Title: What drives job satisfaction in IT companies?

Abstract

Purpose: Strategic goal achievement in every sector of a company relies fundamentally on the firm's employees. This study aims to disclose the factors that spur employees of major Information Technology (IT) in the United States (US).

Design/methodology/approach: In this paper, 15.000 reviews from the top 15 United States IT companies were collected from the social media platform Glassdoor to uncover the factors that satisfy IT employees. To learn the most meaningful features that influence the scores, positive and negative remarks, as well as advice to the management team, were analyzed through a support vector machine.

Findings: Results highlight a positive attitude of coworkers, contributing to a positive environment and job satisfaction. However, unsatisfied IT employees reveal that work exhaustion is the main reason for their job dissatisfaction.

Practical implications: IT human resource departments can use these valuable insights to align their strategies in accordance with their employees' desires and expectations in order to thrive.

Originality: The study highlights the relevance of IT companies to understand the reasons behind their employees' satisfaction. Up until now, little is known concerning the variants of job satisfaction among IT employees, enriching the understanding in this particular professional area.

Keywords: Human resource management; information technology; employee satisfaction; job satisfaction; IT companies; Glassdoor.

Article Classification: Research paper

1. Introduction

Managing human resources is a critical managerial dimension in any type of company (Zheng and Lamond, 2009). Today's competitive environment driven by new information and communication technologies leverages the relevance of keeping employees satisfied and aligned with the corporate strategy (Holland and Bardoel, 2016). Thus, human resource departments are driven by the need to fulfill employees' expectations to keep them motivated and reduce turnover (Tam and Chiu, 2010).

Both scholars and practitioners acknowledge the relevance of satisfaction factors to increase workers' productivity, helping in achieving an organization's goals (Wood and Wall, 2007). After all, employees are paramount in assisting in the building of a corporation's reputation and culture, leveraging its position in the market where it operates. Employee satisfaction is a key construct to which scholars have devoted attention within the organizational behavior scope (Zhou and George, 2001). Such a construct measures how satisfied employees are with their jobs, and it also influences turnover (Gregory, 2011). Specifically, the information technology (IT) sector is known to have high turnover rates due to the need for a very dynamic set of skills that are constantly changing, which leads to a high demand for highly skilled professionals (Thatcher et al., 2002). Thus, keeping employees satisfied is essential for talent retention in IT companies. Several factors affect employee satisfaction, including working conditions, working time, company reputation, employee relationships, salary, benefits, promotion, training, and organizational culture (Auer Antoncic and Antoncic, 2011). Therefore, companies must rigorously manage such factors to improve employee satisfaction, which leads to business success (Gregory, 2011).

Social media is a disruptive set of communication platforms built on the Web 2.0 technology with the goal of making the Internet a user-generated content media where

users express their opinions through text, images, and videos, among others (Ramos et al., 2019). There are several types of social media, including blogs, wikis, discussion forums, online review platforms, and media sharing sites. Nevertheless, the most popular are social networks (Moro et al., 2018). These come in two categories: generic-purpose (e.g., Facebook, Twitter); and specialized ones (e.g., ResearchGate). Professional social networks specifically focused on the market labor and offering a range of interesting services for connecting employers and employees have emerged, and nowadays, both companies and prospective professionals cannot afford to neglect the dissemination effect of networks such as LinkedIn and Glassdoor (Chen et al., 2017).

This study aims to unveil the factors that satisfy employees of major IT companies in the United States (US). The text written about positive and negative remarks, and advice to the management team published on the Glassdoor network is analyzed together with other features through machine learning, specifically a support vector machine (SVM), to show which are the most meaningful features that justify the granted scores. The discovered knowledge helps company managers to understand the key factors of employee satisfaction, shedding additional light on such a dynamic and vibrant labor market as is the case of the IT sector.

2. Background

2.1.IT companies in the US and their working models

The United States (US) is a relatively recent country when compared to large countries in Europe and Asia, grown from a mix of immigrants flocking into the new world to take advantage of a resource-rich and unexplored land (Gabaccia, 1999). Technology companies, especially in the Western region of the US, started to emerge and flourish in the XX century benefiting from skilled workers, some of them immigrants (e.g., Sergey

Brin, co-founder of Google), prospering from an open environment that fosters innovation (Kuz, 2010). Especially in California, and partially fueled by renowned private and public universities such as Stanford, California Institute of Technology (Caltech), and University of California, among others, "Silicon Valley" has nurtured worldwide leading companies such as Hewlett-Packard, Google, Apple, and Facebook (Adams, 2005). These mega-large companies provide important benefits, including schools for workers' children, health units, and others only at the reach of global-scale companies (Garon, 2018). Therefore, it is not surprising that such companies make the dream job of any worker, receiving very large numbers of applications (Di Meglio, 2011).

The organizational culture of companies such as Google is key for their success (Urbach and Ahlemann, 2019). Employees are encouraged to share their thoughts in an open-minded culture where communication is valued. For example, Eric Schmidt, former Google CEO adopted a transparency approach in Google's board meetings by recognizing that he did not have a solution for the difficult problems of the previous quarter (Schmidt and Rosenberg, 2014). This initiative opened the debate to share opinions on the recognized problems. Likewise, talent retention has been at the core of Microsoft's strategy since the 1990s. Also, by developing "a broader range of leadership talent, and implementing a career model framework", Microsoft moved human resource strategies to the forefront (Olesen et al., 2007).

Nevertheless, the seemingly paradisiacal environment for workers in Silicon Valley overshadows well-known problems of high-performing organizations such as management bullying (Walsh et al., 2019). Additionally, as Hyde (2015) pointed out, the high-velocity labor market of the "Valley" still requires social safety nets that provide backup for employees, releasing the day-to-day pressure imposed by flexible

yet not free of constraints labor in a competitive human resources market. Therefore, the IT companies in the US provide an important setup needing further research.

2.2.Job Satisfaction

A large body of literature has pointed to numerous factors involved in stress and burnout among employees from the result of a combination of organizational stressors and individual characteristics. To contradict the dissatisfaction of employees and understand their behaviors, one of the most studied variables is job satisfaction (Frenkel et al., 2013; Lewis et al., 2017; Zou, 2015). The definition of job satisfaction can be the reaction of people who enjoy their work and do it well, revealing characteristics of fulfillment and pride based on a range of elements (Castaneda and Scanlan, 2014). In this scenario, there are two main stakeholders interested in this subject: managers and employees. From the managers´ point of view, they expect to find satisfied workers that, in turn, will have a positive attitude towards the job being dedicated and emotionally involved with their activity. Moreover, employees create their own expectations and attitudes, expecting to be dealt with reasonably and respectfully. Thus, a positive dynamic will reveal to be a key factor in accomplishing competitive advantage, while a negative outcome will have a negative impact on the general achievement of organizational effectiveness and performance (Melián-González, 2016).

In 2016, 13% of US IT professionals revealed dissatisfaction with their job (Statista, 2016), which could be the result of a variety of factors such as: (i) role ambiguity and conflict; (ii) supervisory behavior; (iii) job design; (iv) compensation; (v) training and development (Bakotić and Tomislav, 2013; Bowling et al., 2017; Lewis et al., 2017; Zou, 2015). In order to highlight the most relevant features concerning job satisfaction, each are dissected and first discussed, followed by an explanation of the data collection and method of analysis used to conduct this research paper, described by the extensive

volume of textual data that legitimizes an automated approach. The results are then discussed, followed by the conclusion and considerations for future research.

2.2.1. Role ambiguity and conflict

The variables role ambiguity and role conflict, collectively, are referred to as role stressors. Both are predictors of employee health, job attitudes, and employee behavior (Bowling et al., 2017). Role ambiguity is associated with disorientation and confusion due to a lack of information and clarity concerning an employee's job functions, which can be translated into a stressful experience while role conflict involves conflicting or opposing expectations from coworkers that influence role performance (Madera et al., 2013). The constraints associated with role stressors occur due to difficulty of the employee in completing the job tasks that are associated with him. The conflicts and obstructions are found when employees are performing their job tasks and suffer from anxiety, work exhaustion and negative emotions (Schmidt et al., 2014; Shih et al., 2013) that in turn will have a negative impact on overall job performance and satisfaction, thus harming the company. There is a positive relationship between role conflict/ambiguity and job-related tension (Baroudi, 1985), and in US IT companies, role ambiguity and conflict have a direct impact on the employees' turnover intention (Lo, 2015).

2.1.2. Supervisory behavior

In 2016 and 2017, Canada and US IT decision-makers revealed that 71% of their teams had a lack of necessary skills to meet the companies' objectives (Statista, 2018a). This factor may lead to supervisory pressure towards their employees to perform a better job. Leadership style has an impact on the employees' job satisfaction (Mathieu et al., 2015), and when employees perceive support from their supervisor they tend to respond in the same way towards their supervisor, showing their commitment towards the

company´s objectives, enhancing the satisfaction towards family, job, and career and reducing the level of employee stress (Kang et al., 2015). On the other hand, employees have reported a higher level of stress and lower job satisfaction when being monitored by supervisors (Carpenter et al., 2018). Furthermore, abusive leadership has a positive impact on employee turnover intention, a negative correlation with job performance, satisfaction, low commitment, higher work-family conflict, and burnout. In the end, the employee tends to attribute the responsibility to the company (Mathieu and Babiak, 2016).

2.1.3. Job Design

Job design is developed by organizations as a strategy for improving both productivity and quality of work experience to reduce employee problems such as grievances and absenteeism (Cullinane et al., 2013). It is related to the work specifications of contents, methods, and relationships, and their outcomes are job satisfaction, engagement, resilience, and thriving at work (Taylor, 2014). Hackman and Oldmans (1976) assert that their job characteristics model highlights five key elements (skill variety, task identity, task significance, autonomy, and work feedback) for effective performance, expecting at the same time to increase job satisfaction. Nonetheless, to increase job satisfaction, organizations tend to motivate employees to become job crafters, i.e., to create their own job design by creating enjoyable social relationships with co-workers, changing the work methods and/or specification of contents to meet the employees' demands and expectations (Petrou et al., 2018). Job crafting has an impact on organizational performance since the employee determines what and how the tasks are completed and the interpersonal dynamics of the workplace. This impact can be positive or negative, creating a challenge for organizations while avoiding negative crafting (Bruning and Campion, 2018). For IT employees, job design influences morale, quality

of working life, high involvement work processes, reduces employee turnover, and is considered to be more important than employees' base salary (Korunka et al., 2008).

2.1.4. Compensation

Compensation is an organizational variable that influences job satisfaction, which in turn will impact employee retention, dedication, loyalty, performance, cooperation, motivation, and turnover intention, heightening the employee/organization relationship (Misra et al., 2013). Employees who perceive the compensation plan as positive will have a favorable view of the organizations' support (Demerouti et al., 2014). Various types of compensations are employed by companies, such as pay increments or bonuses (extrinsic), promotion opportunities or job security (intrinsic) in exchange for employees´ performance (Huang et al., 2015). The compensation plan should meet the expectation of the employee by being fair and equitable. It provides tangible rewards aligned with the talent and recognition. The employees' satisfaction is influenced by the perceptions of their own value versus the company perception, among the coworkers overall compensation plans (Williams et al., 2008). A wronged employee outcome is associated with a low commitment level and turnover intention (Misra et al., 2013). In the context of IT companies, compensation is used as an important factor to recruit and retain skilled IT employees, and compensation tends to increase with organizational tenure (Slaughter et al., 2007).

2.1.5. Training and development

Research shows that job satisfaction is positively associated with employees' training and development (Zumrah and Boyle, 2015). Employees are an important company asset and success or failure highly depends on the performance of employees. Consequently, organizations are obligated to finance training and development

programs, which in turn will strengthen knowledge, expertise, and the ability of employees, thus boosting the company's competitiveness (Jehanzeb and Bashir, 2013).

Training and development involve providing the basic knowledge and skills according to employees' needs to conduct their duties within company standards and growth opportunities (Costen and Salazar, 2011). Employees who felt good opportunities to grow within the company demonstrated a strong emotional connection to their organization (Costen and Salazar, 2011). Standard organizations provide training and development programs to keep their employees' highly satisfied, decrease the level of employee turnover, and increase their loyalty. Young professionals with low experience recognize the effort spent on their future career and perceive organization support (Sung and Choi, 2014).

IT decision-makers worldwide highlighted that one of the main reasons for the lack of skills of their teams was low investment in training programs (Statista, 2018b). IT companies are constantly affected by the high degree of exposure to changes and demands due to frequent changes in technology and working methods. Therefore, employees are pressured to be constantly updated.

The current study considers job satisfaction as the general attitude towards work and depends on several psychosocial factors that include role ambiguity and conflict, supervisor behavior, job design features, compensation plan, and training and development. Such characteristics have an impact on motivation, leading to a favorable emotional state and job performance among employees, which in turn have an impact on the overall performance of an IT company.

3. Materials and methods

This empirical study uses data collected from Glassdoor, a professional social network designed to allow professionals to rate and give feedback on their employers (Ehlers, 2015). Glassdoor offers important insights through an information rich platform to which workers can contribute using both quantitative scores and textual opinions. Luo et al. (2016) adopted a text mining approach to analyze 274k opinions of Fortune 500 companies and assess the relation between workers' opinions and companies' performance. Jung and Suh (2019) adopted a South Korean online platform similar to Glassdoor to assess job satisfaction factors using the latent Dirichlet allocation algorithm, a topic modeling technique. Thus, analyzing the information provided online on social media platforms can render interesting results from both the companies and the employees' perspectives.

We adopted the Forbes 2017 world ranking (Stoller, 2017) to select the major IT companies in the US. This ranking includes the 25 biggest technology companies worldwide in market value. From those, the 2017 edition includes 15 US-based companies, shown in gray lines in Table 1. The total dataset compiled from the Glassdoor website consists of 15 thousand reviews, 1,000 for each of the 15 companies, and 14 features highlighted in Table 2 (the US regions and divisions are detailed in Table 3).

Insert Table 1 about here

Insert Table 2 about here

Insert Table 3 about here

The approach followed is based on the studies by Silva et al. (2018) and Guerreiro and Moro (2017). It consists of building a model based on advanced machine learning techniques and extracting the hidden knowledge from it in the form of each features' relevance. In this case, the support vector machine (SVM) was chosen to train the model, since this modeling technique enables the transformation of the input features into a high m-dimensional feature space, using a nonlinear mapping. Thus, it divides the search space through the best linear separating hyperplane connected through the distributed set of support vector points (Moro et al., 2017). The data-based sensitivity analysis (DSA) was used to extract features' relevance. By varying the list of inputs through their possible range of values, it is possible to provide a reliable measure for each feature's influence, i.e., the Glassdoor granted score. Hence, we aim at explaining how each feature contributes to the granted score.

The free input text where employees write about positive and negative remarks or give advice cannot be directly used as inputs to the SVM. Accordingly, we followed an approach similar to Guerreiro and Moro's (2017) study and obtained word frequency for every noun contained in each of three textual features. Verbs and adjectives were excluded since we intended to study the main items/constructs and not the intentions (verbs) or sentiments (adjectives) transmitted. Table 4 shows the words with the highest frequency for three features. Specifically, the ten most frequent words were chosen by quantifying each occurrence and also used as 30 additional features to the SVM (using the prefixes "rv.pros," "rv.cons," and "rv.advice" for each of the three original features).

The result was a total of 40 features to characterize the scores granted by a company's employee.

Insert Table 4 about here

4. Results and discussion

Before extracting knowledge from the model, it is necessary to measure its performance in modeling the Glassdoor score based on the 40 input features. We adopted the k-fold cross-validation scheme, which provides a robust and realistic evaluation procedure (Refaeilzadeh et al., 2009) by dividing the dataset into k folds of equal size and running k times by using all folds for training the model except one, which is used for testing its accuracy (in each run the fold for testing is rotated, assuring that every instance is used for the validation procedure). K was set to 10, as recommended by Refaeilzadeh et al. (2009). Two metrics were chosen to evaluate the results, the mean absolute error (MAE), which measures the absolute deviation between the real value and the predicted one, and the other is mean absolute percentage error (MAPE), which computes a percentage based on the real value in a similar computation as MAE. The obtained values were: MAE=0.700; MAPE=26.85%. These are similar to what Moro, et al. (2016) obtained, supporting our claim that the model is valid for proceeding with knowledge extraction. We chose the 2017 top 15 US based technology companies for our study (Table 1).

The analysis of Figure 1 brings interesting findings. The aggregation of the terms "cons" has a relevance of 31.3%, while the "pros" terms have a relevance of 30.06%, meaning that, although there is a small difference between both comments, "cons" have

more influence in the rating provided by the employees than “pros.” However, the relevance of terms from the comment box “advice” has a greater impact on the rating with a relevance of 32.29%, higher than the terms “pros” and “cons,” revealing their influence in the output variable.

Insert Figure 1 about here

The term with the highest contribution for the overall rating (cons.work) had an influence of 3.99% while the lowest contributor (pros.benefit) had an influence of 1.81%.

The term “work” from the “cons” comment box is the most relevant feature that characterizes the score granted by an IT company employee in all three comment boxes. From the analysis of Figure 2, when the term “work” is mentioned six times, the rating rises to 4.06. However, every time it is mentioned more than six times, the rating tends to decrease until the point when it is mentioned 18 times and reaches the lowest rating (3.49). Data reveals that when an employee mentions the term “work” with too much emphasis, (s)he is not experiencing job satisfaction. Shih et al. (2013) reported that when an IT worker is dissatisfied due to work exhaustion, this feeling is highly associated to a low level of satisfaction, high level of turnover intention, lack of autonomy, role ambiguity and role conflict (Shih et al., 2013). To contradict this feeling of work exhaustion, human resource departments should give liberty and motivate employees to redesign their own job to fit their motives, strengths, and passions by changing their tasks and interactions at work. A company that provides a high degree of

autonomy and discretion leads to greater opportunities of job crafting influencing the overall job satisfaction of the employees (Cullinane et al., 2013).

Insert Figure 2 about here

The term “manag” from the “advice” comment box is the second most important feature (Figure 3). The more focus on management in the advice comment box, the better is the rating. Employees who only mention the term management a few times (less than 4.5 times) tend to rate the company less positively way. Advice to improve the management system reveals to be important for employees and employees feel satisfied by giving their opinions to line and senior management if the leadership style has a positive impact on employees (Mathieu et al., 2015). Supervisor behavior has an important relevance at this level since it can build a voice-supported environment that generates a positive climate for employees to feel protected, secured, and challenged to express problems and ideas (Janssen and Gao, 2015). Managers and supervisors are moderators of advice-seeking and should suggest and motivate IT employees to share opinions regarding the management style since they influence the organizational outcome, job performance, and impact over the company innovativeness (Alexiev et al., 2010).

Insert Figure 3 about here

The third most relevant feature is the term “learn” from the positive remarks comment box (Figure 4). When the term is mentioned between 0.75 and 2 times, the rating

increases. The best result is, in fact, when “learn” is mentioned twice. After this point, the rating starts to decrease until 3.47, revealing a negative impact for the IT companies. Previous studies suggest that, regarding training and development, employees reveal propensity to acquire new knowledge, develop skills and learn new working dynamics (Billett and Choy, 2013). However, since IT companies have a high degree of exposure to changes and market demands, there might be a tendency to overload employees with an environment of higher learning intensity, creating dissatisfaction with employees. High learning intensity depends on work organization and how responsibilities are delegated by managers and supervisors (Skule, 2004). The creation of a successful training and development strategy has the potential to deliver positive outcomes to IT companies as their success heavily depends on having their employees satisfied (Jehanzeb and Bashir, 2013; Zumrah and Boyle, 2015).

Insert Figure 4 about here

Figure 5 highlights the terms with the most negative results in each of the three box comments analyzed. In the “advice” comment box, if the term “employee” is mentioned 4 times, the rating will reach the lowest rating (3.05). Additionally, when the term “employee” is mentioned more than 4 times, findings reveal the interest of employees to share positive advice through the “advice” comment box on how to create and stimulate a good relationship between coworkers. A good relationship between peers has been cited as a predictor of collaboration, trust, empowerment, and responsibility among colleagues (Zayas-ortiz et al., 2015). When companies motivate their employees to become job crafters, there is a positive impact on the relational outcome between workers (Petrou et al., 2018). In the “pros” comment box, the term that leads rating to a

lower level is “work.” When it is mentioned 5 times it decreases the rating to 3.37. Nevertheless, this is the term with the highest rating. The more times it is mentioned, the more inferior the rating is, showing an increasingly negative impact of the number of times the term is used by IT employees. If employees give too much emphasis to the term “work” in their positive comments, there is less positive satisfaction towards different aspects of work, such as working conditions, working time, working environment, or work-family balance. This is consistent with previous research (Anitha, 2014; Bakotić and Tomislav, 2013; Galea et al., 2014; Raziq and Maulabakhsh, 2015). Thus, IT organizations need to create conditions in the workplace that make employees motivated, satisfied, committed to strategic goals, and loyal (Misra et al., 2013). A positive business environment within the organization results in a positive effect on performance of employees. As expected, these data depict that the terms from the “cons” comment box are those with more negative impact for the rating, followed by the “advice” and “pros” terms. Companies need to be aware of the opinions placed in this comment box, analyze and consider them to increase their employees’ satisfaction by turning negative aspects into internal strengths.

Insert Figure 5 about here

Figure 6 uncovers the terms associated with the highest ranking. When the term “keep” from the “advice” comment box is mentioned twice, the rating increases up to 4.29, revealing to be the best result among the three best terms. The term from the “cons” comment box that discloses the highest rating is “environ,” which after being mentioned twice, raises the rating to 4.25. It is interesting to observe that the more emphasis given to the term “environ,” the higher the rating is, revealing the positive impact that this

term has for a company´s score, although it is in the “cons” comment box. Other studies suggested that employees are sensitive to the overall working environment, such as job design, supervisory behavior, role ambiguity and role conflict, and compensation plans (Raziq and Maulabakhsh, 2015). Since the rating is continuously rising as is mentioned, more advice for positive work environment leads to a better rating. Social interactions and relationships are crucial for work environment and consequently job satisfaction (Freeney and Fellenz, 2013). The design of a reward system contributes to organizational effectiveness and motivates IT employees’ to work with satisfaction (Misra et al., 2013). Employees satisfaction has an influence on their behavior and impact on their productivity (Kim and de Dear, 2013; Raziq and Maulabakhsh, 2015). From this perspective, employees give relevance and feel satisfied to contribute to a better environment of the IT companies. In the “pros” comment box, the term “employee” mentioned twice makes the rating increase up to 4.26, revealing that they find coworkers with a positive attitude in general, meaning to be respectful, friendly in terms of personal relationships, helpful, knowledgeable and resourceful colleagues (Hau et al., 2013; Zayas-ortiz et al., 2015). Satisfied employees are willing to transfer knowledge and skills with more enthusiasm than employees who are dissatisfied with their job (Zumrah and Boyle, 2015). It is interesting to observe that the three most positive terms reach their highest rating after being mentioned twice.

Insert Figure 6 about here

Surprisingly, there is not a significant difference between the highest ratings of three comment boxes, when it would be expected to find differences between the “pros” and “cons” ratings. These results might be the consequence of emotional attachment

between employees and IT companies that influence the negative rating towards a nicer rating (Derks et al., 2008; Lee et al., 2013).

5. Conclusions

Employees are a valuable resource for an IT company to survive and thrive. An IT company needs their employees to feel satisfied to achieve the overall objectives and to remain loyal to the company in order to achieve company success (Jehanzeb and Bashir, 2013). The employees' satisfaction is the premise of this commitment and dedication. Providing the necessary conditions for an employee to feel satisfied, employees can become a priceless asset. They can contribute in so many ways for a company to achieve competitive advantage in a globalized world (Bakotić and Tomislav, 2013). Employee satisfaction can help in reducing turnover, which is high in the dynamic IT sector (Thatcher et al., 2002).

In this paper, 15,000 reviews were extracted from Glassdoor, a social media platform developed for professionals to rate and provide feedback about companies they work for, from the top 15 IT companies in the US, according to Forbes 2017 world ranking, using support vector machine to understand which are the most meaningful features that justify the granted scores.

The achieved findings characterize the most important features that satisfy IT workers, providing IT human resource departments valuable insights to align their strategies in accordance with their employees' desires and expectations. Specifically, the results highlight that IT managers should listen to their staff's advice on their needs, management issues, and team. By also highlighting workload as negative, employees are signaling the need for further attention to improve teamwork and work balance to increase satisfaction. Hence, human resource departments can take team-building

initiatives to address such challenges. Regarding the positive items, learning is clearly outlined, with the company's brand and environment also playing a role in employee satisfaction. Thus, workers appreciate working under pivotal brands. Also, interesting to note is the fact that words related to salary such as "payment" did not emerge among the most relevant ones, neither in the positive nor in the negative comments. This result corroborates the findings by Korunka et al. (2008), who analyzed IT employees and unveiled that other factors play a more significant role to employee satisfaction when compared to the base salary. This outcome is also aligned with the meta-analysis of the literature study conducted by Judge et al. (2010) who found that salary is only marginally related to satisfaction. Therefore, human resource departments should focus more on tuning their benefits strategy instead of salaries.

The contribution of this paper is expected to be significant. The outcome of this study makes a conceptual addition to academia and management. Scholars can use this valuable knowledge as an immediate reference to conduct research, considering the opinion of IT employees in terms of job satisfaction while IT human resource departments can redirect their strategies toward the identified characteristics that enhance job satisfaction to meet the organizational objectives and mitigate less satisfactory expectations, behaviors and turnover intentions of actual and future employees. This paper can help IT human resource departments to understand the wishes of employees and take advantage of various actions highlighted that can be taken to prevent negative outcomes. The work of a satisfied employee can benefit both employees and IT companies.

Despite the insights and contributions of this paper, there are limitations that need to be addressed and considered for future research. The collected data refers to the general employees of the 15 most important American IT companies, and not to specific

departments of those companies. Therefore, in future research, data should be separated by departments to perceive the most meaningful variables of job satisfaction of each IT company department. It would be interesting to understand the reasons that make top managers satisfied with their position at an IT company and which factors have the most relevance to their satisfaction.

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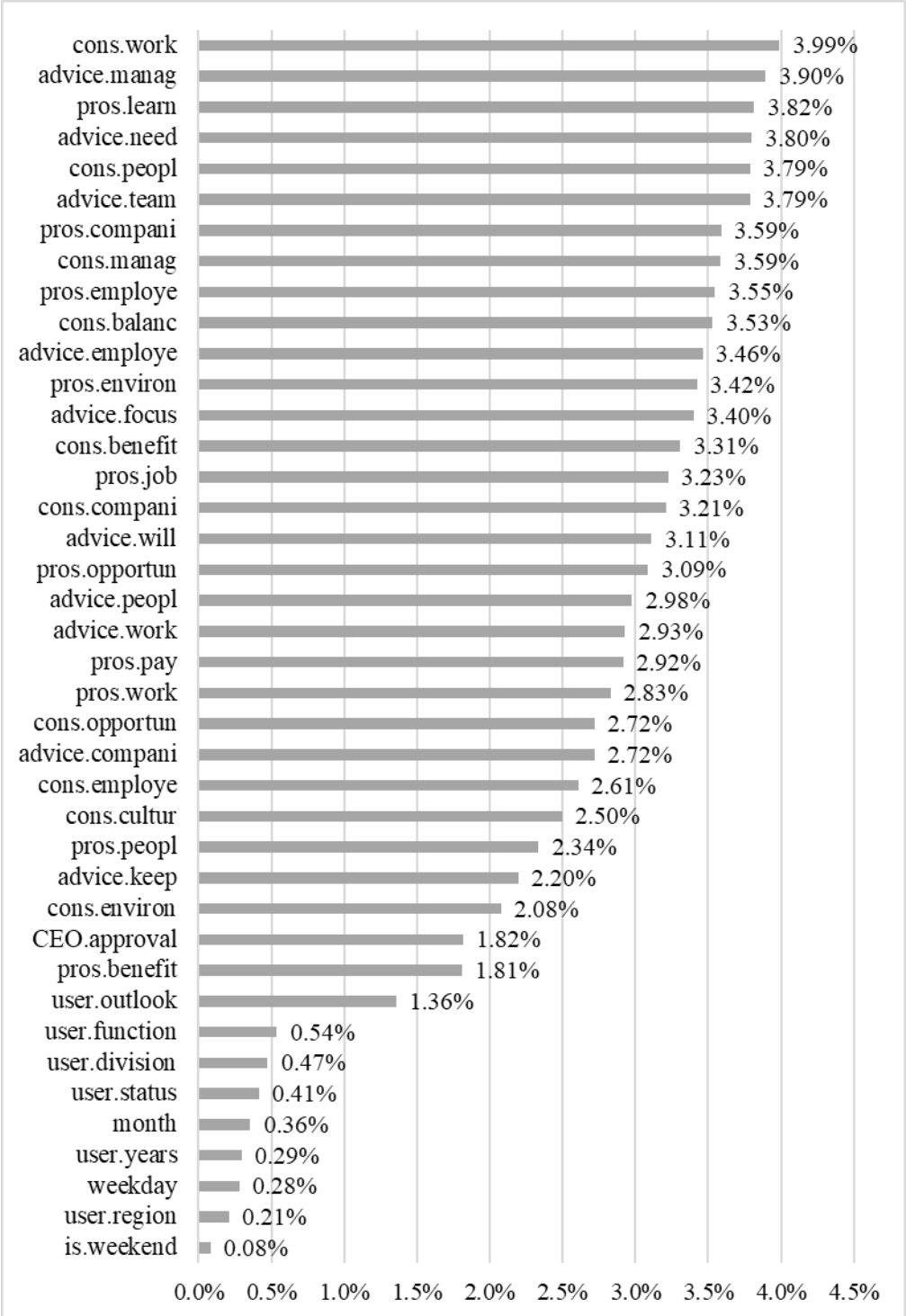

Fig. 1 *- Relative importance of each feature*

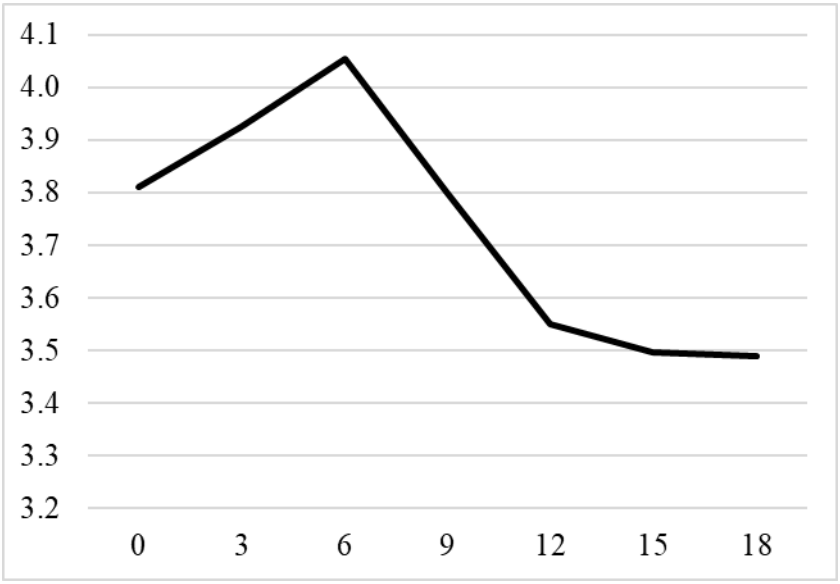

Fig. 2 *- Influence of mentioning word "work" in the "cons" comment*

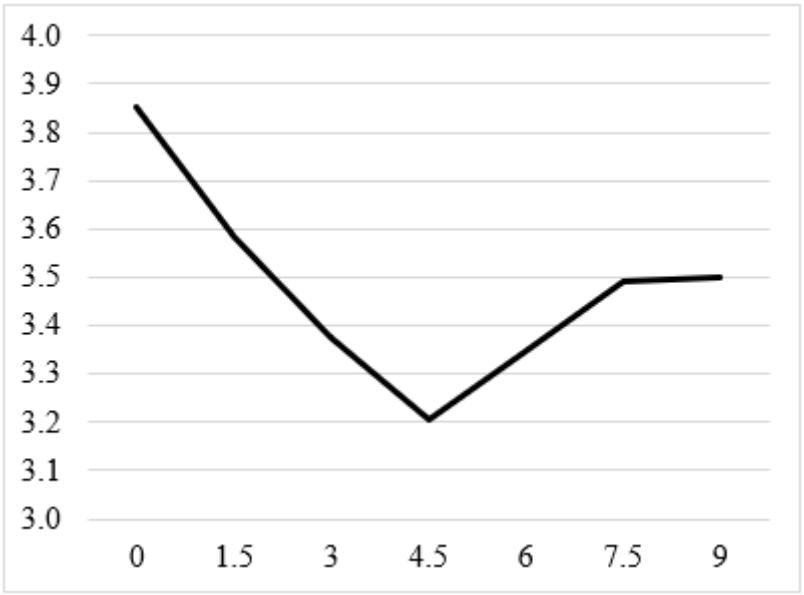

Fig. 3 *- Influence of mentioning word "manag" in the "advice" comment*

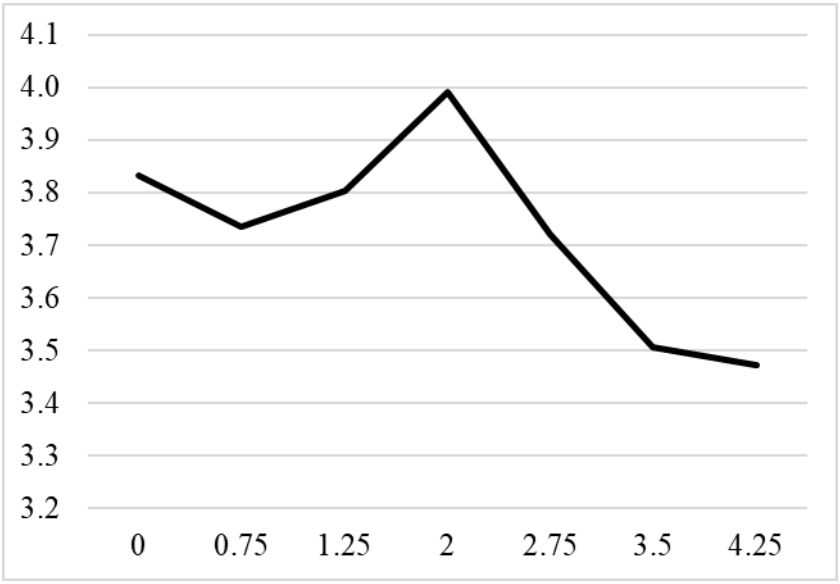

Fig. 4 *- Influence of mentioning word "learn" in the "pros" comment*

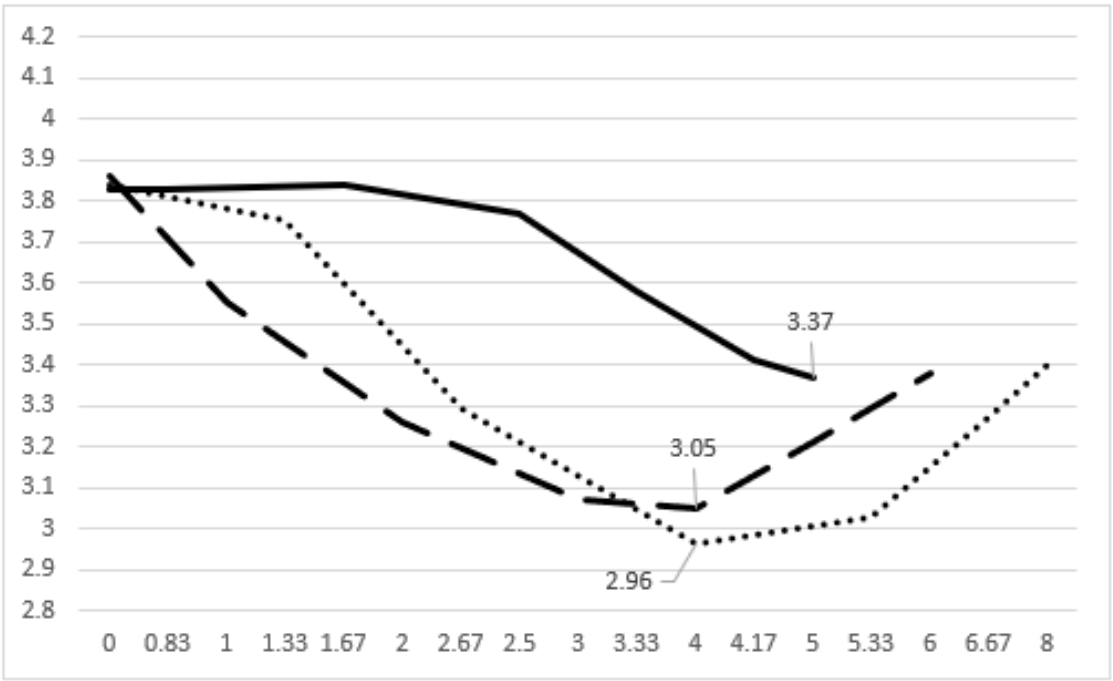

Fig. 5 *- More negative terms of the three comment boxes*

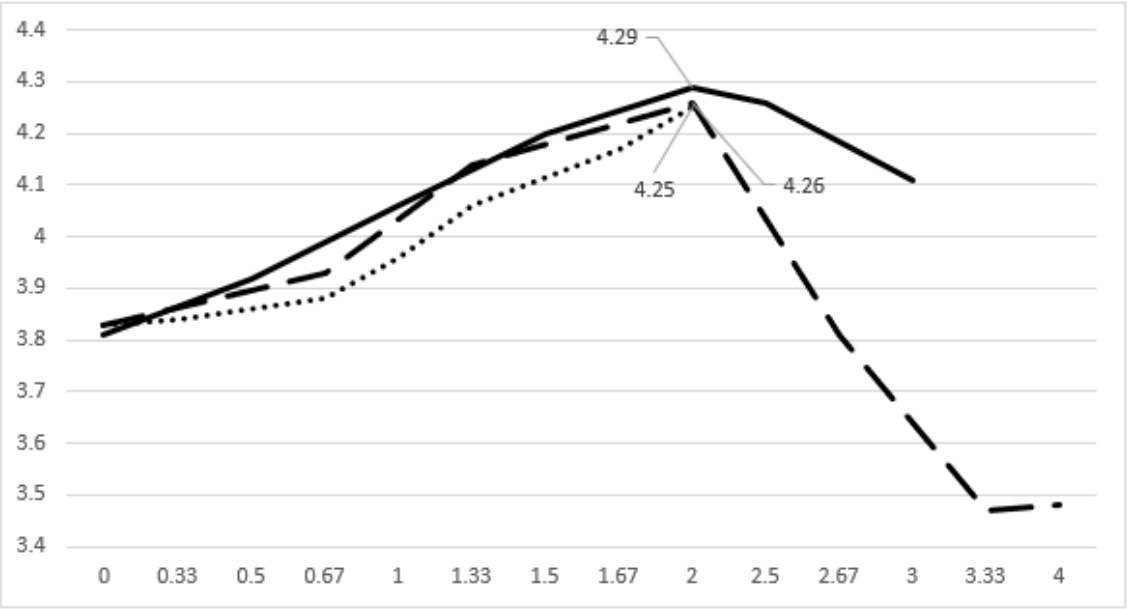

Fig. 6 *- More positive terms of the three comment boxes*

Table 1 - Forbes 2017 ranking

Rankings			Company	Country
Tech	US Tech	Global 2000		
1	1	9	Apple	US
2		15	Samsung	South Korea
3	2	19	Microsoft	US
4	3	24	Alphabet (Google)	US
5	4	43	IBM	US
6	5	54	Intel	US
7	6	58	Cisco	US
8	7	98	Oracle	US
10	8	119	Facebook	US
11		127	Taiwan Semiconductor	Taiwan, China
12		148	Tencent Holdings	China
13	9	170	Qualcomm	US
14	10	171	Hewlett-Packard Enterprise (HPE) *	US
15		178	SAP	Germany
16	11	271	HP **	US
17	12	272	Accenture	US
18		349	SK Hynix	South Korea
19		363	SK Holdings	South Korea
20		377	Tata Consultancy Services	India
21	13	387	Texas Instruments	US
22		392	Baidu	China
23	14	433	Corning	US
24		460	Fujitsu	Japan
25	15	482	Micron Technology	US

* Retained the HP technology solutions segments; ** Retained the HP printing and PC business segments

Source: https://www.forbes.com/pictures/591b9072a7ea434078d412be/2017-global-2000-tech/

Table 2 - Features used for the analysis

Feature	Description
rv.month	Month when the review was written
rv.weekday	Weekday when the review was written
rv.is.weekend	If the review was written on weekend
rv.user.status	Current or former employee
rv.user.function	Management, technical, or other
rv.user.division	User's US division located, or from abroad
rv.user.region	User's US region located, or from abroad
rv.user.outlook	User recommendation rate, outlook, and CEO approval, one from 3 categories: Green, Orange, Red
rv.CEO.approval	
rv.user.years	Years in the company: ≤3 years; >3 years
rv.pros.text	Free text with positive remarks, negative remarks, and advice to management
rv.cons.text	
rv.advice.text	
rv.score	Review score

Table 3 - US regions and divisions

Region	Division	States
Northeast	New England	Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont
	Mid-Atlantic	New Jersey, New York, Pennsylvania
Midwest	East North Central	Illinois, Indiana, Michigan, Ohio, Wisconsin
	West North Central	Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota
South	South Atlantic	Delaware, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, District of Columbia, West Virginia
	East South Central	Alabama, Kentucky, Mississippi, Tennessee
	West South Central	Arkansas, Louisiana, Oklahoma, Texas
West	Mountain	Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming
	Pacific	Alaska, California, Hawaii, Oregon, Washington

Source: https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us_regdiv.pdf

Table 4 - Most frequent keywords within "pros", "cons", and "advice"

rv.pros.text

Word	Frequency
work	1335
benefit	799
company	710
people	606
pay	473
opportunity	331
environment	330
employee	273
learn	249
job	234

rv.cons.text

Word	Frequency
work	6523
company	2868
people	2754
benefit	2319
management	1635
opportunity	1530
balance	1264
culture	1197
environment	1149
employee	1104

rv.advice.text

Word	Frequency
employee	1784
management	1591
people	1238
work	1213
company	1029
keep	892
need	676
team	553
focus	473
will	468