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The Psychological Effects of Digital Companies' Employees during the Phase of COVID-19 Pandemic Extracted from Online Employee Reviews

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Abstract: The ways people use words online can furnish psychological processes about their beliefs, fears, thinking patterns, and so on. Extracting from online employees' reviews on the workplace community websites, we can quantify the psychological effects of employees during the phase of the COVID-19 pandemic. We collect the anonymous employees' reviews of Top 100 digital companies from the Glassdoor website which allows people to evaluate and review the companies they have worked for or are working for. Here, based on the data of numerical evaluations and textual reviews, we firstly use Z-score to investigate the psychological effects of employees in digital companies during the phase of COVID-19 pandemic. Next, we use a text analysis application called Linguistic Inquiry and Word Count (LIWC), which provides an efficient and effective method for studying the various emotional, cognitive, and structural components existing in individuals' verbal and written speech samples, to mine these reviews to obtain changes in personal pronouns and 10 dimensions of psychological processes. Finally, we use Z-score to count on all aspects of drives and personal concerns in psychological processes.

Keywords: online employee reviews; psychological effect; digital company; COVID-19 pandemic

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1. Introduction

During COVID-19, countries around the world are under lockdown and millions of people cannot leave their homes. People are substantially suffering from many symptoms of psychological stress, such as greater levels of anxiety, depression, and distress [1–5]. Particularly, the vulnerable groups range from health care workers, women, younger people, the self-employed, to the people with psychological processes who were plagued by the pandemic [6]. Interventions for mental health are urgently needed for preventing mental health problems [7,8]. Recently, researchers have been searching for solutions to the physical and psychological needs of health care workers [9,10]. During the pandemic period, it is crucial to make arrangements in working conditions in a way to increase job satisfaction, reduce burnout among health care workers, and provide necessary psychological support [11]. For example, the psychological contract on employees' safety behavior in the context of the early epidemic situation [12]. The mental issues and psychological resilience of healthcare professionals who have the closest contact with the patients [13]. The anxiety levels of the emergency medicine professionals who are on the front line in the hospitals should be treated, and they should be provided psychological and behavioral support [14]. Health managers and policymakers need to make a move immediately to find solutions for the physical and psychological needs of health employees [15,16]. The health education programs should be easily accessible, affordable, and available to the general population [17]. Programs such as a mobile app or a digital learning package are designed to address the current and anticipated psychological impacts of the mental health of health care workers [18,19].

In addition to the difficulties encountered by health care workers, industries are also facing a halt. Offices are closed, shopkeepers are experiencing fewer sales, and museum activities are not ready to serve visitors during and after the COVID-19 Pandemic [20]. The coronavirus pandemic has transformed the way we work, with many employees working under isolation and difficult conditions [21]. Wu et al. [22] believes that ensuring mutual consideration is the best way for hotel employees and employers to pull through a crisis. Pathak et al. [23] examined the impact of the psychological capital of owners and the managers of a budget hotel on the organizational resilience during COVID-19, and could give advice to the owners and managers of budget hotels to navigate through the stages of the COVID-19 pandemic for speedy recovery. Work–family conflict's mediating role and psychological resilience's moderating role on the perceived supervisor support of yacht captains and their turnover intentions during the COVID-19 pandemic in the tourism industry are also investigated [24]. In general, understanding work–life wellness contributes to improving the physical health, mental health, and productivity of remote workers. Due to physical distancing guidelines associated with the COVID-19 pandemic, many employees have been working from home, often without adequate training and resources [25].

After the world went into lockdown, the pandemic COVID-19 has affected the mental health of food retailers, food services, and hospitality workers [26,27]. Although the employees are encouraged to work remotely at home full time to stay safe, this is typical only for certain types of work, on an occasional basis, or given unique employee circumstances. The employee has to do their part in reducing the fear and panic caused by the pandemic. How many employees suffered psychological stress in the company during the phase of COVID-19 pandemic? To assess the effects of the COVID-19 on the mental health of workers [28] an empirical study was conducted in the United States on a sample of 347 white collar employees to capture depression and general anxiety during COVID-19 [29]. Such surveys tend to be slower and less extensive. We focus on psychological effects of employees in companies during the phase of the COVID-19 pandemic, therefore, we need to collect the reviews of the company by employees before and after the epidemic, so that it is easy to draw out what changes have actually occurred in employees. The ways people use words online in their daily lives can also give rich information about their beliefs, fears, thinking patterns, social relationships, and personalities. This can only be collected through online social media, but not the kind of people who just want to vent their emotions or false news. Today, more than 2.9 billion people use online social media regularly [30]. In such a condition, online social media is an easy way for individuals and communities to stay connected even while physically separated. We can learn a lot from online employees' reviews on the workplace community websites such as Glassdoor.com, which allows people to evaluate and review the companies they have worked for or are working for. In this research, we collect anonymous employees' reviews of Top100 digital companies from 2017 to 2020 from the Glassdoor website. Based on the data of numerical evaluations and textual reviews, we use Z-score to describe the relationship between the 2020 values and the mean of a group of values from 2017 to 2020 in order to study the psychological processes of employees in digital companies during the phase of COVID-19 pandemic.

2. Materials and Methods

2.1. Online Employees' Reviews Datasets

Glassdoor.com is one of the largest jobs and recruitment websites in the world, covering more than 700,000 global companies and 33 million anonymous salary reports and employee reviews since 2008. Glassdoor.com allows employees to evaluate the companies they have worked for or are working for. Figure 1 shows an example of the employee review information on Glassdoor.com. The dataset specifically covers company name, evaluation time, numerical, and textual reviews. The numerical data are the ratings ranging from 1 to 5 stars, which includes the overall rating and the six dimensions of the company:

work–life balance, culture and values, diversity and inclusion, senior management, career opportunities, and salary and benefits. It is noted that the aspect of diversity and inclusion just appeared after August 2020, so we do not follow it. The textual data include pros (positive comments about the company), cons (negative comments about the company), and advice (suggestions for the company). The credibility of the data is high because of the anonymity measures taken by the website to increase the credibility of the reviews.

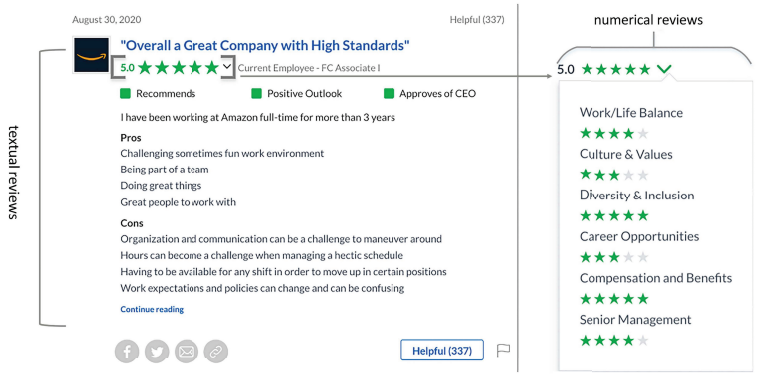

Figure 1. An example of the employee review information on Glassdoor.com. In the numerical reviews, it is noted that the aspect of diversity & inclusion just appeared after August 2020, so we did not draw attention to it.

In this paper, we simulate a browser to crawl from Glassdoor.com to collect anonymous reviews from employees. We select the Top100 companies of the 2019 RANKING digital companies in Forbes (https://www.forbes.com/top-digital-companies/list/#tab:rank (accessed on 31 December 2021)) as the research object. Firstly, we apply a shallow preprocessing over the textual data, involving dividing the textual data into words, and using the STOPWORDS library to filter out some low-meaning but high-frequency words. Secondly, the numerical data are processed, and the non-numerical data in the numerical data are complemented with NaN values, and then filled with 0 uniformly. According to the data processing, we screened out companies with less than 1000 reviews and cleaned out useless data. Finally, there are 52 digital companies, involving 11 digital industries seen in Table 1. There are a total of 357,858 pieces of data in the four years from 2017 to 2020, of which 11,763,648 words can be counted.

2.2. Methods

The ways people use words in their daily lives can provide rich information about their beliefs, fears, thinking patterns, social relationships, and personalities. In order to provide an efficient and effective method for studying the various emotional, cognitive, and structural components present in individuals' verbal and written speech samples, we use a text analysis application called Linguistic Inquiry and Word Count, or LIWC. The LIWC software program is commonly used for content analysis. Its reliability and validity has been extensively investigated and verified [31]. Recently, Seraj et al. used LIWC and found that language left behind on social media exposes the emotional and cognitive costs of a romantic breakup [32]. Theurer et al. analyzed more than 11,100 individual employment webpages to measure companies' projected employer image attributes based on LIWC [33]. To the effects of COVID-19, Wu et al. used a LIWC on Weibo data pool to explore the psychological effects of COVID-19 home confinement in China [34]. Thomas et al. reported the results of a linguistic inquiry of ways therapists presented telehealth services, advertised on their professional websites in six cities in the United States during the COVID-19 global pandemic [35].

Table 1. Information of Top100 companies of the 2019 RANKING Digital Companies in Forbes (https://www.forbes.com/top-digital-companies/list/#tab:rank (accessed on 31 December 2021)).

Industry	Company
Broadcasting & Cable	Walt Disney(3593), DISH Network(2015)
Business & Personal Services	DXC Technology(11764), Automatic Data Processing(7041)
Communications Equipment	Cisco Systems(10626), Nokia(6739), Ericsson(4357)
Computer Hardware	Apple(11678), Dell Technologies(10833), Hewlett Packard Enterprise(7667), HP(3505), Fujitsu(2099), Lenovo Group(1065)
Computer Services	Tata Consultancy Services(46806), Cognizant(37946), IBM(35078), Accenture(32437), Infosys(24063), Capgemini(16988), Alphabet(10398), Facebook(2699)
Consumer Financial Services	PayPal(2424)
Health Care Equipment & Svcs	Philips(1948)
Internet & Catalog Retail	Amazon(54230), eBay(1534), Netflix(541)
Semiconductors	Intel(7961), Samsung Electronics(4282), Qualcomm(3114), Micron Technology(1879), Texas Instruments(1202), Broadcom(1188), NVIDIA(1032), Applied Materials(940), NXP Semiconductors(729)
Software & Programming	Oracle(18449), Microsoft(12165), SAP(9896), Salesforce.com(5486), VMware(3302), Adobe(1805), Fiserv(2824)
Telecommunications services	AT&T(11915), Verizon Communications(9953), Vodafone(5755), BT Group(2606), TELUS(2531), Telstra(1713), Orange(1316), SingTel(765), Telefonica(567)

LIWC can read a given text and counts the percentage of words that reflect different emotions, thinking styles, social concerns, and even parts of speech [36]. For each text file, approximately 90 output variables are written as one line of data to an output file. This data record includes the file name and word count, 4 summary language variables (analytical thinking, clout, authenticity, and emotional tone), 3 general descriptor categories (words per sentence, percent of target words captured by the dictionary, and percent of words in the text that are longer than six letters), 21 standard linguistic dimensions (e.g., percentage of words in the text that are pronouns, articles, auxiliary verbs, etc.), 41 word categories tapping psychological constructs (e.g., affect, cognition, biological processes, drives), 6 personal concern categories (e.g., work, home, leisure activities), 5 informal language markers (assents, fillers, swear words, netspeak), and 12 punctuation categories (periods, commas, etc). A complete list of the standard LIWC2015 scales is included in Table 2.

How much have employees suffered during the phase of COVID-19 pandemic? We use Z-Score to assess the extent to which the 2020 data deviates from 2017–2020 as a reference. Z-score is a numerical measurement that describes a value's relationship to the mean of a group of values. Z-score is measured in terms of standard deviations from the mean. If a Z-score is 0, it indicates that the data point's score is identical to the mean score. A Z-score of 1.0 would indicate a value that is one standard deviation from the mean. Z-scores may be positive or negative, with a positive value representing the score is above the mean and a negative score representing it is below the mean. The flow chart of research methodology in detail is shown in Figure 2. We first count the changes in the data during the four years from 2017 to 2020, as shown in Figure 3a. It turns out that after the COVID-19 pandemic, the Z-score of the number of online comments in 2020 is 1.71, namely the data is 1.71 standard deviations larger than the average. Through textual analysis, it is clear that the Z-score for the word count in 2020 is 0.31, which is close to the average as the statistics illustrate. These reveal that the number of the reviews of selected Top100 digital companies has remarkably

increased after the pandemic, but the total number of words published in reviews is the same as before the pandemic.

Table 2. The psychological processes effects of employees include personal pronoun and psychological processes obtained by the LIWC2015. The output variable information seen in LIWC2015 [36].

Category	Abbrev	Examples	Z-Score
Personal pronouns	ppron	I,them,her	−1.68
1stperssingular	i	I,me,mine	1
1stpersplural	we	we,us,our	−1.53
2ndperson	you	you,your,thou	−1.7
3rdperssingular	shehe	she,her,him	−1.73
3rdpersplural	they	they,their,they'd	−1.65
Psychological Processes			
Affective processes	affect	happy,cried	1.62
Positive emotion	posemo	love,nice,sweet	1.62
Negative emotion	negemo	hurt,ugly,nasty	−1.73
Anxiety	anx	worried,fearful	0.9
Anger	anger	hate,kill,annoyed	−1.41
Sadness	sad	crying,grief,sad	0
Social processes	social	mate,talk,they	−1.64
Family	family	daughter,dad,aunt	−0.58
Friends	friend	buddy, neighbor	1.52
Female references	female	girl,her,mom	−1.41
Malereferences	male	boy,his,dad	−1.73
Cognitive processes	cogproc	cause,know,ought	−1.6
Insight	insight	think, know	1.18
Causation	cause	because,effect	−1.53
Discrepancy	discrep	should,would	−1.66
Tentative	tentat	maybe,perhaps	−1.61
Certainty	certain	always,never	1.21
Differentiation	differ	hasn't,but,else	−1.65
Perceptual processes	percept	look,heard,feeling	−1.51
See	see	view,saw,seen	−1.53
Hear	hear	listen,hearing	−1.73
Feel	feel	feels,touch	1.09
Biological processes	bio	eat,blood,pain	0.9
Body	body	cheek,hands,spit	−0.9
Health	health	clinic,flu,pill	1.11
Sexual	sexual	horny,love,incest	−1
Ingestion	ingest	dish,eat,pizza	−0.96
Drives	drives		1.6
Affiliation	affiliation	ally,friend,social	1.73
Achievement	achieve	win,success,better	1.48
Power	power	superior,bully	−1.53
Reward	reward	take,prize,benefit	1.63
Risk	risk	danger,doubt	1.6
Time orientations	TimeOrient		
Pastfocus	focuspast	ago,did,talked	−1.4
Presentfocus	focuspresent	today,is,now	−1.73
Futurefocus	focusfuture	may,will,soon	−1.64
Relativity	relativ	area,bend,exit	−1.39
Motion	motion	arrive,car,go	−1.67
Space	space	down,in,thin	−1.36
Time	time	end,until,season	−1

Table 2. *Cont.*

Category	Abbrev	Examples	Z-Score
Personal concerns			
Work	work	job,majors,xerox	1.56
Leisure	leisure	cook,chat,movie	0.26
Home	home	kitchen,landlord	−1.6
Money	money	audit,cash,owe	−0.93
Religion	relig	altar,church	−1.73
Death	death	bury,coffin,kill	−1.73
Informal language	informal		1.73
Swearwords	swear	fuck,damn,shit	−1
Netspeak	netspeak	btw,lol,thx	1.73
Assent	assent	agree,OK,yes	1.73
Nonfluencies	nonflu	er,hm,umm	0.58
Fillers	filler	Imean,youknow	0

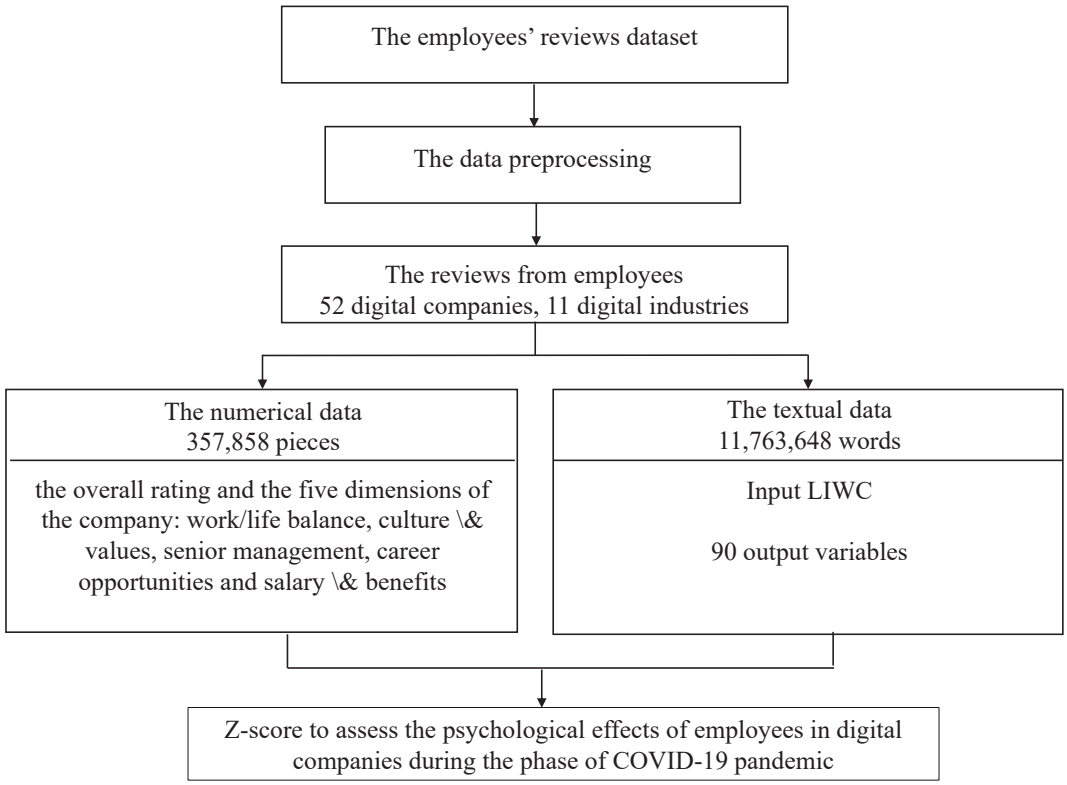

Figure 2. The flow chart of research methodology in detail.

We analyzed Top100 digital companies, covering 11 industries in Figure 3b. To the statistics of numerical reviews, the Z-score in six industries (Broadcasting and Cable, Computer Services, Health Care Equipment and Svcs, Internet and Catalog Retail, Semiconductors, Software and Programming) is close to 1.5, while the Z-score of Consumer Financial Services and Telecommunications Services is close to 0. To the statistics of textual reviews, the Z-score of Broadcasting and Cable, Computer Services, Health Care Equipment and Svcs, Internet and Catalog Retail is greater than 1. For Business and Personal Services, Consumer Financial Services, and Telecommunications Services, the Z-score is greater than approximately −1. Additionally, as we can observe, the Z-score of the industries, including Broadcasting and Cable, Computer Services, Health Care Equipment and Svcs, and Internet and Catalog Retail, exceeds 1 for both numerical and textual reviews.

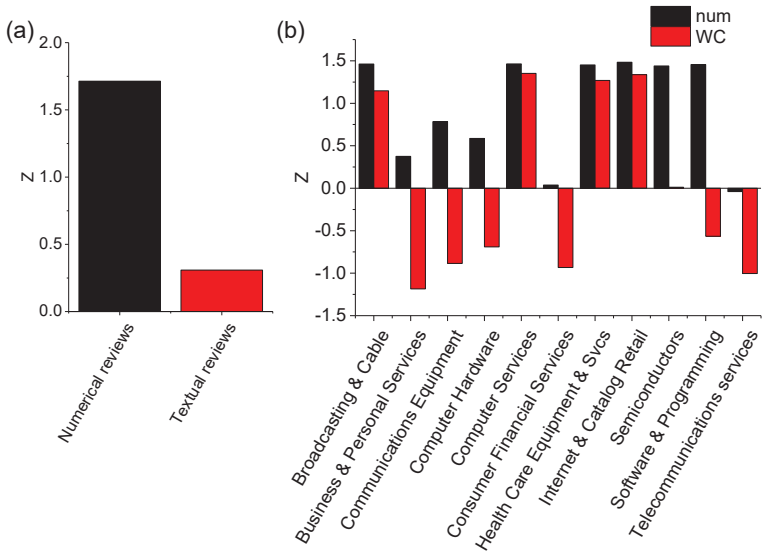

Figure 3. The Z-score of the numerical reviews and textual reviews in 2020. (**a**) Z-score of the total numerical reviews and textual reviews (the words can be counted (namely WC)) in 2020. (**b**) Z-score of the numerical reviews and textual reviews in 11 digital industries.

3. Results

3.1. Extracting Psychological Effects from Numerical Evaluations

The numerical data ranging from 1 to 5 stars relate to the overall rating and the company's five dimensions: work–life balance, culture and values, senior management, career opportunities, and salary and benefits. We first give the mean stars of overall rating and the company's five dimensions in 2020, as shown in Figure 4a. From this we can see that the overall rating star is close to 4, while the five dimensions are all near 3. As shown in Figure 4b, we could find that in 2020, the Z-score of the overall rating is close to 1.5. The Z-score in the five aspects is actually close to −1.5. This shows that people perceive a significant improvement in the overall impression of the company after the pandemic, but they are not satisfactory for the specific aspects involved.

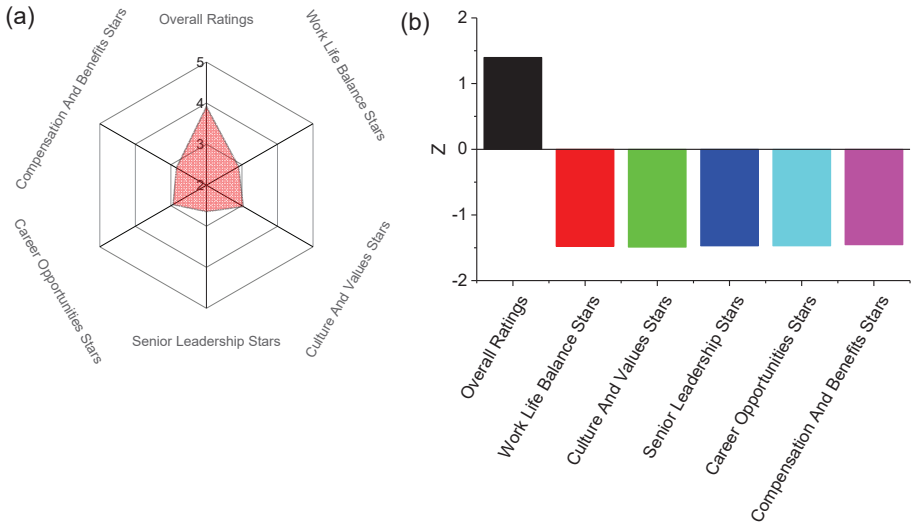

Figure 4. The Z-score of five dimensions of the employees, (**a**) the radar chart of the five dimensions of the employees in 2020 and the overall score. (**b**) Z-score of the five dimensions of 2020 and the overall score.

We made a statistical analysis of the overall ratings and the five dimensions of employee reviews across 11 industries and the representative companies. As shown in Figure 5,

we can observe that the Z-score of the overall ratings in all industries is above 1. In the specific five aspects, the Z-score of work–life balance in all industries is less than −1 and negative for culture and values, but most of the industries are larger than −1. The Z-score of senior management is more scattered, for example, the Z-score of Broadcasting and Cable, Business and Personal Services is 2, whereas the Z-score of Computer Hardware and Consumer Financial Services is nearly 0. The Z-score of career opportunities is basically around −1, except that Business and Personal Services and salary and benefits are less than −1. Therefore, in general, the most affected ratings in industries are work–life balance, career opportunities, and salary and benefits, and the least affected in industries is Business and Personal Services, with a positive impact. For details, refer to the peripheral sub-graph in Figure 5, where it can be reflected from the Z-score of the five aspects of the representative companies like DXCT tech. The overall Z-scores of representative companies in other industries are all close to 2, and all five aspects are negative. In summary, impacted by COVID-19 pandemic in 2020, the overall ratings of digital companies' employees tend to be better, but the detailed five dimensions are still tending to deteriorate, except that the industry of Business and Personal Services has not been affected by the pandemic.

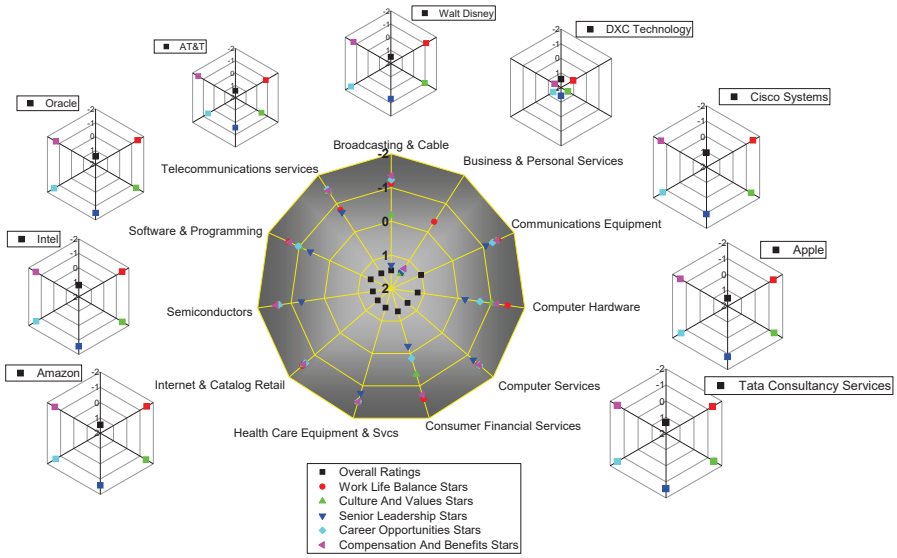

Figure 5. Z-score of the five aspects of the employee reviews in 11 industries corresponding to representative companies. The middle image shows the 11 industries, with different colors representing the scores of different aspects, and the peripheral image shows the employee's reviews of the representative companies in the 11 industries.

3.2. Extracting Psychological Effects from the Textual Reviews

After input the textual reviews from 2017 to 2020 to the LIWC software, we then count the Z-score for 2020 as shown in Table 2. We can see that LIWC gives a wealth of results of psychological processes about their beliefs, fears, thinking patterns, social relationships, and personalities. Among them, the Z-score of the psychological processes, such as affective processes, biological processes, drives, and informal language, is greater than 1, but the Z-score of psychological processes, such as personal pronouns, social processes, cognitive processes, perceptual processes, and relativity, is less than −1. Concretely, in terms of personal pronouns, the number of first-person pronouns increased, while the second and third-person pronouns decreased considerably. What is more, there is a striking change in the aspect of affective processes. The Z-score of positive emotion is 1.62, and the Z-score of negative emotion is −1.62, which also indicates people's resilience in the face of the pandemic. In terms of social processes, the Z-score is −1.64, and although Family is −0.58, Friends is 1.52. The Z-score for cognitive processes is −1.6, but for insight, the Z-score for certainty is larger than 1. For causation, discrepancy, and tentative, the Z-score is less than

−1. Regarding perceptual processes, the Z-score for seeing and hearing is less than −1, however, the Z-score for sensation is greater than 1. There is little variation in biological processes, with the overall Z-score fluctuating around 1. With respect to drives, the Z-score is 1.6, where affiliation, achievement, reward, risk, etc. are greater than 1, and only power is less than −1.5. The Z-score is negative for both time orientations and relativity, and mostly less than −1. In terms of personal concerns, the Z-score of the vocabulary discussed for work is larger than 1, while that of leisure is only 0.9. Other Z-scores such as Family, Money, Religion, and Death are negative. The last aspect is Informal language. The Z-score of Swear words is −1, Fillers is 0, and others such as netspeak, assent, and nonfluencies are all greater than 0.

In general, the aspects of drives and personal concern are the focus of corporate employees. The psychological processes of drives involve affiliation, achievement, power, reward, and risk. The psychological processes of personal concern involve work, leisure, home, money, religion, and death. We will analyze the two aspects of psychological processes in 11 industries and corresponding companies in Figures 6 and 7. The five aspects of drives are affiliation, achievement, power, reward, and risk in 11 industries as shown in the center of Figure 6. We find that except for some of the Z-scores being less than 0, most of them are greater than 0. In particular, the achievement and reward collections are greater than 1. In addition, it can be observed that the Z-cores for affiliation in Business and Personal Services, Health Care Equipment and Svcs, and Internet and Catalog Retail are less than −1. When it comes to achievement, all industries are greater than 0. Power varies across the 11 industries. Computer Hardware, Computer Services, Internet and Catalog Retail, and Telecommunications services are less than −1 for the Z-score, while it is greater than 1 for 11 industries in terms of reward. Beyond that, risk differs among the 11 industries, but most are greater than 0. Therefore, from the perspective of each representative company, there are some differences from the industry. For example, the Z-score of risk for DXCT tech is less than −1, while the Z-score of risk for Business and Personal Services, the industry to which it belongs, is greater than 1. However, most of them still maintain the affiliation, achieve, power, as can be seen in the specific performance of each company in the peripheral sub-graph of Figure 6. Each company has some challenges in drives that employees' emotions encounter after suffering the pandemic.

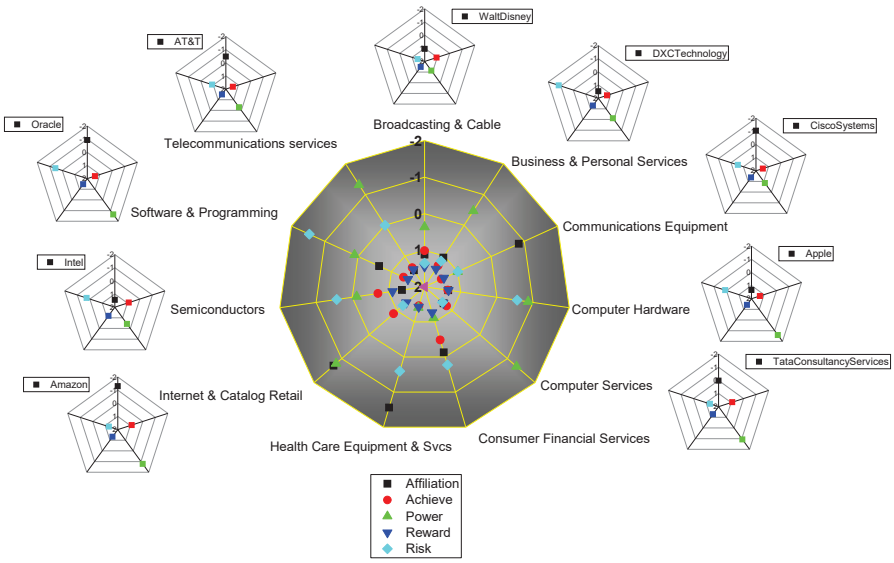

Figure 6. Drives of the psychological processes in 11 industries and corresponding representative companies. The center is the Z-scores of the four aspects of drives in 11 industries. The peripheral shows the Z-scores of the four aspects of drives of a representative company.

Finally, we show the psychological processes of personal concern in 11 industries and the corresponding Z-scores of representative companies as shown in Figure 7. We

can see the six aspects of personal concern: work, leisure, home, money, religion, death. The distribution of Z-scores is scattered. The Z-score of the work is greater than 1, leaving only Health Care Equipment and Svcs with a Z-score of 0. The Z-scores for leisure, money, religion, and death vary across industries. The Z-score on the term of home is basically around −1, indicating that there are fewer expressions for this aspect of home after the pandemic than before the pandemic. The peripheral subgraphs of Figure 7 also show the Z-scores for 6 aspects of the personal concern for representative subsidiaries in 11 industries. Here we can observe the changes before and after the pandemic of a specific company, especially the changes in these prominent top digital companies. Therefore, irrespective of the statistics of drives or personal concerns, we are able to observe some positive changes before and after the pandemic. For example, the achievement is good, but the aspect of home is deteriorating. For different companies in different industries there are some commonalities and differences, and these should be emphatically considered when caring for the employees of the company.

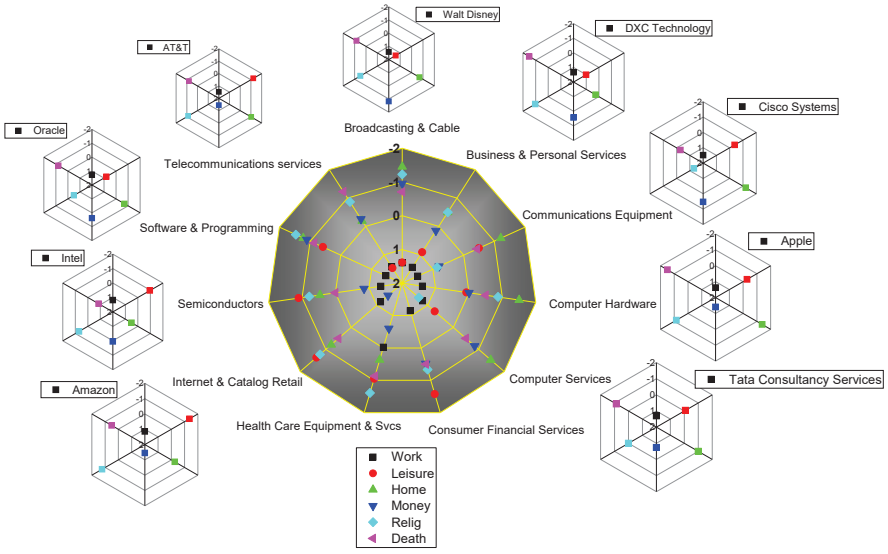

Figure 7. Personal concern of the psychological processes in 11 industries and corresponding representative companies. The center is the Z-scores of the five aspects of Drives in 11 industries. The peripheral subgraphs show the Z-scores of the five aspects of personal concern of each representative company.

4. Discussion and Outlook

In the wake of the new coronavirus outbreak in late 2019, the world has undergone great changes, and people's lives and work have been greatly affected. Fortunately, people are still able to express their attitudes and ideas through the Internet, whereupon we can utilize people's comments towards their work on the Internet to discover the effects of this pandemic on them. In this paper, we took the Top 100 companies of the 2019 RANKING Digital Companies of Forbes as the research object, obtaining a total of 357,858 anonymous employee reviews from 52 companies, across 11 industries, over four years from 2017 to 2020, through data processing and cleaning. The text-based reviews had 11,763,648 words to be counted. We combined numerical scoring and text-based reviews for studying psychological processes of employees in digital companies during the phase of the COVID-19 pandemic. It started with numerical scores, ranging from 1 to 5 stars, and included an overall rating as well as five aspects of the company: work–life balance, culture and values, senior management, career opportunities, and salary and benefits. Therefore, we targeted 11 industries and representative companies. Z-scores for each of the five dimensions of employee reviews and the overall score was statistically analyzed. Affected by the pandemic after 2020, although the overall evaluation of digital companies employees was tending to be better, were work–life balance, culture and values, senior management,

career opportunities, and salary and benefits, which were still getting worse. As one of the affected industries, Business and Personal Services, its employees' ratings had risen in all five aspects after the pandemic. Then we used LIWC, a text analysis tool based on word measurement, to mine text reviews, and we could see that LIWC gives a wealth of results of psychological processes. Among them, those with Z-scores greater than 1 are affective processes, biological processes, drives, and informal language; those with Z-scores less than −1 are personal pronouns, social processes, cognitive processes, perceptual processes, and relativity. Eventually, we made statistics on all aspects of drives and personal concerns in the psychological processes. We could see that some of the changes are still improving. By way of example, for different industries, while the family aspect became worse, the achievement aspect improved.

We can learn that different companies suffer different difficulties, which should be emphatically considered in caring for the employees of the company. Based on the identified stressors, which may explain the potential negative psychological effects of digital companies' employees during the phase of COVID-19 pandemic, we should develop a list of considerations and recommendations for workplaces, mainly for managers and for human resource management practitioners. The following recommendations could be the solutions in the field of the psychological effects of digital companies' employees during the phase of COVID-19 pandemic. Task setbacks during COVID-19 are stressors that would trigger a resource loss process and could be positively related to the employee's emotional exhaustion [37]. Lifestyle and stress management items are thought to be related to COVID-19 and various socio-demographic items including occupation or income [38]. Employee involvement, well-being, and support to digital work could even foster digital transformation of the workplace [39]. How the met expectations cause an advantageous effect on the employees as well as the organizations in this COVID-19 pandemic situation [40]. The traits and behaviors of organization leaders that are deemed helpful by employees [41,42]. The research incorporated the conservation of resource theory to examine how high-performance work practices affect the employee's in-role performance and employee's task performance during the pandemic [43,44]. The psychological contract could also breach on employees' innovative behavior and well-being who are working from home [11]. Therefore, intervention studies should focus on raising their levels of engagement to increase the effectiveness of educational initiatives intended to promote preventive behaviors [45].

The main goal of this paper is to provide the necessary information to learn the psychological effects of digital companies' employees during the phase of COVID-19 pandemic. However, the results are extracted from online employee reviews, and the contribution of the literature should be considered in light of certain limitations. First, the quality and quantity of data is most important, for example some companies have a large amount of data and some are very sparse, which could lead to a conclusion that is not universal. In addition, the studies related to COVID-19 were conducted while COVID-19 is ongoing, and we may need to collect data for longer periods of time to help identity the real psychological effects. Future research needs to be performed in this case. Future research may also explore specifically when the psychological effect of COVID-19 on employees fade. It may cover, in this case extracted from online employee reviews, what the employer or manager does to protect employees and enhance health and wellbeing in the workplace.

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