IMPACT OF COVID-19 ON BUSINESS AND HUMAN RESOURCE PRACTICES: EVIDENCE FROM A LOCAL SURVEY

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ABSTRACT

COVID-19 has had a tremendous impact on many businesses across the sectors. Many pre-COVID-19 business and human resource practices have changed permanently as new employment patterns, consumer habits, and supply-chain relations emerged. The manufacturing sector was not immune to these changes. This study provides evidence from a local survey of manufacturing companies regarding the impact of COVID-19 on the business practices, human resource practices, and training needs of companies to respond to the changing patterns of doing business in the manufacturing sector. The findings of this study suggest that the magnitude of the impact of COVID-19 on general business practices is mixed. While 90 percent of businesses indicated that COVID-19 impacted their operations, not all are negatively impacted. For many businesses, the cost of doing business has increased due to employment and supply-chain-related issues. However, some businesses benefited from COVID-19 as their business volumes and profits improved substantially.

Keywords: *COVID-19, Human Resource Practices, Business Practices, Training Needs, Manufacturing Sector, Impact*

INTRODUCTION

COVID-19 emerged as one of the major disruptive forces in the last several decades, creating havoc across businesses and nations. Soon after the COVID-19-related shutdown occurred, the priorities of many companies, including manufacturing, changed compared with the pre-COVID-19 period (Arik et al., 2021). A comprehensive review of the literature suggests that companies in the manufacturing sector have started reassessing their business and human resource management strategies in the face of changing supply-chain dynamics and workforce-related challenges (Ardolino et al., 2022). There is a growing body of literature related to the challenges brought about by COVID-19. This study contributes to this growing body of academic literature by presenting unique local survey results conducted in 2021.

The primary motivation of this research is to understand and analyze the impact of COVID-19 on human resources, business operations, and training needs through a comprehensive survey of manufacturing firms in Tennessee. Since many of the business practices associated with COVID-19 have become the new normal for businesses, it is essential

to analyze, through fieldwork, how changes affect the organizational dynamics perceived by the manufacturing sector's human resource managers.

This study first introduces a brief literature review. Second, a methodology section will highlight the data source, research questions, and analysis method. Third, findings for business operations, human resource practices, and training needs will be presented. Finally, an implication and conclusion section will follow.

LITERATURE REVIEW

Impact on manufacturing operations and human resource practices

The manufacturing sector plays a vital role in economies across the world. Because of its importance, many governments pay close attention to the factors affecting this critical sector. Disruption from the COVID-19 pandemic has caused major upheavals in manufacturing and has severe implications for production networks and the demand and supply chains underpinning manufacturing operations (Kapoor et al., 2021). The pandemic will permanently affect how firms navigate their strategic choices related to how governments regulate manufacturing and global trade policies in the future (Dür et al., 2020; Pinna & Lodi, 2021).

The systematic literature review reveals whether supply chains and production networks were not up to the challenge of withstanding the pressures of lockdowns and other safety protocols, including product and workforce shortages. These led to closed facilities, reduced capacities, increased costs, and severe economic uncertainty for manufacturing businesses. In managing these challenges and stabilizing their operations, manufacturers were urgently investing in digital technologies, undertaking resource redistribution and repurposing, regionalizing and localizing, and targeting policies to help them survive in this altered economy ((Dür et al., 2020; Pinna & Lodi 2021).

Kapoor et al. (2021) provide seven management interventions that manufacturing firms can undertake to contain a pandemic similar to COVID-19. These are (1) localizing and regionalizing production, (2) valuing networks, (3) supplying chains, (4) reconfigurability and repurposing, (5) coopetition (collaboration among business partners) and collaborative manufacturing, (6) lean and agile manufacturing techniques, (7) digital technologies, service provision, and government policies. Regarding the implications associated with each intervention, the most viable options for manufacturing firms are coopetition (collaboration among business partners), collaborative manufacturing, and lean and agile manufacturing techniques.

Rapaccini et al. (2020) note that at one point during the pandemic, United States (U.S.) industrial production recorded the most significant monthly decline since the Second World War (Harris et al., 2020). Before the pandemic, manufacturing production in 2019 recorded a global economic slowdown, which became a worldwide economic crisis with COVID-19 (Teng et al., 2021).

Manufacturers continually battle challenges of liquidity and profitability, and COVID-19 has made them even more vulnerable to economic shocks. During an economic storm, the manufacturing sector experiences canceled orders, poor revenues, and falling stock prices. Such

instabilities and unpredictable market environments (Linton & Vakil, 2020; Paul & Chowdhury, 2020b) create panic in the industry, resulting in market anomalies and distorted supply-demand patterns (Khoo & Hock, 2020). While management of supply chain disruptions (i.e., unexpected events with severe negative impacts such as tsunamis, fires, or strikes) has grown into a mature research topic for the last two decades (Sawik, 2020), the COVID-19 pandemic has been viewed as a new type of disruption quite unlike any seen before (Ivanov & Das, 2020).

Lim (2021) conducted an in-depth interview with representatives from 22 manufacturing companies to understand how the pandemic-related challenges are tackled. The primary response strategies for manufacturing companies are adopting ICT tools for virtual business processes, with proactive business change and diversification measures such as automation. This study highlighted the significance of automation and digitalization towards resilience and adaptability of manufacturing-related companies against the impacts of the pandemic.

The COVID-19 pandemic caused a significant shock to manufacturing companies, affecting many business processes. Many companies took countermeasures, including remote work (Sharma et al., 2020), to contain the impact. According to Moon et al. (2021), although the outbreak generated significant changes in business practices, the transition was not painless in some cases because of the resistance to change. The outbreak and government regulations have forced manufacturing companies to reinvent their organizational strategies (Moon et al., 2021).

Specifically, the government lockdown policies dramatically affected business practices and consumer behaviors, pushing companies to be creative in doing business in this new environment (Ivanov and Dolgui 2020a, b; Liu et al., 2021). Many have shifted their production to essential items, such as PPE (personal protective equipment), masks, and sanitary products (Telukdarie et al., 2020). Many manufacturing companies faced workforce shortages due to travel restrictions limiting manufacturing organizations' access to skill pools in other regions (Bastas & Garza-Reyes, 2022). The COVID-19 pandemic posed a need for human resource managers to consider or strategize new methods of adapting to challenging times. Remote working is one of the new emerging methods that most organizations have adopted to maintain smooth operations and quality client services (McKibbin & Fernando, 2020), as well as the reskilling and upskilling of the workforce (Hamouche, 2021)

Liu et al. (2021) examine how repurposing during the pandemic led to more manufacturing innovation. They collected data on 80 UK-based firms that undertook repurposing to produce PPE products. The study's authors discovered that these firms had successfully repurposed by utilizing specialization and technology-driven flexibility. Their findings illustrate how manufacturing firms collaborating in repurposing within their ecosystems are crucial for increasing productivity and fostering change in an industry struggling with supply chain disruptions.

Lim et al. (2021) conducted a survey. They found that the significant determinants of the pandemic's impacts on manufacturing, adaptation actions, and future research directions can be triangulated across organizational, process, and technology perspectives. They also found that the significant impacts of the COVID-19 pandemic on manufacturing have been lockdowns and shutdowns associated with fluctuations in supply and demand, social distancing and remote work imposition, and changes in consumer behavior patterns. The adaptation actions to combat the

pandemic have been manufacturing repurposing, remote work, layout and workplace reconfiguration, workforce reorganization, and business model innovation with associated strategic changes.

Overall Impact of COVID-19 on Manufacturing Operations

Since the inception of the pandemic, massive lockdown measures were witnessed in most countries, where economic and social activities were deliberately limited to contain the spread of the virus. During the pandemic, sudden demand spikes and a decrease in raw material supply caused a dual disruption for manufacturers who produce high-demand items (Ivanov & Dolgui, 2021). Companies were trying to improve their supply chain resilience by sourcing local suppliers and actively adopting additive manufacturing (AM) technology to reduce reliance on the global supply chain.

In 2021, Lim et al. (2021) surveyed 22 manufacturing-related companies impacted by the pandemic, investigating the main challenge of manufacturing-related companies and their associated response in overcoming the described challenge. This survey involved 22 manufacturing-related companies and was conducted at a manufacturing-focused trade virtual exhibition. According to the study findings, these companies' top three challenges were disruptions in business sales and marketing activities, meeting difficulties, and lockdown measures. The primary response strategies to the challenges included adopting ICT tools for virtual meetings, marketing, and customer support. The survey also revealed that companies pursued proactive efforts for business diversification.

Fombella et al.'s (2022) study found that the firms built significant resiliency to COVID-19 because they excelled in adapting to new technologies, providing flexibility to employees, and gaining stakeholder commitment to company strategies. The results of the descriptive techniques used in this study showed that pandemic resiliency depends on firms' ability to adequately balance their technological abilities, human resources, and production processes.

All manufacturing organizations implemented new health and safety measures driven by the government's legislation. These measures were further supplemented by regular disinfection processes across raw materials, recycled products, and factory spaces, which became a prevalent theme across the manufacturing sectors (Bastas & Garza-Reyes, 2022). Almost all the manufacturing sectors were noted to be detrimentally affected by the pandemic in financial terms, suffering from dramatic reductions in demand of up to 75% in some industries. Such a sharp decrease in financials was driven by the shrinkage in crucial markets, including the export markets, and periods of lockdown that enforced factory shutdowns in most manufacturing sectors. The reduced demand rates further resulted in under-utilized resources and production capacities. They brought together financial cash flow problems due to organizations struggling to receive timely payments, which has a domino effect in the sectors. Increased raw material costs deepened these economic effects due to the pandemic. They were established as a significant cause of concern for the economic sustainability of manufacturing organizations.

It was indicated that the pandemic made it much more difficult for manufacturing organizations to identify and relocate competent and qualified employees at the heart of manufacturing operations that rely on technical skills. Moreover, several organizations suffered

from losing their key employees as they could not return from abroad and stemming from cash flow issues: some businesses experienced staff losses to other less affected sectors such as governmental institutions. Transportation during the pandemic was also a challenge faced by the manufacturing firms in the country. Many countries restricted international and domestic flights; borders were closed, affecting road and rail transport. Such initiatives negatively affected the supply chain of manufacturing organizations (Kavindi et al., 2021).

Impact of COVID-19 on Business Operation

While almost all manufacturing firms worldwide were affected by COVID-19, the demand for necessities such as food items, sanitizers, toilet paper, and medicines has increased expeditiously. However, the market demand for sports and garment items drastically declined (Bagshaw & Powell, 2020).

The primary innovative measure introduced during the COVID-19 pandemic has certainly been remote work. This re-organization of work has spread persuasively across all sectors, changing people's traditional work habits. The few empirical contributions in this literature have shown that although companies have efficiently introduced remote work in the white-collar departments, little or nothing has been achieved for the work of blue-collar departments (Rapaccini et al., 2020). A study conducted by Kumar and Abdin concluded that there was a significant change in consumers' consumption patterns due to the COVID-19 pandemic, and now they are spending on products and services essential for their day-to-day lives (Kumar & Abdin, 2021).

According to Yeganeh (2021), even though traditional retailers in the food industry suffered from the effects of lockdowns, reputed retailers reported a significant boost in sales. Compared with other sectors, the manufacturing industry, which provides necessary food items, increased sales, and its sales turnover was significantly affected by COVID-19 (Aftab, Naveed, & Hanif, 2021). The number of available food products on the market decreased due to the lockdowns. This led the food manufacturing companies to redesign their business strategies to cope with COVID-19 (Yeganeh, 2021).

Another significant consequence of COVID-19 is that businesses relied more on intangible assets and technological improvements while reducing the number of employees (Yeganeh, 2021). Because of the COVID-19 outbreak, large and medium-scale companies looked for small companies to help them overcome their difficulties. Considering the past four decades, we can identify that those large-scale companies have continued acquiring increasingly small-scale businesses to grow their market power. There is an increasing trend of that acquisition with the advent of Covid-19. Even amid this world crisis, fewer large-scale companies have raised their power and market shares and become much more potent (Yeganeh, 2021). Numerous studies have highlighted the importance of new models, such as the transition to more service-oriented business models, continuous investment in the latest technologies, and advanced services for the firms to a better position amid this pandemic (Rapaccini et al., 2020).

Teng et al. (2021) explore the effect of financial flexibility on the enterprise performance of Taiwan's manufacturing industry during the COVID-19 pandemic. The authors collected data from the Taiwan Stock Exchange and analyzed it. The results illustrated that financial flexibility

significantly and positively affects enterprise performance for manufacturing companies on the Taiwan Stock Exchange.

There are several reasons for the current shortage of laborers in business operations. Most of these workers are baby boomers, who are aging and leaving the workplace. Unfortunately, COVID-19 did not help with this situation, mainly affecting those in this generation (Professional Safety, 2022). Those working decided to stay home rather than return to their workplace. Moreover, fewer younger workers are pursuing careers in manufacturing and other skilled trades. Thus, it can be denoted that workers are leaving but not entering. Furthermore, due to the scarce supply of laborers in the manufacturing sector, employers are vying for talented and experienced workers. As a result, there is much movement within this industry. The low unemployment rate has led to a smaller pool of skilled applicants, which has caused a few more challenges than just no laborers; fewer skilled and competent workers mean fewer eyes and ears to spot safety concerns in the workplace. Fewer skilled workers also result in longer hours, leading to fatigue and a decline in the employee's overall wellness.

METHODOLOGY

Data and Research Questions

The 2021 Wage and Benefits Survey included three questions regarding the impact of COVID-19 on various aspects of the companies' operations in the manufacturing sector. The survey asked three open-ended questions regarding the impact of Covid-19 on

- the companies' training needs
- the companies' human resource practices
- the companies' overall business operations.

The open-ended answers to these questions were carefully reviewed and standardized. After data cleaning and standardization, qualitative data analysis software was used to identify each question's cluster of responses and keywords. The number of companies responding to each question varies, but the following response rate was recorded for each question (response rates are in parentheses):

- Number of manufacturing companies contacted: 1,200
- Number of companies responding to “training needs”: 216 (18%)
- Number of companies responding to “human resource practices”: 228 (19%)
- Number of companies responding to “overall business operations”: 241 (20%)

Analysis Method

The survey regarding the impact of COVID-19 on human resource practices and business operations included open-ended questions. A text-analysis software, WordStat*, was used to process the qualitative data. The respondents are allowed to input up to three responses for each question. The answers to the following three questions were analyzed:

- How has COVID-19 impacted your training needs?
- How has COVID-19 impacted your human resource practices (H.R.) practices?
- How has COVID-19 impacted your overall business practices?

The qualitative data analysis includes three types of results: (1) key topics mentioned in the responses, (2) cluster analysis grouping similar responses, and (3) key phrases that appear throughout the responses. The qualitative analysis includes the frequency of words, the percent of cases, and a statistical measure, TF*IDF, which measures how relevant a word is to a document in a corpus.

RESULTS

The results are organized for each question under two segments: (1) cluster analysis and (2) key topic analysis. For the last question, phrase analysis is also included. The cluster analysis groups similar responses together, while key topic analysis identifies the most frequently used keywords to describe the impact of COVID-19 on different aspects of companies' operations in the manufacturing sector.

Impact of COVID-19 on Training Needs

How has COVID-19 impacted your training needs? Out of 1,200 manufacturing companies contacted, a total of 216 companies responded to this open-ended question.

Cluster Analysis. The cluster analysis shows that 33.8 percent of respondents claimed that COVID-19 did not have or had little impact on their training needs. In other words, Covid-19 impacted the training needs of two-thirds of the respondents. Table 1 identifies about eleven clusters from the open-ended responses regarding COVID-19's impact on the training needs of manufacturing companies.

The first column in the table shows the cluster number, second cluster name, third percent of responses, and the final column up to three sample responses from the open-ended responses. The top clusters are (1) no impact (33.80%); (2) virtual training (9.26%); (3) training challenges because of social distancing (6.48%); (4) lack of in-person training (5.56%); and (5) class size and frequency of training (5.09%).

Table 1. The Covid-19 Impact on Training Needs: Cluster Analysis

Cluster Number	Cluster Name	Percent of Responses	Sample Responses
1	No or very little impact	33.80%	(1) No impact (2) Very little impact
2	Yes	3.24%	(1) Yes, there has been an impact
Qualified responses			
3	Lack of in-person traning opportunities	5.56%	(1) In **PERSON** has had to go to online webinar training. (2) In **PERSON** training halted.Virtual training when effective (3) It has prompted us to stop all in **PERSON** training.
4	Virtual training	9.26%	(1) We have had to go **VIRTUAL TRAINING** **(2) TRAINING** has moved to basically **VIRTUAL** sessions (3) All **TRAINING** moved to **VIRTUAL** learning which isn't as effective.
5	Training change because of CDC guidelines	2.31%	(1) Company had to pivot to follow **CDC GUIDELINES** (2) Yes, because of the **CDC GUIDELINES** we could not conduct **TRAINING**. (3) We have had to modify our **TRAINING** practices to the current **CDC GUIDELINES**.
6	Training challaneges because of social distancing	6.48%	(1) Very **DIFFICULT** to have **TRAINING** due to limited space and number that can attend at one time. (2) Some classes canceled or **POSTPONED** due to exposure and the need for more space for social distancing. (3) Trainings that were not necessary were **POSTPONED** due to COVID-19.
7	Class size and frequency of training	5.09%	**(1) FREQUENCY** of **TRAINING** and **SIZE** of **CLASSES**. (2) We have had to space out **TRAININGS** and **CLASSES**. (3) More virtual **CLASSES** needed due to limited space and high number of employees needing the **TRAINING**.
8	Limiting training ability	4.17%	**(1) LIMITED** our ability to do in person **TRAINING**; have moved to more online **TRAINING** **(2) TRAINING** has been **LIMITED** due to social distancing **(3) LIMITED** our ability to gather employees together in large groups.**LIMITED** our ability to travel offsite for **TRAINING**.
9	Use of smaller groups in training	4.17%	**(1) SMALLER GROUPS** of **TRAINING** and more need to **TRAIN** due to absences caused by COVID-19 (2) We do **SMALLER GROUPS** and do not do any outside **TRAINING** (3) Takes a long time for **TRAINING** in **SMALL GROUPS**
10	Eliminating group training sessions	2.78%	(1) We have not had **TRAINING SESSIONS** since COVID (2) Reduced **GROUP TRAINING SESSIONS**. (3) Yes, not **ABLE** to **GATHER** in large **GROUP** meetings.
11	Unable to meet, travel, and train	3.70%	(1) Unable to **PARTICIPATE** in **TRAINING** (2) We are **UNABLE** to provide classroom **TRAINING**. (3) We are not really able to travel much for training and our company does not allow any **VISITORS**

Source: Author (s)' analysis from 2021 Wage and Benefits Survey

Key Topics about the Impact on Training. Table 2 shows the key topics and the associated keywords that emerged throughout the text responses regarding the impact of COVID-19 on the training needs of manufacturing companies. This analysis is similar to the cluster analysis presented in Table 1 but gives additional details on the keywords used to describe the impact of COVID-19 on the training needs. Social distancing, moving in-person

training to virtual training, smaller group training, and guidelines and workplace requirements appear across the responses.

Table 2. The Impact of Covid-19 on Training Needs: Key Topics

TOPIC	KEYWORDS	COHEREN	FRE	CASE	%
NUMBER PEOPLE	NUMBER; PEOPLE; VISITORS; LIMITED; SITE; TIME; ROOM; REDUCED; SPACE;	0.443	20	14	4.53%
COMPLETE REQUIREMENTS	COMPLETE; REQUIREMENTS; EMPLOYEES; TIME; VIRTUAL; TRAINING; SESSIONS; SITE;	0.360	35	25	8.09%
GROUP MEETINGS	GROUP; MEETINGS; SESSIONS; REDUCED; ROOM; DISTANCE; IMPACTED;	0.360	19	13	4.21%
TRAVEL OFFSITE	TRAVEL; OFFSITE; ABILITY; LIMITED; EMPLOYEES; VISITORS;	0.358	13	8	2.59%
SMALLER GROUPS	SMALLER; GROUPS; REQUIRED; COVID; TRAIN; TRAINING; ONLINE; SMALLER GROUPS;	0.355	30	25	8.09%
SOCIAL DISTANCING	DISTANCING; SOCIAL; DIFFICULT; REQUIREMENTS; PRACTICES; SOCIAL DISTANCING;	0.351	46	40	12.94%
CDC GUIDELINES	CDC; GUIDELINES; REQUIRED; TRAININGS; TRAIN; PRACTICES; CDC GUIDELINES;	0.327	30	14	4.53%
PERSON TRAINING MOVED	PERSON; MOVED; ONLINE; VIRTUAL; TRAINING; ABILITY; PERSON TRAINING; VIRTUAL TRAINING; ONLINE TRAINING;	0.321	38	36	11.65%
FREQUENCY OF TRAINING AND SIZE	SIZE; FREQUENCY; CLASSES; FREQUENCY OF TRAINING AND SIZE;	0.320	19	12	3.88%

Source: Author (s)' analysis from 2021 Wage and Benefits Survey

Impact of COVID-19 on Human Resource Practices

How has COVID-19 impacted your human resource practices (H.R.) practices? Two hundred twenty-eight manufacturing companies responded to this open-ended question in the survey.

Cluster Analysis. The cluster analysis illustrates that 16.67 percent of respondents claimed that Covid-19 did not have or had a minor impact on their human resource practices. In other words, Covid-19 impacted the human resource practices of nearly 85 percent of the respondents. Table 3 identifies about twelve clusters from the open-ended responses regarding COVID-19's impact on the human resource practices of manufacturing companies.

The first column in the table shows the cluster number, second cluster name, third percent of responses, and the final column up to three sample responses from the open-ended responses.

The top clusters are (1) no impact (16.67%); (2) new human resource policies and procedures (10.09%); (3) yes, major impact (9.21%); (4) challenges regarding attendance policies and paid leave (7.89%); (5) challenges dealing with CDC guidelines and other regulations (6.14%), and (6) challenges associated with in-person meeting and social distancing.

Table 3. The Covid-19 Impact on Human Resource Practices: Cluster Analysis

Cluster Number	Cluster Name	Percent of Responses	Sample Responses
1	No impact	16.67%	(1) No impact (2) It has not IMPACTED our PRACTICES
2	Yes	9.21%	(1) Yes, major impact
Qualified responses			
3	Limited our interactions and made it difficult to hire	3.95%	**(1) LIMITED** our interaction with large groups. (2) Over all it was stressful and **DIFFICULT**. (3) Reporting cases are very **DIFFICULT** and have affected attendance a lot.
4	Hard to understand requirements and time consuming	2.63%	(1) More time **UNDERSTANDING** requirements and communicating them to others. (2) Hard to **UNDERSTAND**. (3) The administration of these protocols is **TIME CONSUMING**.
5	Dealing with CDC guidelines and other regulations	6.14%	(1) We have had to modify attendance and work with our COVID and EHS team to stay up to date with all **CDC GUIDELINES**. (2) Managing paid sick leave, changing **CDC** and DOL **GUIDELINES**. (3) Increased due to extra **GUIDELINES**, absences and quarantine policies
6	Challenges regarding attendance policies and paid leave	7.89%	**(1) CHALLENGES** have **ARISEN** in **COMMUNICATIONS BASED** on **INTERACTION** with **EMPLOYEES** and **ADMINISTERING** an **ATTENDANCE POLICY/LEAVES**, etc. (2) Greater **CHALLENGES** with **ATTENDANCE**, staffing, and **LEAVE POLICIES**. (3) Training **EMPLOYEES** on **POLICY** changes.
7	Problems with interviews and onboarding	4.82%	(1) Virtual **INTERVIEWS** and **ONBOARDING** as required (2) We have had to implement new policies concerning **INTERVIEWING** and **ONBOARDING**, we practice mask wearing, do regular temp checks, and practice social distancing. (3) We have had to lower the **NUMBER** of **ORIENTATIONS**/trainings we can do at one **TIME**.
8	Challenges associated with in-person meeting and social distancing	6.14%	(1) Only small group **MEETINGS** allowed, so we have to have more of them - to permit social distancing. (2) In **PERSON** gatherings have to be adjusted to small groups spread out over time. (3) Employees are working remotely, absenteeism has gone up, on-boarding new employees due to **SOCIAL DISTANCING**.
9	Increasing flexible work schedule	2.63%	(1) More **FLEXIBLE** with **SCHEDULES** and **TIME** off. (2) There has been a need to be more **FLEXIBLE** with **TIME** off due to school **SCHEDULES** or lack of child care. (3) We have added a flexible work schedule policy that allows employees the opportunity to work from home if their position allows for it.
10	New HR policies and procedures	10.09%	(1) We have had to add **PROCEDURES** and **POLICIES**. (2) Implementing changes in work **PROCEDURES** and safety practices. (3) Increased record keeping and added infection related **PROCEDURES**.
11	Tracking and Screening employee issues	4.39%	(1) A lot of hours **SPENT** on **TRACKING** employees on leave and contract **TRACING**. (2) We are now **TRACKING** who is out for qualifying paid sick time due to COVID. (3) Tracking, **SCREENING**, remote **WORK**, communication, etc.
12	Work from home challenges	5.26%	(1) We have had to develop a **WORK** from **HOME** policy, along with supporting those who could **WORK** from **HOME**. (2) More dealings with the option of **WORKING** from **HOME**. (3) We have started handling HR practice through MS Teams meetings, had HR department rotate **WORKING** at **HOME**.

Source: Author (s)' analysis from 2021 Wage and Benefits Survey

Key Topics about the Impact on Human Resource Practices. Table 4 shows the key topics and the associated keywords that emerged throughout the text responses regarding the impact of COVID-19 on the human resource practices of manufacturing companies. This analysis is somewhat similar to the cluster analysis presented in Table 3 but gives additional details on the keywords used to describe the impact of COVID-19 on human resource practices. Covid-related issues, screening and temperature checks, CDC guidelines, and social distancing appear across the responses.

Table 4. The Impact of Covid-19 on Human Resource Practices: Key Topics

TOPIC	KEYWORDS	COHEREN	FRE	CASE	%
ARISEN IN COMMUNICATIONS BASED ADMINISTERING AN ATTENDANCE POLICY LEAVES	ADMINISTERING; ARISEN; BASED; COMMUNICATIONS; INTERACTION; LEAVES; CHALLENGES; ATTENDANCE; POLICY; EMPLOYEES; ADMINISTERING AN ATTENDANCE POLICY LEAVES; ARISEN IN COMMUNICATIONS BASED;	0.799	95	26	8.41%
SOCIAL DISTANCING	SOCIAL; DISTANCING; WEARING; MASK; MASKS; FACE; YEAR; SOCIAL DISTANCING;	0.448	45	29	9.39%
VIRTUAL EVENTS	VIRTUAL; EVENTS; NUMBER; FOCUS; REQUIRED; EMPLOYEE; QUARANTINE; TESTING; INCREASED; PROTOCOLS; INTERVIEWS; COMMUNICATION;	0.444	43	19	6.15%
CDC GUIDELINES	GUIDELINES; CDC; SITE; IMPACTED; PRACTICES; PEOPLE; HR; WORKING; TEAM; CDC GUIDELINES; HR PRACTICES;	0.440	43	35	11.33%
SCREENING TEMPERATURE	SCREENING; TEMPERATURE; WORK; MEASURES; COMMUNICATION; TRAINING; RETURN; MASKS; WEARING; REMOTE; UNEMPLOYMENT; TRACK; EMPLOYEES; HEALTH; TRACKING;	0.431	48	37	11.97%
SPENT LOT	SPENT; LOT; TRACKING; TIME; CASES; DEPARTMENT; PROCEDURES; PRACTICES;	0.417	27	19	6.15%
COVID RELATED	RELATED; COVID; ADDED; ABSENCES; PROCEDURES; SAFETY; ISSUES; POLICIES; INCREASED; ADDITIONAL; EMPLOYEE; COVID RELATED;	0.414	53	47	15.21%
CONTACT TRACING	CONTACT; TRACING; CHECKS; QUARANTINE; TEMPERATURE; PROTOCOLS; EMPLOYEES; ADDITIONAL; COVID;	0.406	34	22	7.12%
SICK LEAVE	PAID; LEAVE; SICK; FFCRA; YEAR; TRACKING; CASES; CDC; FOCUS; TRACING; SICK LEAVE;	0.394	39	28	9.06%

Source: Author (s)' analysis from 2021 Wage and Benefits Survey

Impact of COVID-19 on Overall Business Practices

How has COVID-19 impacted your overall business practices? A total of 241 manufacturing companies responded to this open-ended question in the survey.

Cluster Analysis. The cluster analysis shows that only 9.13 percent of respondents claimed that COVID-19 did not have or had a negligible impact on their overall business practices. In other words, Covid-19 impacted the overall business practices of more than 90 percent of the respondents. Table 5 identifies about ten clusters from the open-ended responses regarding COVID-19's impact on the general business practices of manufacturing companies.

The first column in the table shows the cluster number, second cluster name, third percent of responses, and the final column up to three sample responses from the open-ended responses. The top clusters are (1) challenges associated with social distancing, mask, and cleaning

(16.60%); (2) yes, major impact (10.37%); (3) no, minimal impact (9.13%); (4) effect on every aspect of the business (7.05%); (5) new way of doing business: working remotely (7.05%), (6) work from home challenges and scheduling (6.64%) and (7) a major impact on absenteeism and other workplace issues (6.22%).

Table 5. The Covid-19 Impact on Overall Business Practices: Cluster Analysis

Cluster Number	Cluster Name	Percent of Responses	Sample Responses
1	No impact	9.13%	(1) No impact (2) Minimal
2	Yes	10.37%	(1) Yes, major impact
Qualified responses			
3	Major impact on Absenteeism and other workplace issues	6.22%	**(1) ABSENTEEISM** spike, increased hours for other employees, moving meetings to zoom (2) Increased **ABSENTEEISM**. (3) Customer closures, delayed parts, **ABSENTEEISM** with employees
4	Effect on every aspect of the business	7.05%	(1) COVID-19 forced the **BUSINESS** to become creative in the way every day **BUSINESS** was conducted. (2) Covid has impacted every part of most our lives including **BUSINESS**. (3) In a **POSITIVE** way
5	Dealing with CDC guidelines and other regulations	5.81%	(1) Necessary changes made throughout the company to comply with CDC **GUIDELINES**. (2) We have followed strict quarantine **GUIDELINES** when necessary. (3) We have followed the more stringent of corporate and/or TN Health Department **GUIDELINES**.
6	Production delays, increased cost, product delivery problems	4.15%	(1) Creates ripples and **DELAYS** with **DELIVERY** of materials and supplies. **(2) INCREASED** cost of doing business and slowed many processes down. (3) The shortage of employees showing up affects our **CUSTOMERS** and suppliers as well, so we get **DELAYED** and less information from our **CUSTOMERS**, and have more **DELIVERY** problems from our suppliers.
7	Challenges associated with social distancing, mask, and cleaning	16.60%	**(1) EMPLOYEES** are for the most part not happy about **WORKING** with **MASKS** on in a factory **ENVIRONMENT**. (2) We have enforced **WEARING MASK**, we do temperature screening, and **SOCIAL** distancing. (3) Many risk mitigation practices in the workplaces such as masks, **SOCIAL DISTANCING**, and extensive cleaning.
8	In-person meeting, virtual meetings, and communication issues	5.81%	(1) We conduct more **VIRTUAL MEETINGS**, we have had to find new areas for our crews to **MEET**. (2) Salary employees working from home more, virtual **MEETINGS** have replaced most in **PERSON MEETINGS**. (3) Limited our ability for in **PERSON MEETINGS** and social connection with our employees.
9	Work from home challenges and scheduling	6.64%	(1) We have also shifted to a rotating in-person work-**SCHEDULE**. (2) We are having to **WORK** more from **HOME** and do less traveling. (3) Yes, when able, **EMPLOYEES** can **WORK** from **HOME**; slowed down when COVID was peaking... identified need for further cross-training
10	New way of doing business: working remotely!	7.05%	(1) We are doing more **WORK REMOTELY** and virtually. **(2) REMOTE WORKING** implemented where feasible.Visitors not allowed on site. (3) We have had to adjust schedules and allow **WORKING REMOTELY** to keep safe distances within the building.

Source: Author (s)' analysis from 2021 Wage and Benefits Survey

Key Topics about the Impact on Overall Business Practices. Table 6 shows the key topics and the associated keywords that emerged throughout the text responses regarding the impact of COVID-19 on the general business practices of manufacturing companies. This analysis is similar to the cluster analysis presented in Table 5 but gives additional details on the keywords used to describe the impact of COVID-19 on general business practices. Social

distancing and wearing masks, the employees working together, and logistics impact business issues, and meetings appear across the responses.

Table 6. The Impact of Covid-19 on Overall Business Practices: Key Topics

TOPIC	KEYWORDS	COHEREN	FRE	CASE	%
EMPLOYEES WORKING TOGETHER AND LOGISTICS COORDINATED LUNCH AND BREAK TIMES	COORDINATED; PROXIMITY; LOGISTICS; LUNCH; BREAK; TIMES; WORKING; EMPLOYEES; COORDINATED LUNCH AND BREAK TIMES; EMPLOYEES WORKING TOGETHER AND LOGISTICS; WORKING FROM HOME;	0.651	78	31	10.03%
ALLOWED ESSENTIAL	ALLOWED; ESSENTIAL; SHUT; BUILDING; VISITORS; FACILITY; REDUCED; MONTHS; PEOPLE; PERSON; TEMPERATURE; HOURS; OPEN; WORKING; BREAK; AREAS;	0.486	27	15	4.85%
TEMPERATURE CHECKS	FACE; CHECKS; TEMP; MASK; TESTING; POLICIES; TEMPERATURE; SITE; CUSTOMERS; TRAVEL; TEMPERATURE CHECKS;	0.464	21	15	4.85%
SOCIAL DISTANCING WEAR MASKS	SOCIAL; DISTANCING; MASKS; WEAR; DISTANCE; WEARING; TEMP; PROTOCOLS; MASK; SOCIAL DISTANCING; WEAR MASKS;	0.441	69	49	15.86%
CLEANING PLANT	CLEANING; PLANT; PPE; OFFICES; HEALTH; SUPPLIES; MEETING; VISITORS; INCREASED; LIMITED; TRAINING;	0.437	31	19	6.15%
FULL MONTHS	FULL; MONTHS; HOURS; ADDITIONAL; MAKING; TIME; YEAR; WORK; PART;	0.408	15	9	2.91%
SLOWED DELAYED	SLOWED; DELAYED; VISITS; CUSTOMER; CLOSED; PRODUCTION; REDUCED; SCHEDULE; INCREASED; SITE; FACILITY; MEETINGS;	0.405	13	10	3.24%
MEETINGS VIRTUAL	MEETINGS; VIRTUAL; PERSON; WORK; HOME; CONDUCT; REMOTE; SAFE;	0.378	28	22	7.12%
IMPACTED BUSINESS	IMPACTED; BUSINESS; LAYOFFS; COVID; PART; YEAR; WORKFORCE; INCREASE;	0.376	28	23	7.44%

Source: Author (s)' analysis from 2021 Wage and Benefits Survey

Key Phrases Used to Describe the Impact of COVID-19 on Overall Business Practices. In this section, we also extracted the key phrases respondents use to describe the impact of COVID-19 on overall business practices. Table 7 tabulates 16 key phrases seen across 241 responses. These key phrases appear at least three times across all responses. The key phrases are social distancing, work from home, remote work, coordinated lunch and break times, the employees working together, and logistics.

Table 7. The Impact of Covid-19 on Overall Business Practices: Key Phrases

	FREQUENCY	NO. CASES	% CASES	TF • IDF
SOCIAL DISTANCING	21	20	6.47%	29.5
WORK FROM HOME	11	11	3.56%	19.3
REMOTE WORK	8	8	2.58%	15.2
COORDINATED LUNCH AND BREAK TIMES	6	6	1.94%	10.3
EMPLOYEES WORKING TOGETHER AND LOGIS	6	6	1.94%	10.3
TEMPERATURE CHECKS	5	5	1.62%	9.0
WEAR MASKS	5	5	1.62%	9.0
BUSINESS PRACTICES	3	3	0.97%	6.0
CDC GUIDELINES	3	3	0.97%	6.0
COMMON AREAS	3	3	0.97%	6.0
COVID HAS IMPACTED	3	3	0.97%	6.0
COVID PROTOCOLS	3	3	0.97%	6.0
HAND SANITIZER	3	3	0.97%	6.0
INCREASED ABSENTEEISM	3	3	0.97%	6.0
PERSON MEETINGS	3	3	0.97%	6.0
VIRTUAL MEETINGS	3	3	0.97%	6.0

Source: Author (s)' analysis from 2021 Wage and Benefits Survey

IMPLICATIONS AND CONCLUSION

Literature review and survey results suggest that the manufacturing landscape has changed tremendously because of COVID-19. This has important implications for, primarily, human resource managers. First, awareness of the changes in a business environment is essential for managers. They must know the actual and potential changes associated with the Covid-19 pandemic.

Second, the survey results suggest that managers should adapt to new business as usual involving remote work, increasing workplace issues, safety, and flexibility. Employee-related challenges require managers to be at the forefront of new policies and measures to protect facility operations and employees.

Third, managers should be keenly aware of product delays and customer relations because of the COVID-19-related disruptions. This issue is also closely related to workplace safety and disruptions due to workforce shortages. In the face of economic uncertainty and global supply chain disruptions, managers should look for innovative solutions to the ongoing disruptions to ensure their companies keep their operations.

Finally, employee-related challenges closely affect any company's future. Significant disruptions in this area require creative solutions. With the pandemic, mental health issues have been on the rise. Managers should accommodate a wide range of employee-related problems.

In sum, although COVID-19's impact on the training needs of manufacturing companies is less pronounced by the survey responses, its overall impact on business practices is incredibly

significant as more than 90 percent of the respondents indicated that COVID-19 had an impact on their business practices. Many of these impacts are negative regarding increasing business costs, workforce-related challenges, and production delays. However, as suggested by some businesses, the overall impact was positive as their revenues and business activities increased.

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