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Productivity or overload? The paradox of instant messaging in Costa Rica's tech sector

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Abstract – Abstract – The use of instant messaging (IM) in Costa Rica's tech industry presents a clear paradox. While these tools speed up decision-making and reduce email traffic, they also fragment communication, increase pressure for constant availability, and reinforce existing inequalities related to gender and social structure. This study examines the dual effects of IM on productivity and well-being in Costa Rica's tech sector. It uses an interpretive phenomenological approach based on 35 semi-structured interviews with executives, managers, and operational staff. Document analysis was also conducted in accordance with national data protection regulations. Thematic analysis (NVivo, κ = 0.82) shows that IM accelerates decision-making by 72% and reduces reliance on email by 65%. However, it also creates significant cognitive costs: 55% of participants reported difficulty maintaining focus, and higher levels of technostress were reported by female executives (65%) compared to male executives (40%). The findings suggest that the benefits and costs of IM are not evenly distributed across organizational levels or gender groups. In high-context communication environments such as Latin America, these effects are intensified due to the additional interpretive demands placed on users. These results contribute to a better understanding of digital workplace dynamics in the region and highlight the importance of implementing organizational policies, such as clear communication norms and designated "quiet hours," to support both productivity and employee well-being.

Keywords-- Digital workplace, communication in a hierarchy, instant messaging, productivity at work, technostress.

I. Introduction

By 2025, 90% of small and medium-sized (SME) Information Technology (IT) businesses in Costa Rica were using instant messaging (IM) as their main way to communicate with each other [1]. That number shows adoption, and the cost is not mentioned. Notifications in Microsoft Teams, Slack, and WhatsApp Business do not just come and go; they build up social responsibilities and make employees always reachable without a clear "off" button [2, 3]. This was partly done on purpose for companies that use rapid processes and teams that work from different places. It has proven to be more difficult for people who work for those companies than acceptance rates suggest.

The problem is worse in Latin America. Digital message use in the region increased by 217% [4] between 2019 and 2022. This is what experts call "acceleration without adaptation" [5]: the tools came out before organizations built ways to manage them. This gap is more important than in North America or Northern Europe, where most IM studies have been done, because in high-context countries [6], communication carries meanings that the same message would not convey elsewhere. In Latin America, maintaining relationships is an important part of all areas of work. So, a chat message demands more from the recipient than just the information it includes. Every word adds to the cost of interpretation.

The tech industry in Costa Rica is a good place to start. It is big enough to matter economically—it makes up 8.1% of the country's Gross Domestic Product (GDP) and employs more than 65,000 people [7]. It's also at a unique cultural crossroads: companies there adopt Silicon Valley work practices while still retaining a Latin American relational work culture [8, 9]. This research does not look at the effects of IM use based on gender or social rank; this is the gap that the study addresses.

The current material gives us a starting point, but it is not all the research needs. Studies from North America and Northern Europe show that effectiveness goes up: decisions are made 25–35% faster, and 40–60% less email is sent [2, 3]. Not as much attention is paid to the fundamental imbalances in how these wins and losses are distributed. According to research on female technostress, women are 35–50% more likely than their male counterparts to experience stress linked to instant messaging [10, 11]. This difference may be even bigger in high-context communication settings. The technology-power link [12, 13] questions the idea that digital tools make organizations more democratic. Instead, data shows that they reinforce existing structures and add new ways to monitor employees [14]. Neither claim has been put to the test in SMEs in Central America.

The study aims to examine how IM platforms both make operations more efficient and cause cognitive overload, female technostress, and power imbalances in small technology companies in Costa Rica. To answer it, an explanatory phenomenological strategy was used [15, 16]. This research makes three important contributions: it is the first to examine gendered technostress in digital workplaces in Central America; it demonstrates that IM strengthens organizational hierarchies instead of breaking them down; and it applies attention economy theory and the technology-power nexus to a Latin American organizational setting where it has not been used before.

II. Literature Review

It is not hard to see why IM at work can be useful. Teams that use Microsoft Teams or Slack regularly make decisions faster and send fewer official emails. Several studies in developed countries [2, 3] have found gains of 25–35% and

40–60%. These benefits are necessary for agile software development, where work depends on quick iterations between people who work in different places [17]. A shared thread can solve a problem quickly in the middle of the afternoon, but an email chain would not be ready until the next morning. The point about efficiency is valid. The other side of the balance is often left out.

There are real, measurable cognitive costs that come from receiving constant messages. Reference [18] (attention economy theory) provides the theoretical foundation: people's attention is limited, and platforms that are designed to capture it impose a cost on the user. Interruptions research measured the operational cost and found that IM-driven task-switching takes up about 3.2 focused work hours per week [19]. This is due to what the researchers call "attention residue," which is the cognitive trace of a previous task that stays after a switch and makes performance on the next task worse [20]. It costs a lot to have short breaks. When you add in the social pressure to react right away, the real cost of a message is much higher than the time it takes to read it. For many knowledge workers, this leads to a constant state of partial attention that is hard to get out of [21, 22].

Not all workers are affected by technostress in the same way, and the gender gap in the study is consistent enough that it needs to be explained structurally. Between 35% and 50% of women workers in high-income areas report stress linked to IM compared to their male peers [10, 11], and this difference is mostly due to two factors. The first is differential availability pressure, which means that women are expected to be more available, react quickly, and keep a noticeable online presence outside of work hours [21, 23]. Second, there is a gap between the platform and the culture of the person using it. IM tools are designed for short, task-oriented conversations, which makes it harder to communicate in a way that is more social and contextual [22, 24]. Women in work roles depend on that kind of contact more, and the problems are felt more by them. This is a problem with the structure, not the style.

It is not a strong claim that IM makes groups more democratic because open chat rooms let everyone talk to each other equally. The technology-in-practice theory by Reference [12] and later research in the technology-power nexus school [13] provide a more accurate interpretation: digital tools do not just transfer resources; they reshape them through existing organizational structures. When a message is read, it allows managers to verify that it was seen. Response-time data creates new metrics for evaluating performance. Online status indicators reveal availability in ways that email never did [14]. Because of this, workers are affected by monitoring in different ways based on where they sit. A boss who reacts at her own pace is being careful. If a young coder does the same thing, it could be interpreted in a quite different way.

How high-context communication norms interact with these factors is what makes the Latin American situation particularly important. The distinction introduced by Reference [6] is immediately relevant: in high-context societies, communication is more than just passing on knowledge; it builds relationships. Nonverbal cues, the past of a relationship, and the way people speak all have meaning that words alone do not. When those signs are not present in a chat thread, it is up to the person receiving the message to figure out what it means, since the message was not meant to carry that meaning. The "relational attention tax" is what this study calls that process: a culturally specific cognitive cost that adds to the attentional costs that have already been found in low-context settings. Some experts have seen "digital mestizaje," which is a mix of digital and social organizational forms, in Latin American workplaces [25, 26]. However, there isn't a lot of real-world evidence about how these forms work in different countries and industries. With its unique mix of global tech industry practices and Latin American organizational culture, Costa Rica's tech sector is a great place to investigate these mixed dynamics in more depth.

III. METHODOLOGY

Interpretive phenomenological analysis [15, 16] was used as the study strategy. This was chosen because of the nature of the problem, not because it is a common way to do research. Survey tools and platform performance data describe the measured results of IM, but not what it is like to live in them, such as what it is like to always be available or the social calculations that go into deciding whether to reply at 10 p.m. To do that, methods had to be used that were sensitive to emotional meaning and the social context of the group. The study was based on two theories: the technology-power nexus [12] and the feminist technostress theory [11]. These were chosen because the study had to look at both hierarchical and gender-differentiated processes at the same time without reducing one to the other.

To find 35 workers from SME tech companies in the Greater Metropolitan Area of San José, the study used the CAMTIC list as a starting point and purposefully sampled them with snowball referrals. Eight leaders (CEOs and CTOs), twelve mid-level managers, and fifteen operational staff (software developers and User eXperience (UX) designers) made up the final division.

Gender balance was a design goal from the start, and the 18 male (51.4%) and 17 female (48.6%) members closely reflect the makeup of Costa Rica's official IT sector. Everyone in e study had used at least one business instant messaging app every day for at least twelve months in a row. The recruitment process stopped when theoretical saturation was reached, which was practically described as less than 5% of codes from the last five interviews adding information that was not present in earlier transcripts [27]. The group is shown in Table I.

TABLE I
PARTICIPANT DEMOGRAPHICS (N = 35)

Category	Frequency	Percentage
Gender		

Male	18	51.4%
Female	17	48.6%
Job Role		
Executives	8	22.9%
Mid-level Managers	12	34.3%
Operational Staff	15	42.8%

The data was gathered from three different sources during the first half of 2023. The 35 interviews were all conducted in Spanish, and the guide was designed to capture experiences of IM that structured instruments cannot capture. For example, it aimed to explore what it was like to receive a work message at midnight, how workers managed multiple notification demands while working, and how their gender affected how they thought others perceived their availability. A documentation layer was added by carefully analyzing 22 corporate IM governance policies from the participating companies. This allowed a direct comparison between formal policies and actual practices. A third stream of data included aggregated response-time ranges, anonymized platform usage metrics, and after-hours activity trends. This data was provided by participants with their consent and used to compare reported behavior with observable platform data.

In NVivo 14, thematic analysis followed Reference[28] s three-step framework (see Fig. 1). The full transcript dataset was open-coded, producing 478 distinct codes. Inductively derived terms such as "emoji deference," "after-hours guilt," and "notification hierarchy" emerged without being assigned to predefined categories. Cohen's $\kappa = 0.82$ indicates a high level of inter-rater reliability, confirmed by a second independent coder. The initial codes were then grouped into 12 thematic clusters through iterative comparison. For example, codes related to performance pressure and unequal access converged into a theme addressing power dynamics in digital communication. Finally, five overarching themes were identified through selective coding, including "IM as a Hierarchical Performance Monitor" and "The Gendered Burden of Digital Availability."

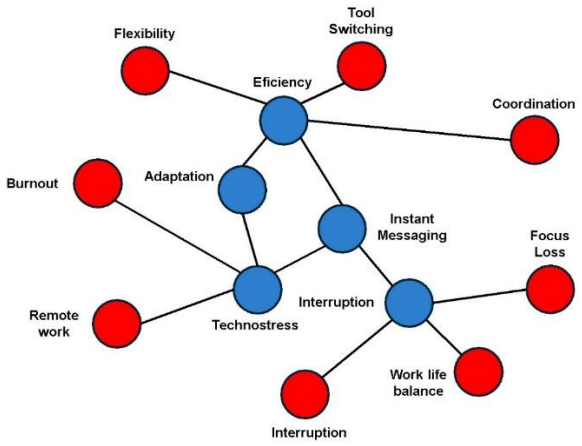

FIG. 1. THEMATIC MAP OF INSTANT MESSAGING IMPACTS

References [29, 30] four criteria were used to evaluate trustworthiness. Credibility was based on member checking of interview transcripts (85% of users confirmed their own) and staying involved with the study sites during the whole time the data was collected. Transferability was supported by detailed demographic and organizational descriptions integrated throughout the results. Dependability was maintained by keeping an official audit trail of 74 critical choices that could be looked at by anyone else. Two separate experts in organizational behavior from Latin America used negative case analysis to look for proof in the data that would go against the main themes that were forming. Approval from an ethics committee was not required, as this study was conducted in accordance with Law No. 8968, which is the Data Protection Law of Costa Rica.

IV. RESULTS

The 35 interviews created a set of facts that cannot be summed up in a clean way. IM makes people work faster. It must also cost them something. Both of those things are true about the same tool and the same person on the same day. The study showed that both effects are real and big. Also, the costs and benefits are not spread out randomly among the sample members; they are organized by gender and organizational rank in a way that is hard to explain by individual differences.

There was a strong signal for speed. Eighty-two percent of those who participated said that their company was more efficient since they started using IM. This effect was strongest for workers on geographically distributed teams. 72% said they could make decisions faster, and 65% said they relied less on email (see Table 2). These numbers are in line with averages for high-income economies [2, 17], which suggests that the case for IM's output holds true in this situation. But the way people talked about those gains often made it harder to understand. A software worker said: "Slack lets us resolve problems in minutes instead of waiting hours for email chains, but that same tool interrupts you every fifteen minutes when you are trying to concentrate." Almost no one talked about productivity without adding some details. The tool did its job and got a prize.

TABLE 2
PRODUCTIVITY IMPACTS OF IM

Aspect	Positive (%)	Negative (%)	Neutral (%)
Decision-making speed	72	18	10
Email reduction	65	25	10
Focus disruption	38	55	7

There were clear and large cognitive costs. Fifty-five percent of the people who took part said they had trouble concentrating on things on a regular basis, and 45% said they were under mild to high levels of technostress. These numbers are 13 percentage points higher than those from North America for focus disruption. The detailed statistics made it clear how this difference came about. It is not the number of

notifications per se, but the social sense of exposure that is at issue. Because of read receipts and online status indicators, being invisible is a deliberate choice rather than a neutral default. People who worked there said they were always aware of what they had not done yet, even when there were not any live messages coming in. Fifty-five percent of the people who took part said they had informational overload, which is not exactly too many messages, but a constant feeling of too much that made it hard to focus and caused what different people called "low-grade cognitive fatigue" that built up during the workday and didn't go away until the next morning. The trade-offs are shown on Fig. 2 by group job.

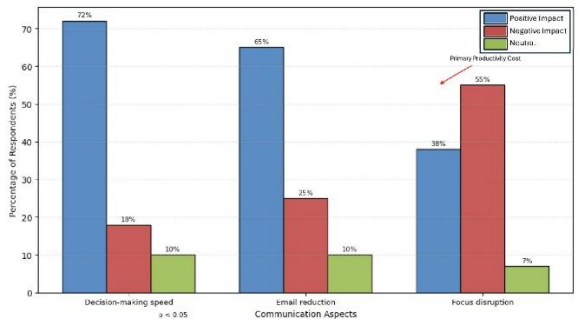

FIG. 2. THE TRADE-OFFS BETWEEN EFFICIENCY AND DISRUPTIONS AFFECT THE USE OF IM IN SMALL AND MEDIUM-SIZED COSTA RICAN SOFTWARE ENTERPRISES

It was not subtle how the costs were distributed across the organizational structure. The variation is easy to see in Table 3: 60% of leaders said that IM had net benefits, while 70% of operational staff said that stress was the main effect. The specific cause was different levels of exposure to informal communication from above: 68% of operational staff said they were regularly interrupted by messages from managers, compared to 20% of executives, which is a ratio of 3.5 to 1. By closely examining the 22 governance policies, the underlying structure became clear: 19 of them did not have any rules about after-hours contact with junior staff, how long to respond, or how to handle notifications. The platform tracking features did not need a written strategy to make sure they were available. They made absence clear, and workers adjusted their behavior accordingly.

TABLE 3
LEVELS OF PARTICIPANTS (N = 35)

Role	Benefits (%)	Stressors (%)
Executives	60	40
Mid-level managers	45	65
Operational staff	30	70

The gender factor followed a similar but distinct pattern. 60% of female executives said they were under a lot of stress because of IM, while only 40% of male executives at the same level reported the same. The 20-point gap did not decrease with experience. Female leaders talked about access issues that happened after work hours that their male peers in the same position did not talk about as often or as strongly. Because IM platforms are designed to be short, it can be hard to communicate in a way that considers relational context and nuance. This was something that female participants constantly talked about, but most of their male coworkers did not. It wasn't a matter of how sensitive or able to deal with stress each person was. Both were built-in features of the communication environment. Fig. 3 displays the effect pattern broken down by gender across all organizational roles.

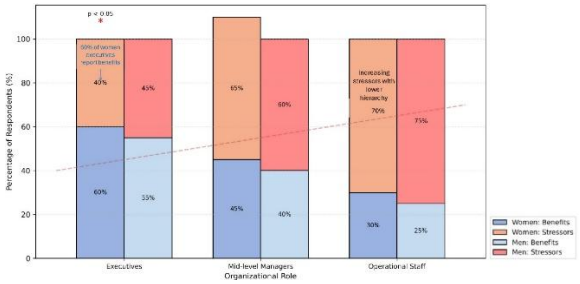

FIG. 3. GENDER-DISAGGREGATED IMPACTS OF IM BY ORGANIZATIONAL ROLE IN SME COSTA RICAN TECHNOLOGY COMPANIES

V. DISCUSSION

No story about a useful tool with bad side effects can be drawn from the facts. They tell a story about a tool that helps workers in different ways based on their gender and where they work in the company. The time savings are real: 72% faster decision-making and 65% less email. The costs are also high: 55% have trouble focusing and 45% experience moderate to high technostress. The numbers give a clear picture of how those costs are distributed compared to what has already been written. They do not just fall there.

Focus disturbance rates in other countries are 13 percentage points lower than those in the U.S. (55% vs. 36%). To understand this difference, the original attention economy theory [18] lacks a culture variable. In a high-context communication setting, every word has an interpretive demand that goes beyond what it says. The person who receives the message needs to judge the tone, figure out the relationship register, and think about what brevity from the sender means in this exchange. That does not happen quickly or for free. This is the "relational attention tax": the extra mental work that being on IM requires in a world where talking is never just about getting information. The data from Costa Rica are shown in Table 4 next to U.S. standards. There is a difference between the two sets of numbers for all four indicators. This research takes the attention economy approach [18] and applies it to cultures where cognitive load is raised by communication standards as well as platform design, which was not done in previous research.

TABLE 4
CROSS-CULTURAL COMPARISON OF IM IMPACTS

Metric	Costa Rica (This Study)	The U.S. [31, 32]
Reported efficiency gains	72%	68%
Focus disruption	55%	42%
After-hours usage	45%	38%

The gendered stress gap, which is 60% of female executives compared to 40% of male executives, adds to what has already been written about technostress [10, 11, 33] and makes it easier to understand. The gap has nothing to do with different levels of stress susceptibility. The qualitative data point to a structural mechanism: in Costa Rica's simultaneous work culture, being responsive in an obvious way shows professional commitment, and women are given a lot more weight than men when this signal is sent. Fig. 4 shows a map of the main causes of technostress among women in the group. One finding that has not been talked about enough in the literature is that status did not help anyone. The stress levels of female executives at the same level of the company were more like those of operational staff than of male executives at the same level. Even when women got to the top of the system, they were still subject to the access pressures that caused stress at every level below. This adds to and makes things more complicated for the feminist technostress framework [11] in ways that directly affect how companies set up their IM governance.

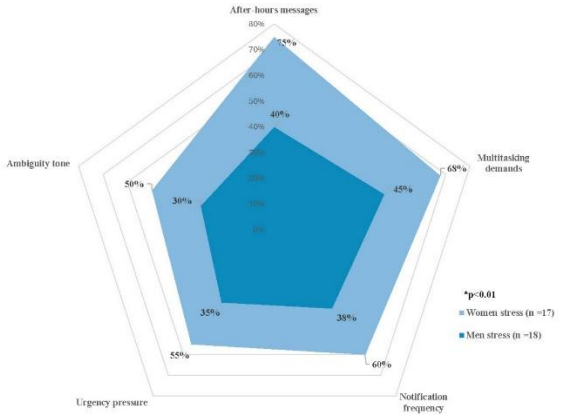

FIG. 4. GENDER DISPARITIES IN TECHNOSTRESS DRIVERS AMONG SME COSTA RICAN TECHNOLOGY COMPANIES

The structural data may be the most direct threat to the way that IM usage is usually thought of. This directly goes against the popular argument that chat platforms make conversation more open to everyone because they give everyone the same access. There were 3.5 times as many interruptions for operational staff as for leaders. Junior employees often did not feel able to turn off messages from managers. This was not because policy said they had to, but because the way the platform was set up made not responding clear. Read receipts, online status indicators, typing messages, and response-time logs all work together to make a tracking system that no one planned but that all employees understood and got used to. Senior staff members were careful about how they communicated. The junior staff did not think they had the power to use judgment. The technology-power link [12, 13] fits very well with what the participants said, and these data give it its first real-world test in the setting of a Central American small business.

Based on the data, there are three useful answers. Making "quiet hours," or setting times when work-related instant messaging isn't allowed, official is the most direct way to help, but only if those rules are followed and not just announced and then forgotten. Concentration disruption rates before and after implementation should be measured using validated experience sampling. Deep-work hours per week should be tracked through platform analytics. Technostress scores should be collected every three months using the Technostress Creators Scale [21], , and after-hours platform activity should be broken down by gender and organizational level. The gender differences this study found would not be visible if only aggregate measures were used. By lowering the number of active instant messaging platforms to one or two main ones, channel consolidation makes it easier to direct attention across multiple settings at the same time [34]. The third measure is to make gender-disaggregated tracking of IM governance results a regular part of organizational communication reviews. The differences seen in this study are too constant and too big to be random [35, 36].

VI. CONCLUSIONS

IM is neither good nor bad for tech companies in Costa Rica, as you can see from the main picture. The same tools help some workers more than they harm others, in ways that reflect and reinforce existing inequalities in the workplace. Efficiency gains: making decisions 72% faster and relying on email 65% less. 55% of people have trouble focusing, and 45% experience mild to high levels of technostress. For operational staff and women in leadership roles, the balance is more negative, but not for male executives, whose control over communication practices shields them from the daily access pressures that their female and younger coworkers face.

Based on the data, the study can draw three general conclusions. First, the attention economy theory [18] needs to be culturally adjusted when used in high-context communication settings. The "relational attention tax" that the research identifies here is a real process that causes cognitive costs that are higher than those observed in low-context settings. Second, feminist technostress theory [11, 37] needs to take into account the fact that status does not remove gendered availability pressure: in this group, female leaders felt more stressed than their male peers at the same level in the company hierarchy. Third, the relationship between technology and power [12, 13] is tested for the first time in SMEs in Central America. The results are clear: instant messaging platforms made surveillance features available to all levels of an organization, and power within the organization determined

who could modify these features and who had to comply with the rules..

For businesses, this means that IM usage without proper governance will always lead to these differences. To fix them, institutions need to step in directly, not platform tools or unofficial rules. Governance models that take gender into account need to spell out in writing what kind of contact is expected after hours. The review system described in the discussion is needed for "quiet hours" rules so that their effects can be measured instead of just guessing. Channel management needs to make more sense. People at all levels need to learn how to understand and deal with the power dynamics built into instant messaging systems as part of digital literacy programs. Any tech company that works in a high-context cultural setting can use these ideas. They might even work for any company that has not really thought about how power in the workplace affects privacy in communication.

There are some things that this study cannot say. The cross-sectional design only shows a picture and not a trend. It cannot show if technostress builds up over time, if effective coping strategies develop, or if organizational adaptation finally bridges the gap between acceptance and governance. To keep track of these changes, modern society needs longitudinal research, ideally through experience sampling over one to two years. A second limitation is the fact that organizations in Brazil, the Southern Cone, and Andean countries operate in different legal, cultural, and labor environments. The trends described here should not be taken to apply to those other places without being checked first. The next step that makes the most sense is to conduct comparative regional studies. Adding physiological markers such as cortisol, heart rate variability, and electrodermal activity to self-reported data would also help future studies that investigate the health effects of long-term IM use. As more organizations use AI-powered communication tools, the control issues this study raises are likely to become more important. Ensuring that technological progress does not harm well-being or the fairness of organizational structures will take more than just better platform design. It will require ongoing monitoring.

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