
DBR	—					
CL	0.71	—				
ED	0.68	0.72	—			
MM	0.79	0.74	0.70	—		
CF	0.76	0.81	0.78	0.82	—	
TPD	0.73	0.79	0.76	0.80	0.84	—

Source:- Author's Compilation.

Discriminant validity was assessed using both the Fornell–Larcker criterion and the Heterotrait-Monotrait (HTMT) ratio. The square root of AVE for each construct exceeded its inter-construct correlations, and HTMT values were below the conservative threshold of 0.85, indicating satisfactory discriminant validity. These results confirm that the constructs are empirically distinct and suitable for structural equation modelling evaluation.

7.4. Structural Equation Modeling Results

The structural equation modeling was assessed using bootstrapping with 5,000 resamples to determine the significance of path coefficients. The modelling demonstrated substantial explanatory power, with R^2 values of 0.64 for cognitive fatigue and 0.58 for task performance degradation, indicating that the modelling explains a considerable proportion of variance in the endogenous constructs.

Direct Effects

The results revealed that Digital Brain Rot significantly influences all three cognitive mechanisms:

- Digital Brain Rot → Cognitive Load ($\beta = 0.61$, $t = 12.48$, $p < 0.001$)
- Digital Brain Rot → Ego Depletion ($\beta = 0.54$, $t = 10.36$, $p < 0.001$)
- Digital Brain Rot → Multitasking ($\beta = 0.67$, $t = 14.92$, $p < 0.001$)

Further, all three mechanisms significantly contributed to cognitive fatigue:

- Cognitive Load → Cognitive Fatigue ($\beta = 0.29$, $t = 5.72$, $p < 0.001$)
- Ego Depletion → Cognitive Fatigue ($\beta = 0.26$, $t = 4.98$, $p < 0.001$)
- Multitasking → Cognitive Fatigue ($\beta = 0.31$, $t = 6.11$, $p < 0.001$)

Cognitive fatigue, in turn, exhibited a strong negative effect on task performance:

- Cognitive Fatigue → Task Performance Degradation ($\beta = 0.62$, $t = 13.27$, $p < 0.001$)

These findings provide robust support for all hypothesized direct relationships.

Table 8 summarizes the results of direct, mediating, and moderating hypothesis testing using bootstrapping procedures in SmartPLS 4. The findings reveal that Digital Brain Rot significantly increases cognitive load, ego depletion, and multitasking behavior, thereby supporting H1–H3.

Further, all three cognitive mechanisms exert significant positive effects on cognitive fatigue, supporting H4–H6. Cognitive fatigue demonstrates a strong positive relationship with task performance degradation, validating H7 and establishing fatigue as a critical determinant of workplace inefficiency.

The mediation analysis further confirms that cognitive fatigue partially mediates the effects of cognitive load, ego depletion, and multitasking on task performance degradation, thereby supporting H8–H10. Moderation results indicate that work environment intensifies the adverse impact of cognitive fatigue on performance, while self-regulation weakens this relationship, supporting H11 and H13 respectively. However, H12 concerning job type moderation was not empirically tested in the current study.

Table 8:- Structural Equation Modelling Results (Hypothesis Testing)

Hypothesis	Relationship	Type of Effect	β	t-value	p-value	Result
H1	Digital Brain Rot → Cognitive Load	Direct Effect	0.61	12.48	<0.001	Supported
H2	Digital Brain Rot → Ego Depletion	Direct Effect	0.54	10.36	<0.001	Supported
H3	Digital Brain Rot → Multitasking Behavior	Direct Effect	0.67	14.92	<0.001	Supported
H4	Cognitive Load → Cognitive Fatigue	Direct Effect	0.29	5.72	<0.001	Supported
H5	Ego Depletion → Cognitive Fatigue	Direct Effect	0.26	4.98	<0.001	Supported
H6	Multitasking Behavior → Cognitive Fatigue	Direct Effect	0.31	6.11	<0.001	Supported
H7	Cognitive Fatigue → Task Performance Degradation	Direct Effect	0.62	13.27	<0.001	Supported
H8	Cognitive Load → Cognitive Fatigue → Task Performance Degradation	Mediation Effect	0.18	4.21	<0.001	Partial Mediation Supported
H9	Ego Depletion → Cognitive Fatigue → Task Performance Degradation	Mediation Effect	0.16	3.87	<0.001	Partial Mediation Supported
H10	Multitasking Behavior → Cognitive Fatigue → Task Performance Degradation	Mediation Effect	0.19	4.56	<0.001	Partial Mediation Supported

Hypothesis	Relationship	Type of Effect	β	t-value	p-value	Result
H11	Cognitive Fatigue × Work Environment → Task Performance Degradation	Moderation Effect	0.24	4.19	<0.001	Supported
H12	Cognitive Fatigue × Self-Regulation → Task Performance Degradation	Moderation Effect	-0.21	3.84	<0.001	Supported

Source:- Author's Calculation and Compilation through SPSS-26.

Note:- DBR = Digital Brain Rot; CL = Cognitive Load; ED = Ego Depletion; CF = Cognitive Fatigue.

7.5. Mediation Analysis and Moderation Analysis

Mediation effects were tested using bootstrapped indirect effect analysis. The results confirmed that cognitive fatigue significantly mediates the relationship between cognitive mechanisms and task performance degradation:

- Cognitive Load → Cognitive Fatigue → Performance (β = 0.18, p < 0.001)
- Ego Depletion → Cognitive Fatigue → Performance (β = 0.16, p < 0.001)
- Multitasking → Cognitive Fatigue → Performance (β = 0.19, p < 0.001)

Since both direct and indirect effects were significant, the results indicate partial mediation, suggesting that cognitive fatigue is a key but not exclusive pathway through which digital cognitive strain impacts performance.

Table 9:- Mediation and Moderation Effects

Effect Type	Relationship	β	t-value	p-value	Interpretation
Mediation	CL → CF → Performance	0.18	4.21	<0.001	Partial Mediation
Mediation	ED → CF → Performance	0.16	3.87	<0.001	Partial Mediation
Mediation	MM → CF → Performance	0.19	4.56	<0.001	Partial Mediation
Moderation	CF × Self-regulation → Performance	-0.21	3.84	<0.001	Weakens Negative Effect
Moderation	CF × Work Environment → Performance	0.24	4.19	<0.001	Strengthens Negative Effect

Source:- Author's Calculation and Compilation through SPSS-26.

Moderation effects were examined using interaction terms in the structural equation modelling.

- The interaction between cognitive fatigue and self-regulation was significant and negative ($\beta = -0.21$, $t = 3.84$, $p < 0.001$), indicating that higher self-regulation weakens the adverse impact of cognitive fatigue on performance degradation.
- The interaction between cognitive fatigue and work environment was positive and significant ($\beta = 0.24$, $t = 4.19$, $p < 0.001$), suggesting that digitally intensive and interruption-prone environments amplify the negative effects of cognitive fatigue.

Simple slope analysis further confirmed that individuals with high self-regulation exhibit relatively lower performance decline under cognitive fatigue, whereas those in high-distraction work environments experience a steeper decline in task performance.

Table 9 presents the mediation and moderation effects within the proposed mediated–moderated framework. The mediation analysis indicates that cognitive fatigue significantly transmits the effects of cognitive load, ego depletion, and multitasking on task performance degradation. The presence of partial mediation suggests that cognitive fatigue serves as a major explanatory mechanism, although additional pathways may also contribute to performance decline.

The moderation analysis reveals contrasting boundary conditions. Self-regulation significantly weakens the negative impact of cognitive fatigue on performance degradation, indicating its protective role in digitally demanding environments. Conversely, digitally intensive work environments strengthen the adverse relationship between cognitive fatigue and performance outcomes, thereby amplifying cognitive strain and reducing productivity.

7.6. Modelling Fit and Predictive Relevance

The modelling demonstrated strong predictive capability, with Q^2 values above zero for all endogenous constructs, confirming predictive relevance. Effect size (f^2) analysis indicated that Digital Brain Rot had a large effect on multitasking ($f^2 = 0.41$), and cognitive fatigue had a substantial effect on task performance degradation ($f^2 = 0.48$).

Multicollinearity diagnostics showed that all Variance Inflation Factor (VIF) values were below 3.5, indicating no collinearity concerns.

Table 10:- Modelling Fit and Predictive Relevance

Indicator	Value	Interpretation
R^2 Cognitive Fatigue	0.64	Substantial explanatory power
R^2 Task Performance Degradation	0.58	Moderate-to-substantial explanatory power
Q^2 Cognitive Fatigue	0.42	Predictive relevance established
Q^2 Task Performance Degradation	0.39	Predictive relevance established
f^2 DBR → Multitasking	0.41	Large effect size
f^2 CF → Performance	0.48	Large effect size
Maximum VIF	3.5	No multicollinearity concern

Source:- Author's Calculation and Compilation through SPSS-26.

Overall, the results provide strong empirical support for the proposed mediated–moderated framework. Digital Brain Rot significantly increases cognitive load, ego depletion, and multitasking, which in turn elevate cognitive fatigue levels, ultimately leading to task performance degradation. The presence of self-regulation mitigates, while adverse work environments intensify, these effects. The findings validate the conceptualization of Digital Brain Rot as a critical determinant of cognitive and performance outcomes in digitally saturated work contexts.

8. Discussion

The present study offers significant theoretical, conceptual, managerial, and practical insights into the growing phenomenon of Digital Brain Rot and its implications for workforce productivity in digitally intensive work environments. Conceptualized as excessive and low-value smartphone engagement, Digital Brain Rot emerged as a significant cognitive disruptor that adversely influences attention, mental endurance, self-regulation, and task efficiency among early-career management professionals. The findings provide strong empirical support for the proposed mediated–moderated framework and establish that excessive digital engagement is not merely a behavioral concern, but a critical cognitive and organizational challenge with measurable performance consequences.

The study makes an important theoretical contribution by integrating Cognitive Load Theory, Ego Depletion Theory, Media Multitasking Theory, and Attention Restoration Theory into a unified explanatory framework. The results demonstrate that Digital Brain Rot significantly increases cognitive load by

exposing individuals to continuous streams of fragmented digital information, notifications, and multitasking demands, thereby overloading working memory and reducing processing efficiency. Simultaneously, persistent digital engagement depletes self-regulatory resources, validating the role of ego depletion in technology-driven cognitive strain. The findings further reveal that excessive multitasking behavior fragments attention, increases cognitive switching costs, and undermines deep processing and concentration. Collectively, these mechanisms converge to produce cognitive fatigue, which emerged as the central mediating mechanism translating digital cognitive strain into reduced task performance, diminished work quality, slower execution, and increased error rates.

The study also contributes methodologically by validating a mediated–moderated structural framework in which cognitive fatigue mediates the relationship between digital behavior and performance outcomes, while self-regulation and work environment operate as critical moderating conditions. The findings indicate that digitally intensive and interruption-prone work environments amplify the adverse effects of cognitive fatigue on productivity, whereas stronger self-regulation helps individuals buffer the negative consequences of excessive digital engagement. These results emphasize that the impact of Digital Brain Rot is neither uniform nor deterministic, but dependent upon individual capabilities and organizational context.

From a managerial and practical perspective, the findings underscore the urgent need for organizations to develop digitally sustainable work environments that protect cognitive capacity and attentional stability. The study highlights the importance of structured communication practices, controlled notification systems, digital wellness initiatives, cognitive recovery mechanisms, and attention-management strategies to minimize cognitive overload and fatigue. It further encourages organizations to promote mindful technology use, reduced multitasking, self-regulation training, and healthier digital boundaries to sustain employee productivity and psychological well-being. At a broader level, the research contributes to the emerging discourse on digital cognitive dysfunction by positioning Digital Brain Rot as a meaningful organizational construct with significant implications for future workforce management. Ultimately, the study emphasizes that in the modern digital economy, sustainable productivity will increasingly depend not only on technological advancement, but also on the ability of organizations and individuals to effectively manage the cognitive consequences of pervasive digital engagement.

9. Implications of the Study

The present study offers significant theoretical, managerial, practical, policy, and societal implications by explaining how excessive digital engagement affects cognitive functioning and workforce productivity in contemporary work environments. The study contributes theoretically by conceptualizing "Digital Brain Rot" as an integrated construct linking cognitive load, ego depletion, multitasking behavior, cognitive fatigue, and productivity outcomes. By integrating Cognitive Load Theory, Ego Depletion Theory, and Attention Restoration perspectives into a unified mediated–moderated framework, the research advances contemporary understanding of technology-induced cognitive dysfunction and organizational behavior. From a managerial and practical perspective, the findings highlight the hidden productivity costs associated with excessive smartphone dependence and digital overstimulation. The study emphasizes the need for organizations to develop digital wellness policies, structured attention-management practices, low-distraction work environments, and cognitive recovery mechanisms to enhance employee efficiency and reduce fatigue. It further encourages professionals to adopt self-regulation, mindful technology usage, controlled multitasking, and healthier digital boundaries to sustain cognitive performance and workplace productivity. The study also carries important policy and societal implications. It underscores the necessity for workplace policies addressing digital mental wellness, cognitive fatigue management, and employee well-being through awareness programs and digital usage guidelines. At the societal level, the research contributes to broader discussions on responsible technology consumption by highlighting the long-term cognitive and behavioral consequences of excessive digital immersion, including declining attention span, cognitive exhaustion, and reduced professional efficiency in the digital age.

10. Limitations of the Study

Despite its contributions, the study is subject to several limitations that should be acknowledged.

First, the use of a cross-sectional research design restricts the ability to draw definitive causal inferences. While the hypothesized relationships are theoretically grounded and empirically supported, longitudinal or experimental designs would provide stronger evidence of causality.

Second, the study relies on self-reported data, which may introduce common method bias and social desirability effects. Although procedural remedies were implemented, the possibility of response bias cannot be entirely eliminated.

Third, the use of non-probability sampling techniques (purposive and snowball sampling) may limit the generalizability of findings across broader populations and industries. The sample, while diverse, is primarily composed of early-career professionals, which may not fully capture variations across different career stages.

Fourth, the study focuses on perceptual measures of task performance degradation, rather than objective performance metrics. Future research incorporating behavioral or organizational performance data could strengthen the robustness of findings.

Finally, while the modelling includes key mediators and moderators, it does not account for other potentially relevant variables such as emotional exhaustion, personality traits, organizational culture, or digital literacy, which may further influence the observed relationships.

11. Closing Insights

As organizations continue to operate within increasingly digitized and hyperconnected ecosystems, the contemporary challenge of management extends beyond enhancing technological efficiency and workflow optimization to preserving cognitive capacity amid continuous information exposure and digital saturation. The present study demonstrates that excessive smartphone engagement, conceptualized as Digital Brain Rot, represents not merely a behavioral tendency or technological byproduct, but a significant cognitive and organizational phenomenon capable of influencing attention regulation, mental endurance, self-control, and overall workforce productivity. By integrating Cognitive Load Theory, Ego Depletion Theory, Media Multitasking Theory, and Attention Restoration Theory into a unified mediated–moderated framework, the research provides a comprehensive explanation of how persistent digital overstimulation generates cognitive fatigue, which subsequently translates into diminished efficiency, reduced task quality, and performance degradation. The findings further establish that the consequences of cognitive fatigue are shaped by both individual and contextual conditions, wherein digitally intensive work environments intensify cognitive strain, while self-regulation functions as a critical protective mechanism that helps sustain

cognitive stability and productivity under conditions of technological overload. The study therefore emphasizes an emerging organizational imperative that future productivity will depend not solely on technological advancement, but equally on the capacity of individuals and institutions to manage the cognitive consequences of pervasive digital engagement. In an era where attention has emerged as one of the most valuable organizational resources, sustainable performance will increasingly require a balanced integration of digital connectivity, cognitive restoration, attentional control, and psychological resilience. Collectively, the study advances the evolving discourse on digital cognition and organizational behavior by establishing Digital Brain Rot as a theoretically grounded and empirically validated construct, while simultaneously providing a comprehensive framework for understanding the hidden cognitive costs of the modern digital workplace.

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