Evaluating Successful Biotechnology Management Through the COVID-19 Lens: A Case Study in Financial Performance, Employee Engagement, and Attrition

Citation

Martersteck, Emily. 2022. Evaluating Successful Biotechnology Management Through the COVID-19 Lens: A Case Study in Financial Performance, Employee Engagement, and Attrition. Master's thesis, Harvard University Division of Continuing Education.

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Evaluating Successful Biotechnology Management Through the COVID-19 Lens: A

Case Study in Financial Performance, Employee Engagement, and Attrition

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A Thesis in the Field of Biotechnology Management

for the Degree of Master of Liberal Arts in Extension Studies

Harvard University

May 2022

Abstract

In the United States in March 2020 the outbreak of novel coronavirus SARS-CoV-2 created a public health crisis. As workers in an essential industry, biotechnology employees were required to continue gathering in labs and offices despite the COVID-19 pandemic, or asked to work remotely and navigate the unique challenges posed by suddenly working from home. Taking mid-sized biotechnology company "Biocorp" (name changed) as a case study, the aim of this thesis was to determine best practices for biotech management in the context of this crisis. Biocorp's management successfully prevented employee-employee transmission of the virus, and generated record-breaking profit margins in the timeframe analyzed (July 2020 to October 2021). However, attrition over this timeframe increased by 140% despite high employee engagement scores. Using mixed methods, the Utrecht Work Engagement Survey (UWES), and grounded theory, analysis determines a disconnect between management and frontline employees to be primarily driving attrition, a disconnect due to communication breakdown in this company. Concluding that remote work will be "the new normal", best practices for biotech companies to retain an engaged workforce include: improving communication channels between management and the frontline through anonymous employee surveys, enabling remote work and flexible schedules, setting aggressive revenue goals without overextending employees, and preempting any rise in attrition by cross-training and talent pipeline development. This analysis will be valuable for informing decision-making in various challenging scenarios biotech companies and managers will face in the future.

Acknowledgments

First and foremost, to Dr. Ashley Prisant, my thesis director: thank you for your expertise, guidance, encouragement, and enthusiastic mentorship. I will be forever grateful you said 'yes' to this, because quite simply, I could not have completed this work without you.

To Dr. Steven Denkin: thank you for your guidance on everything from proposed topic to proper formatting of the final draft.

To Jen Stover: you set an example for what it means to be a great boss. Thank you for your engagement and allowing for my flexible work schedule while completing my master's.

To Dr. Jesse Fioravanti: you are the best partner and support system a girl could ask for. And thank you for continuing to work on the frontlines every day of this pandemic.

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Chapter I.

Introduction and Background

COVID-19 (coronavirus disease 2019) is a deadly respiratory illness caused by novel coronavirus SARS-CoV-2. The world was not acquainted with this disease until January 5, 2020, when the World Health Organization (WHO) issued a Disease Outbreak News Report to alert the global community

> [o]n 31 December 2019, the WHO China Country Office was informed of cases of pneumonia of unknown etiology (unknown cause) detected in Wuhan City, Hubei Province of China. As of 3 January 2020, a total of 44 patients with pneumonia of unknown etiology have been reported to WHO by the national authorities in China. Of the 44 cases reported, 11 are severely ill, while the remaining 33 patients are in stable condition….(World Health Organization, 2020)

By October 2021, the disease had claimed the lives of more than 700,000 Americans (World Health Organization, 2021).

Attempting to limit the spread of the virus, sweeping measures were enacted by the United States' federal, state, and local -level authorities (MA Department of Health, 2020; Taliesin, 2020; USA.gov, 2020). In March 2020 measures taken to limit the spread of the virus included shelter-in-place orders, which resulted in a temporary shutdown of nonessential businesses across the country. This meant retail shops and stores, music venues, movie theaters, salons, bars, and some restaurants were forced to close. Partly due to this unprecedented turn of events, COVID-19 was initially projected to cause economic fallout as severe as that of the Great Depression (Congressional Research Service, 2020).

Essential businesses such as grocery stores, transportation services, medical and health care facilities and a small number of other enterprises were allowed to continue operations, albeit while taking dramatic measures to protect the safety of employees and force social distancing (Angell, 2020). Biotechnology companies were deemed essential as they assist in development and manufacture of therapies, equipment, and supplies necessary for healthcare providers and researchers on the frontlines fighting disease. For example, according to the Public Health and Safety order in March of 2020 in Alameda County, California: "For purposes of this Order, individuals may leave their residence to work for or obtain services at any "Healthcare Operations" including hospitals, clinics, dentists, pharmacies, pharmaceutical and biotechnology companies…(Pan, 2020)." Even as the US economy contracted, biotechnology companies were presented with new business opportunities in the face of a dire need for laboratory supplies and treatment methodologies to study and combat a novel biological agent.

However, this required biotech employees to continue to gather in laboratories, offices, manufacturing plants, and shipping docks, which increases the risk of catching/spreading disease. Thus, managers in the biotechnology sector were suddenly faced with a difficult balancing act between preventing the spread of disease and preventing disruption of business operations. When faced with a simple choice between two clear options, the decision-making process warrants little analysis, but decision-making becomes more difficult with multiple contingencies. In the face of an unprecedented crisis at the intersection of health, safety, and profit margins, navigating the decision-making process becomes far more complex as the consequences are potentially dire at both the organization and individual level.

This thesis analyzes the decisions made by management of a biotech company that turned out to be successful in preventing the spread of COVID-19 on its campus, while generating record-breaking profit margins. The case study company is a medium-sized biotechnology company, called "Biocorp" (name changed). Brief company overview: "Biocorp (BC)" has 250 employees but is the wholly owned subsidiary of a parent company with ~2700 employees worldwide. Their commercially available products range from reagents used in laboratories for research and development, to companion diagnostics (CDx) and lab-developed tests (LDTs). Publicly available information on company financials was used to analyze financial performance. Using grounded theory and leveraging the Utrecht Workplace Engagement Survey (UWES) (see Methods section), surveys and interviews were conducted to gather quantitative and qualitative data from managers and subordinates in a variety of business units. Data were analyzed to determine what management decided to do to protect the health and safety of employees while maintaining a profitable business, and the effect of management's decision-making on employee engagement and the rate of attrition.

Data were generated over a time period from April 2020 through October 2021. Analysis determines the company's management was aggressive in implementing safety measures to protect its workforce, sufficient to prevent onsite transmission of COVID-19. Management was also aggressive in driving on revenue goals, including a restructure of its salesforce to drive additional revenue in the face of nonessential business shutdowns. The result: success in zero cases of onsite transmission of COVID-19, and financial success in revenue growth and stock valuation. Employee engagement was used as an additional metric for how successful management was in navigating this pandemic;

employee engagement as measured by the Utrecht Work Engagement Survey (UWES) is high in this company, another success. However, the attrition rate in this company increased significantly over the time period analyzed and is the direct result of a disconnect and a lack of communication between management and frontline employees. Given the key finding that remote work will be the work paradigm of the future (see Discussion Chapter), this is particularly informative for future biotech managers.

Based on these key determinations, the following best practices for future biotech managers should be implemented: **invest in enabling remote work and flexible scheduling to the greatest extent possible; maintain a quarterly schedule of company-wide in-person gatherings; solicit feedback from employees in the form of anonymous quarterly "pulse" surveys and if possible, roundtable discussions; get out ahead of a potential attrition problem by incentivizing, cross-training, and preemptively creating a talent pipeline; set consistent, aggressive organizational goals without overextending employees.** This analysis transforms from a "pandemic survival guide" to having major implications for success in biotech management in a post-pandemic future of remote work.

Economic Downturns

There have been many economic downturns in the modern history of the United States. Most notably, the Great Depression of 1929 – 1938, which was the biggest economic crisis in the country's history. In 1933 unemployment reached a high of 25%, but high rates of unemployment persisted for a decade—in 1938 unemployment was still 19% (Amadeo, 2020). Then came the Great Recession of 2007 – 2009 which at the time was the most significant downturn since the 1930s. In December of 2007 unemployment was at 5%, and rose to peak at 10% in October 2009 (Rich, 2013). In April of 2020, a direct result of COVID-19, the unemployment rate in the US shot up 10.3 percentage points to 14.7% (Bureau of Labor Statistics, 2020).

Deemed essential, biotechnology companies were permitted to stay open for business despite shelter-in-place orders in 2020; however, the effect of the economic retraction on the life sciences industry was an unknown early in the COVID-19 pandemic (March – June 2020). For example, while biotech companies stayed open, academic labs shut down along with other nonessential businesses, impacting sales of reagents. According to the June 2020 report by the Congressional Research Service: "Estimates so far indicate the virus could trim global economic growth by as much as 2.0% per month if current conditions persist and raise the risks of a global economic recession similar in magnitude to that experienced during the Great Depression of the 1930s. Global trade could also fall by 13% to 32%, depending on the depth and extent of the global economic downturn (Congressional Research Service, 2020)."

Global Pandemics and Measures to Mitigate

There are many types of disease-causing agents in humans, including several types of viruses. Influenza viruses consist of a viral envelope surrounding a negative-sense, single-stranded RNA genome (Arbeitskreis Blut, 2009). The influenza outbreak of 1918 is notorious for how widespread and deadly it became. Likely of avian origin, this pandemic was caused by influenza virus strain H1N1 and from 1918 – 1919 it infected an estimated 500 million people—at the time, a full one third of the world's population (Centers for Disease Control and Prevention, 2019a). Worldwide estimates of mortality tally to 500 million people; in the US alone there were approximately 675,000 deaths (Centers for Disease Control and Prevention, 2019a). This pandemic spared no age group in particular, with high mortality rates in those younger than 5, 20-40, and older than 65 years old (Centers for Disease Control and Prevention, 2019a). Why this pandemic was so particularly deadly is poorly understood but of note is how even young, relatively healthy people were stricken. More recently, the swine flu outbreak of 2009 caused a global scare though it was far less lethal than the 1918 flu. A novel strain of H1N1 influenza, (H1N1)pdm09, caused 12,469 deaths in the United States before the swine flu pandemic was declared over in August 2010 (Centers for Disease Control and Prevention, 2019b).

In addition to influenza, coronaviruses are disease-causing agents and may be transferred from animals to humans. Like influenza, coronaviruses are enveloped, single-stranded RNA viruses though their genome is positive-sense (Zhu et al., 2020). Coronaviruses are incredibly diverse, and very common causes of mild to moderate upper respiratory tract infections, often diagnosed as 'the common cold.' However,

coronaviruses may also cause more severe, deadly infections. The outbreaks of SARS in 2002 and MERS in 2012 were caused by coronaviruses SARS-CoV and MERS-CoV respectively. Both the health threat and the economic impact of these outbreaks was significant. But neither compared to the outbreak of SARS-CoV2 in December of 2019, a novel coronavirus which causes the disease we now call COVID-19.

COVID-19 is a severe respiratory disease caused by the novel coronavirus SARS-CoV-2. The first cases were identified in Wuhan, China in 2019; within months there were cases detected across the globe. This is a rapidly evolving situation. As of October 2020, more than 7,636,000 people in the United States had been infected with the coronavirus and at least 212,600 lives claimed, according to a New York Times database (The New York Times, 2020). As of October 2021, more than 45.6 million people in the United States have been infected with the coronavirus and tragically, there have been 744,157 American deaths (World Health Organization, 2021).

In 1918, there were no medical interventions available for treating influenza patients. Preventing large groups of people from congregating, requiring sick people to quarantine, and limiting peoples' movement aided in limiting disease and death. Case in point: comparing influenza deaths in 1918-19 in Philadelphia, Pennsylvania versus St. Louis, Missouri. On September 17, 1918, the city of Philadelphia hosted a parade attended by 200,000 people even though the city's first flu case was diagnosed 10 days earlier and officials were fully aware the city was on the verge of a possible pandemic (Strochlic, 2020). Then, officials waited until October 3 before they finally shut down public gathering places like schools, and churches (Strochlic, 2020). Just two weeks after its first flu case was diagnosed, Philadelphia was facing about 20,000 cases (Strochlic,

2020). By contrast, St. Louis shut down most public gathering spaces a mere two days after its first case was detected, in addition to requiring patients to quarantine in their homes (Strochlic, 2020). This resulted in a death rate less than half of Philadelphia's (Strochlic, 2020). During the deadliest phase of the pandemic, its first six months, per 100,000 people Philadelphia had 748 deaths whereas St. Louis had 358 (Strochlic, 2020). Without vaccine technology the pandemic nonetheless took a toll. The influenza vaccine was not developed until 1936 (Plotkin, 2014).

There are parallels between efforts to prevent the spread of flu in 1918 and COVID-19 in 2020, though these pandemics are separated by 100 years and incredible technological advancements in medicine. The only avenues for mitigation of disease in 1918 were nonpharmacological measures such as quarantining sick individuals, remaining in isolation when possible, wearing masks, and paying special attention to cleanliness and personal hygiene. These are imperfect measures, particularly when inconsistently adopted or slow to be enacted (see above example in Philadelphia). In 2019, there was no treatment available for COVID-19, given the novelty of the SARS-CoV-2 coronavirus. There are certain pharmacological measures that doctors could try, such as convalescent plasma, or ventilating patients as last resort. Until the development of COVID-19 vaccines in late 2020 – early 2021, the world was left with the 1918 approach of quarantine, isolation, and masking. The great risk is what Philadelphia experienced in 1918, where the rapid onset and spread of disease overwhelmed the city's healthcare systems. Thus the call to "flatten the curve" in the early stages of the COVID-19 pandemic measures to prevent people from congregating and traveling as much as possible.

An additional challenge is how in the 21st century people are significantly more mobile than in 1918. Globalization has created a need for people to travel frequently for business. Whereas commercial airlines did not even take off until the 1920s, in today's day and age it would take just 2 hours and 40 minutes to fly from Philadelphia to St. Louis (Encyclopaedia Britannica, 2006). For a business trip, someone might fly from Pennsylvania to Missouri and back in a single day. This poses a challenge for implementing measures to keeping people quarantined in their homes.

One of the first biotechnology companies to hit headlines after the outbreak of COVID-19 was Biogen. Biogen held a conference in Boston in March of 2020, drawing people from all over the country to congregate, indoors, maskless—which became a superspreader event. Final estimates are that this one conference created roughly 300,000 cases (Stockman, 2020). This was immediately preceding government-induced restrictions on large gatherings or any implementation of mask-wearing and social distancing policies, but provides evidence that biotech companies, though in the business of science, are not immune to bad judgement when it comes to decision making.

Managing Engagement, Motivation, and Burnout in Crisis Scenarios

Why some companies thrive in uncertain times can be directly tied to what decisions were made, despite volatility. Upheavals are inevitable but informed decision-making capabilities are critical for a business to survive crises they cannot control. Authors Jim Collins and Morten Hansen publish results of their research into why some companies thrive or fail in times of volatility in *Great by Choice*. The authors study matched pairs of companies over the course of nine years, one who performed well, the

other who did not, in several industries (Collins & Hansen, 2011). One of the matched pairs of companies is in biotech: Amgen vs. Genentech. Over the course of time researched, Amgen outperformed Genentech, culminating in the latter selling a controlling share to Roche and losing independence. Using an economic lens to compare these two companies, Collins and Hansen make recommendations for management including building "financial buffers and shock absorbers," capitalizing on advantages, being "specific, methodological, and consistent," and encouraging steady growth without overextending—a principle they term the "20 Mile March principle" (Collins & Hansen, 2011).

The importance of not overextending employees ties into the concept of employee engagement. Employee engagement may be defined as "an individual employee's cognitive, emotional, and behavioral state directed toward desired organization outcomes (Shuck, 2010, pp103)." As defined by Wilmar Schaufeli, engagement is "a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption...characterized by a high level of energy and strong identification with one's work (Schaufeli, 2004), pp4-5." If employees are engaged, the benefits to the organization include increased productivity, worker satisfaction, and a decrease in turnover (Pink, 2009). Employee engagement has only become a focus of HR departments in the last couple decades. The field has been advanced in part thanks to Schaufeli's development of the Utrecht Work Engagement Scale (UWES), an assessment to quantitatively measure employee engagement. See Materials and Methods section for details.

Distinct from engagement but closely related is motivation, which can be either intrinsic or extrinsic. In a 2009 TED talk, Dan Pink makes the case that extrinsic motivation of the 'if-then' reward system does not work to incentivize employees to perform their best work. Monetary rewards work well to incentivize workers for very focused tasks, but not for tasks that involves higher-order problem solving of an abstract problem (Pink, 2009). "Traditional notions of management are great if you want compliance, but if you want engagement, self-direction works better (Pink, 2009)." He uses research conducted by Karl Duncker, Sam Glucksberg, Dan Ariely, and others to illustrate this point (Pink, 2009). Instead, managers should leverage intrinsic motivators to encourage engagement in their employees, especially autonomy—giving employees control over how to manage their own work (Pink, 2009).

In the context of motivation theory, engagement is a positive characteristic of an employee's work and is defined by vigor, absorption, and dedication. On the other hand, burnout is defined as "any combination of three distinct symptoms: exhaustion (a depletion of mental or physical resources), cynical detachment (a depletion of social connectedness), and a reduced sense of efficacy (a depletion of value for oneself)" (Heng & Schabram, 2021). Burnout and engagement are not strictly opposites, but the two are negatively correlated and burnout is a negative characterization of an employee's work, whereas engagement is a positive one (Schaufeli, 2004). The term "burnout" has been on the rise in HR-related articles. While the term originated in the 1970s, in 2019 the WHO added burnout to its International Classification of Diseases, defined as " a syndrome conceptualized as resulting from chronic workplace stress that has not been successfully managed," and since the onset of the COVID-19 pandemic in 2020 the problem has

become rampant (Moss, 2021). Burnout may be assessed with the Maslach Burnout Inventory (MBI). Harvard Business Review devoted their Big Idea Series in February of 2021 to burnout, and those in management positions should pay attention as according to the research study conducted, workers belonging to the Millennial generation have the highest levels of burnout, and the biggest factor leading to burnout is feelings of loneliness (Moss, 2021). This clearly becomes an important consideration in the context of remote work.

Chapter II.

Materials and Methods

This chapter describes the mixed methods grounded theory approach taken to gather and analyze a de novo dataset. This case study uses the grounded theory method in analysis of quantitative and qualitative data about the biotechnology industry's success in keeping employees safe and business profitable during the COVID-19 pandemic. Specifically, how did management take action to protect the continuity of business operations, while ensuring employee safety, and what is the resulting effect on employee workplace engagement and attrition.

Data collection began in May and ended in October of 2021. Of specific interest was the timeframe between April 2020 through October 2021. These timepoints were chosen as April 2020 was shortly after COVID-19 was declared a pandemic, and just at the start of Q2 of the case study company's Fiscal Year 2020; October 2021 was just prior to the case study company's intended date to bring all workers back onsite on November 1, 2021.

Grounded Theory

The standard in scientific literature is to take the empirical approach of scientific method and deductive reasoning. Starting with a hypothesis, the researcher runs a series of carefully designed experiments, generates quantitative data, and then seeks to prove or disprove the null hypothesis. In this thesis, however, proposing a specific hypothesis and

testing it would severely limit what may be learned from general inquiry into the state of the biotech workplace "post-COVID." An inductive method is more conducive to gathering data and developing theory to explain trends that emerge. The inductive approach "involves the search for pattern from observation and the development of explanations – theories – for those patterns through series of hypotheses (Russell, 2011, pp7)." It is the inductive approach that is more appropriate in this case, specifically, grounded theory.

Grounded theory originated with Glaser and Strauss in the 1960s and was advanced by Charmaz and others in the 21st century. Grounded theory requires that data be codified based on recurring themes and compared against new incoming data (Charmaz, 2006). What makes this approach particularly useful for this case study is its utility in identifying and understanding "desirable improvements in work contexts (Martin, 1986)." Constructivist grounded theory requires the researcher to be open-minded to discovering new theory but not neutral. "A constructivist approach places priority on the phenomena of study and sees both data and analysis as created from shared experiences and relationships with participants and other sources of data (Charmaz, 2006) pp 130." As an employee of the case study company, this researcher is not neutral and has some relationship to and shared experience with the data, making constructivist grounded theory apt for this thesis.

Institutional Review Board Approval

Prior to any contact with research participants an application was submitted to Harvard's Institutional Review Board (IRB), since administering survey and interview

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questionnaires falls into the category of human experimentation. All methods were approved by Harvard's Institutional Review Board under protocol IRB21-0011. Once approval was granted, email invitations were sent out to potential research participants across business units of the case study company. Each email invite contained a description of the research project, a link to the Phase I survey as well as an attached consent form based on Harvard's HRP-502 –HUA Adult Consent Form Template Version 2.2, and detailed information about IRB approval.

<p style="text-align:center">Quantitative Data (Research Phase I)</p>

This case study collects and analyzes quantitative data from publicly available financial data, including stock performance and financial performance data from quarterly investor calls. In addition to these publicly available datasets, a quantitative research survey was designed and administered to a sample of biotechnology employees, spanning a variety of job functions, to collect data on measures implemented in the workplace in response to the COVID-19 pandemic, and levels of workplace engagement. This quantitative survey was termed the Phase I survey, since leveraging grounded theory necessitated a follow-up qualitative dataset. The qualitative follow-up interviews became Phase II (see below).

The Phase I quantitative survey was built and administered via the Qualtrics platform. See Appendix 1 for the quantitative survey questionnaire. Emails were sent out inviting biotech employees of the case study company "Biocorp" to participate in this research project. After reading the consent form participants could click the link to take the survey. While demographic information including age, education level, race, sex,

gender, ability, etc. may offer additional insight and be of interest for future research, such information was not collected for the purposes of this case study. Instead, to protect the privacy and job security of all participants and to encourage honest and frank responses, no identifying information was collected beyond the participant's job function and years in the role.

Survey data were initially collected and displayed with Qualtrics-provided graphical user interface (GUI) options. Displaying data in the form of tables, histograms, or graphs enabled initial perceptions for a first-pass analysis of emerging trends from the quantitative data. For more in-depth statistical analysis, data was exported in CSV format and analyzed in Excel. The student two tailed t-test was used to analyze for statistical significance between samples. For analysis of workplace engagement characteristic of a particular sample subset (e.g. manager vs. non-manager, work-from-home vs. onsite worker) scores from each subscale are reported (see Appendix 3.) but the total UWES score of the subsample was used for t-test.

The quantitative survey leverages the existing, well-validated Utrecht Work Engagement Survey (UWES). The UWES-17 is a 17-question survey where respondents self-report on their level of engagement, the readout concerned with three dimensions of work engagement: vigor, dedication, and absorption (Schaufeli, 2006). UWES scores comprise three subscale scores and a total score, with a range of 0 to 6 (Schaufeli, 2004). To score the UWES data, mean scores for each of the three subscales (vigor, dedication, and absorption) are calculated by adding scores within each scale, and dividing by number of scores in that scale (Schaufeli, 2004, 2006). A total score is calculated in the same manner. Like Likert scale data, the UWES data is treated as interval data; a simple

t-test was used to test for significant differences between samples and could be used to test for significance between the sample and reference database scores (Schaufeli, 2004).

In the aftermath of the global recession of 2008, a sample of more than 200 life sciences professionals was asked a series of questions in a large survey conducted by Deloitte Touche Tohmatsu (Deloitte) Life Sciences and Healthcare (LSHC) Industry Group, in partnership with the Economist Intelligence Unit (The Economist Intelligence Unit Ltd, 2010). Focused on the industry as a whole, rather than examining decision-making by management or employee engagement, these data can offer a comparison to the effect on the biotech industry from COVID-19. Therefore several questions included in the quantitative survey were based on the report (The Economist Intelligence Unit Ltd, 2010).

This quantitative survey was administered in May 2021, the midpoint of the time period analyzed (April 2020 – October 2021). While the Phase I dataset generation was in progress, additional quantitative data regarding a rising attrition rate at the case study company was generated drawing from information not publicly-available. These data are presented in the Results Chapter, and further discussed in Discussion Chapter.

Qualitative Data (Research Phase II)

When it comes to examining employee engagement, "it is at the level of the individual business unit and the individual employee where the most insight can be gleaned (Shuck, 2010, pp106)." Accordingly, to follow up on emerging trends from Phase I research, interview questions were composed to gather qualitative data on individual perceptions and personal experience. The interview questionnaire was

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designed to probe for the root cause of rising attrition (see <u>Appendix 2. Qualitative</u>

<u>Interview Question Template</u>) but to allow full opportunity for grounded theory

development. Accordingly, the interviews were semi-structured, to spark insight from the

participant, while gathering data that could be codified and comparatively analyzed.

Those who provided their contact details at the end of their Phase I surveys

received email invitations to participate in a follow-up Phase II interview. Potential

participants were selected to provide a variety of job functions and levels of seniority in

the company. Participants were given the option of video or phone call interviews. Once

a 30-minute timeslot was decided upon, video conferencing was scheduled via the Zoom

platform; those who requested a call received a phone call at their provided number. All

participants were asked to verbally consent to participate, and separately asked to

specifically consent to recording of the audio of the conversation for accurate note-taking

purposes. Upon consent, audio was recorded using the iPhone Voice Memo app. These

audio recordings were then roughly transcribed into an Excel spreadsheet. Once each

interview was transcribed into the spreadsheet, the data were reviewed, collapsed into a

succinct version containing key points to better compare emerging themes across the

entire dataset. Key soundbites were preserved as direct quotes for illustrative examples of

the common themes. This process had to be reiterated multiple times, as more interviews

were conducted, and major themes emerged in a pattern of repetition.

Interviews were conducted on a rolling basis. Following Charmaz's guidelines,

data were codified based on recurring themes, and in accordance with the constant

comparative method, compared against new incoming data (Charmaz, 2006). Focused

coding condensed the initial coding into selective concepts. At this point, subconcepts

emerged from the data, related to the major themes—the axial coding strategy was used

to link these subconcepts back to the whole (Charmaz, 2006). The themes were

categorized as pertaining to 1) contributing factors to Biocorp's attrition rate, 2) the

realities of work in the time of COVID, both positive and negative and lastly 3) the

paradigm shift wrought by COVID-19.

An important element of grounded theory is that a saturation point be reached in

the data, the point at which no new insight is forthcoming (Charmaz, 2006). When

themes become repetitive, and no new insight was gained in four interviews in a row, the

qualitative dataset collection phase was completed. A total of n=10 interviews were

conducted. Biocorp's intended return-to-site date for all employees was November 1,

2021; to match conditions under which the quantitative survey was administered in May

2021, interviews all took place in October 2021, to close out the research portion of this

thesis.

Chapter III.

Results

This chapter summarizes key findings from both the quantitative and qualitative datasets. Quantitative data were gathered from a survey sent out to biotechnology company employees. Key findings from the Phase I quantitative dataset include:

- The apparent contradiction between employee engagement level (relatively high), company financial performance (excellent) and attrition rate in this case study company (also high).

- There was no significant difference between level of employee engagement in workers who continued to commute to office/lab during COVID versus those who were sent home to work remotely (UWES mean score 4.396 and 4.336 respectively, t-test p-value=0.295).

- However, there was a highly significant difference in engagement level between those employees with management status, relative to frontline employees without direct reports (4.638 and 4.203 respectively, t-test p-value=3.277e-05).

The qualitative dataset was generated from a series of interviews conducted with a subset of the biotechnology employees that answered the Phase I quantitative survey. In lieu of identifying information, direct quotes from qualitative interviews are coded according to abbreviation of job title-number. For example, SR_1 was the first Sales

Representative interviewed; SR_2 was the second Sales Rep interviewed. See Appendix 5. for full key. Significant findings from the Phase II qualitative dataset summarized:

- The unique business opportunity created by the COVID-19 pandemic for the biotechnology industry was capitalized upon by the case company

- However, to do so, the company prioritized profitability over their people, achieving financial goals at the expense of attrition.

- Attrition was accelerated by a perception of major disconnect between frontline employees and their leadership; caused by lack of communication between senior management and frontline employees (partly due to parent company/subsidiary structure).

- The problem of disconnect/lack of communication would be solved by implementation of anonymous surveys.

- The outbreak of COVID-19 was a "wake-up call" for workers, inviting self-reflection and re-alignment of priorities, a contributor to attrition.

- This research concludes that flexibility is going to be a pre-requisite for the workplace in the future

The conclusion that flexibility will be not an incentive but a pre-requisite for attracting talent is extrapolated further in Discussion Chapter.

Management-Enacted Safety Measures Successful in Preventing Spread of COVID-19

Onsite

The case study company is considered a success story in how safety measures put into place by management prevented any onsite transmission of COVID-19. Zero cases of COVID-19 due to onsite transmission occurred in the period between April 2020 and October 2021. There were company employees who contracted COVID-19 and fell ill, but none of these cases was due to worker-worker direct transmission. Instead, these cases would have arisen from contact with friends or family, or children who continued to go to school, or other exposure. While impossible to determine the source of every infection, with zero cases of infection reported to HR, measures taken to protect the workforce from disease proved to be successful.

Safety Precautions

Measures to mitigate the spread of disease in company labs and office space prioritized mask wearing and social distancing. In rank order according to survey responses recorded, the measures put in place are the following:

1. Masks are required onsite at the company's offices and lab spaces

2. There are limits on the maximum number of people allowed in any one room or laboratory

3. There are staggered shifts for people working onsite

4. More people are working from home now

5. There are temperature screenings at the entrance

6. Anyone entering the workplace is required to sign in and sign out upon arrival and departure from the site

7. COVID tests are made available to employees by the company but only if necessary, they are not required and not offered on a regular basis.

Masks Required Onsite. The requirement that all workers wear a mask when onsite was made a company rule in March of 2020, when there were indications that the virus was spread through respiratory droplets from sick people coughing, sneezing, even talking. Wearing a mask limits the physical spread of respiratory droplets and therefore viral particles, limiting the viral load available for infecting others. The guidance for mask-wearing onsite was "Unless actively eating or drinking, or when alone in a conference room with the door closed, masks must be worn covering nose and mouth (private communication)." This rule remained in place for the site of the company's offices and labs from April of 2020 at least through October of 2021 when the research phase of this thesis concluded; October of 2021 is four months after the local government of the county stopped requiring the wearing of masks indoors (Aragon, 2021)

> "We have never really lifted our mask mandate. We will continue to take our conservative approach here. And if things get worse, we will adjust accordingly. We did get some pressure from [parent company] particularly over the summer, to lift our mask mandate. But we here in this community held ourselves accountable for keeping masks on and keeping people safe." – Case Study Company General Manager, October 2021 (personal communication)

Social Distancing. To enforce social distancing—staying six feet apart from others—room maximum occupancy was updated. On the door of conference rooms that would comfortably hold 15 people, a sign reading "Max Occupancy: 2" was installed. Large in-person meetings were stopped. Chairs were removed from break rooms and markings taped off on the floor to indicate how much distance six feet would be. Plastic dividers were installed in between desks and lab benches. Maximum one employee per six-by-six

23

foot cubicle was permitted. If there were office spaces now vacant due to employees moved to working-from-home, onsite employees were moved into the space to encourage distance and to have a physical barrier.

Staggered Shiftwork. Personnel who must be physically present in lab to conduct experiments, including the R&D team, contract research organization (CRO) services scientists, quality control scientists, shipping and manufacturing personnel, were still coming to campus. To further limit the number of people and allow for social distancing, onsite personnel began to work in staggered shifts. To create staggered shifts, management put in place a policy of two shifts per seven-day week, weekdays and weekends. One shift began at 6am and ended at 2pm, the second lasted from 2pm to 10pm. Each shift was limited to allow no more than 30% of staff per shift. Management monitored attendance to make sure each shift contained no more than 30% of onsite staff (personal communication).

Number of People Onsite Minimized. While biotechnology companies were deemed essential businesses and therefore all workers were permitted to return to work on the company campus despite county-wide shelter-in-place orders, to reduce the chances of infection Biocorp initiated work-from-home orders for any employee who could fulfill their job requirements without physically being present on campus. This meant that employees in functions including technical support, marketing, sales, product management, regulatory affairs, and others, stopped coming to the office, and began working from home. 74% of survey respondents were working from their homes (see Fig1 and Table 1) in May, 2021. This is a significant increase, even accounting for the number of survey respondents who were remote pre-pandemic as well. If not fully

remote, 78% of people were spending more time working from home, compared to pre-pandemic levels.

Sign-In/Sign-Out Recordkeeping Requirement. The front door to the office was locked, requiring badge access to enter. All persons entering the office were required to check their temperature at a touchless temperature checking station installed at the front door to the office, then sign-in at the reception desk with their name, time in, temperature; they were to sign out upon completion of their business that day. Any visitors were required to complete a health questionnaire prior to visiting to ask about recent travel to screen for travel to areas of high COVID risk in addition to asking about any onset of COVID-19 related symptoms. These measures helped limit the flow of people into the building, as well as allowing for contract tracing in the event of a positive case onsite. The sign in/sign out records were also how management monitored adherence to the staggered shift policies.

Testing. Any onsite employee feeling ill was required to stay home and alert HR of their symptoms. Regular COVID testing was not required or offered on a regular basis; however, tests were made available to employees if strictly necessary. An example of a necessary case would be to rule out a potential onsite transmission: an onsite employee feeling ill with COVID-related symptoms was provided a test, and required to show proof of negative result before returning to site. Another example is a field employee engaging in essential work travel involving crossing state lines, entering a state which required proof of a negative COVID test.

Lastly, the janitorial staff onsite was given enhanced cleaning procedures to follow, and workers were required to sanitize their hands and work spaces regularly to

prevent the spread of disease. Once vaccines became available there was a vaccine

mandate put in place.
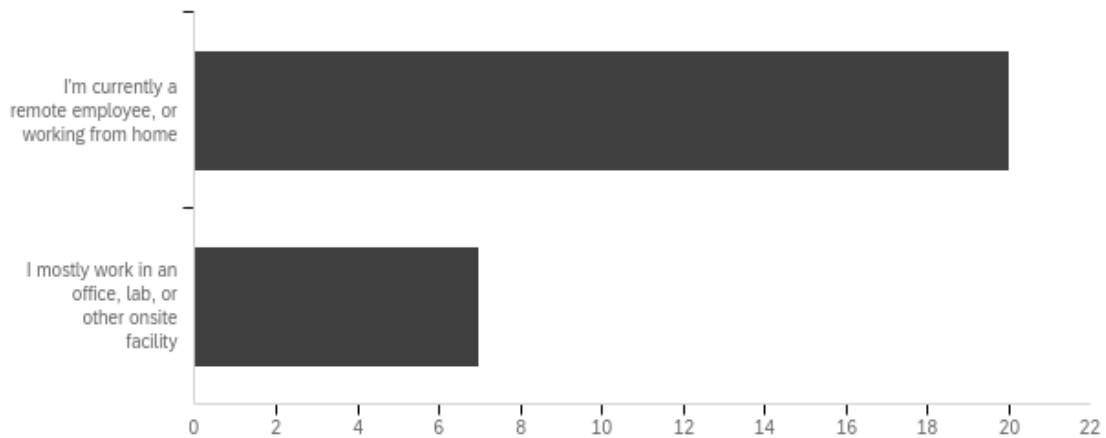
Figure 1. Proportion of At-Home Versus Onsite Workers in May 2021

*To the question "Are you currently an at-home, or remote worker?" in May, 2021, 74%
of case study company survey respondents answered 'yes' they were working from home.
26% replied 'no' they were working onsite.*

Table 1. Job Functions of At-Home versus Onsite Workers

#	Field	Office personnel (Marketing, Administration, Finance, etc)	Laboratory personnel	Sales Representative/Account Manager	Technical Support	Manufacturing personnel	Shipping personnel	Executive (CSO, CMO, CEO, CFO)	Other (type category here):	Total
1	Yes, I'm currently a remote employee, or working from home	10.00% 2	10.00% 2	50.00% 10	20.00% 4	0.00% 0	0.00% 0	0.00% 0	10.00% 2	20
2	No, I mostly work in an office, in a lab, or in an onsite facility (e.g. shipping, manufacturing)	0.00% 0	42.86% 3	0.00% 0	0.00% 0	0.00% 0	14.29% 1	14.29% 1	28.57% 2	7

*Reported job functions of work-from-home employees (top row) as compared to onsite
workers (bottom row) in May 2021.*

Management's COVID-19 Response Drives Strong Financial Performance

After an initial dip in March 2020 at pandemic onset, the life sciences industry, and the case study company in particular, generated record-breaking revenue and saw stock prices soar in the fiscal year between July 1, 2020 and June 30, 2021. In terms of revenue, based on publicly reported financial data including investor call transcripts and investor reports, the company enjoyed unprecedented organic growth. From the investor report: in a market size of 1-2 billion dollars USD, the market growth rate of the life sciences segment rests in the "mid-single digits" (~5-6%) as opposed to the case study company Biocorp's growth rate of "20-30%" (ST, 2021).

Table 2. Snapshot of Life Sciences vs. Case Study Company Growth Rate in FY21

Fiscal Year	End Market	Market Size	Life Sciences Market Growth Rate	Case Study Company "BC" Growth Rate
July 2020 – June 2021	Biotechnology assays, reagents, and services	USD $1-2 B	5% - 6%	20% - 30%

Case study company "Biocorp" reported 20-30% organic growth in fiscal year 2021 (FY21). The Life Sciences segment of publicly-traded biotechnology companies reported "mid-single digit" organic growth over the same time period, July 2020 – June 2021. Adapted from (ST, 2021)

Even compared to the significant rise in stock prices of the life sciences industry as a whole, Biocorp enjoyed an exceptional stock price increase. In Figure 3. below is data over the course of 12 months, October 2020 to October 2021. The price per share of stock in the Life Sciences segment increased 36.74%, over the same time period the price per share of stock in Biocorp rose 88.31%.

Figure 2. Percent Increase in Stock Price: Life Sciences Segment vs. Biocorp

Price per share % increase of Biocorp stock relative to % increase of life sciences industry October 2020 – October 2021 (source: personal communication and Nasdaq.com). Blue line is case study company; price per share increased 88.31% from October 2020 to October 2021. Orange line is Life Sciences Tools & Services subset of stocks; price per share increased 36.74% from October 2020 – October 2021

Effect of Management's COVID-19 Response on Employee Engagement

This case study uses employee engagement to gauge the impact on the biotechnology worker of the abovementioned drastic changes to the biotechnology industry labs and office spaces. Using the UWES-17 (Schaufeli, 2004)—see Materials and Methods for details—questions about workplace engagement were included in the quantitative survey and sent to employees across business sectors of the company.

Employee Engagement Scores in Case Study Company High Overall; No Significant

Difference in Engagement of Onsite vs. Remote Workers

The results demonstrate a high level of employee engagement in the case study

company Biocorp in May 2021. Biocorp's UWES scores across survey respondents

(regardless of job function and job level) are vigor: 4.30, dedication: 4.40, absorption:

4.35 with a total UWES score of 4.35. See Appendix 3. for full UWES-17 dataset from

quantitative Survey I. This is compared with average scores of 3.99, 3.91, 3.56 and 3.82

respectively (Schaufeli, 2004). What these scores indicate is a relatively high level of

workplace engagement. An initial hypothesis was that there would be a significant

difference in workplace engagement levels between employees working remotely versus

those employees whose job functions required them to continue to come to work despite

the pandemic. However, there was no significance difference observed in WE scores

between onsite workers and remote workers. Taking the group of respondents currently

working from home (WFH), and comparing mean UWES scores to those who conduct

their work onsite in office or in lab (OS) shows no significant difference (Table 3,

p=0.295) in employee engagement between these groups. Notably, the sample of WFH

employees included employees who were sent home because of COVID-19 in addition to

employees who were remote all along. Workers who were remote pre-pandemic as well

include sales representatives and field employees spread out across the country, far from

the lab and offices of company's HQ. To confirm the results above, and to control for any

potential masking effect from the proportion of at-home employees who were always

remote regardless of pandemic, WE scores in remote employees who were onsite pre-

pandemic (WFH/OS) were compared against WE scores of always-remote employees

(WFH/WFH). No significant difference was found. (See WFH/WFH vs WFH/OS, Table 3., p=0.586.)

Employee Engagement Significantly Reduced in Frontline Workers Compared to Management

The data do show a highly significant difference in workplace engagement between managers and non-managers (p=0.0000328) with managers having significantly higher levels of WE. See Table 3. Whether or not an employee is a manager was self-reported in the survey, with those who reported a "manager" role asked to specify how many people report to them. Employees without management status are also referred to as frontline employees or frontline workers. WE scores in the subset of employees who manage at least one other employee and have a manager-level title were compared against WE scores in the subset of employees who do not have manager status. This is a key finding from this dataset.

Table 3. Significant Difference in Employee Engagement of Managers vs. Non-Managers

t-Test: Two-Sample Assuming Unequal Variances						
a=.05	*WFH*	*OS*	*WFH/WFH*	*WFH/OS*	*Manager*	*Not Manager*
Aggregate WE Score	**4.34**	**4.40**	**4.31**	**4.40**	**4.64**	**4.20**
Variance	0.00	0.01	0.00	0.08	0.00	0.00
Observations	4.00	4.00	4.00	4.00	4.00	4.00
Hypothesized Mean Difference	0.00		0.00		0.00	
df	5.00		3.00		6.00	
t Stat	-1.17		-0.61		11.05	
P(T<=t) two-tail	**0.295**		**0.585**		**3.28E-05**	

Comparative analysis of workplace engagement scores. Two-tailed t-test; data from May, 2021. Employee engagement scores of workers who work from home (WFH) versus those who work onsite (OS), (ns, p=0.295); in work-from-home workers who were onsite pre-pandemic (WFH/OS), vs. work-from-home workers who worked from home pre-pandemic as well (WFH/WFH), (ns, p=.585); in managers who manage at least one person (M) compared to those who do not manage any other employees (NM). Highly significant difference in mean UWES scores was observed (p=.00003278).

Additional Effects of Management's COVID-19 Safety Precautions: More Hours Worked, Less Hours Traveling

The company was successful in preventing direct employee-employee transmission of COVID-19, but the measures put into place drastically changed the workplace landscape for biotech employees. Workers at biotech company "Biocorp" reported working more hours now overall, compared to pre-pandemic hours. All respondents in the sample are salaried employees, presumed to take as their typical workweek the American standard of 40 hours per week, Monday through Friday. 67% of people surveyed report working more hours overall in May 2021 as compared to January 2020 (pre-workplace closures due to COVID-19). And while 33% of survey participants

report no change in hours worked, 0% report working fewer hours compared to pre-pandemic work life. See Figure 3.

When asked about amount of time spent traveling for work, survey respondents reported a significant decrease compared to pre-pandemic levels: 72% of people report traveling less for work, 28% the same amount, and 0% reported an increase in work travel post-COVID. This was not only due to a reduction in commute time, as 75% of the workforce in case study company was now working from home. Prior to COVID, outside sales representatives took in-person meetings in their sales territories with customers and clients. Even without the temporary full shutdown of academic research laboratories, sites no longer allowed visitors except in case of emergency. Reduction in work travel also included scientists or business development personnel who normally would attend conferences, as all conferences were moved from in-person to online platforms.
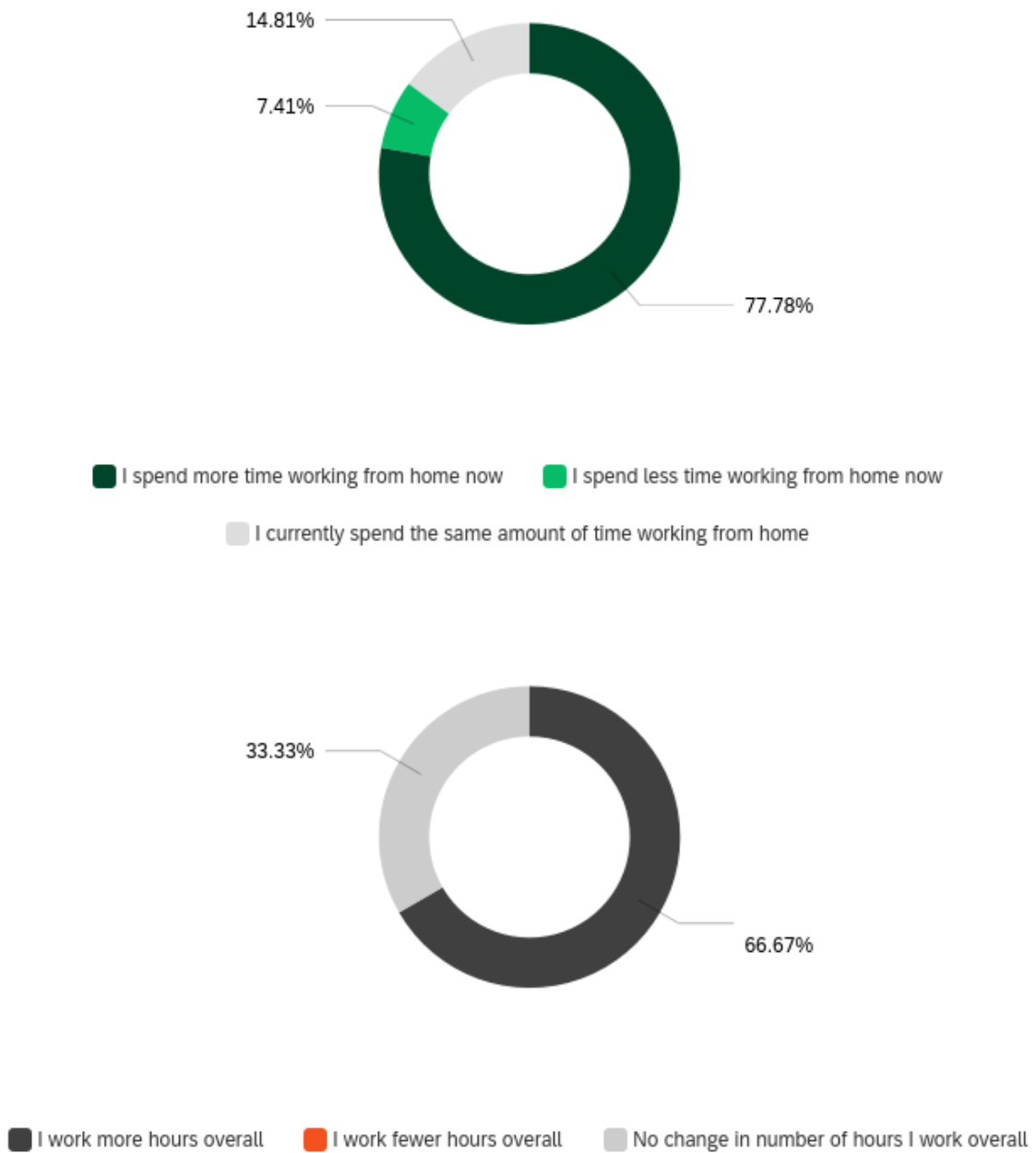
Figure 3.   Changes In Working Hours Due to COVID-19

Reported amount of time spent working from home (top) and overall hours worked (bottom) in May 2021, compared to pre-pandemic levels. Compared to pre-COVID levels, of all respondents 78% were working more hours from home; 15% report no change in time worked from home; 7% report less time working from home. Compared to pre-COVID levels, of all respondents 67% are working more hours compared to pre-pandemic, 33% report no change, 0% report working fewer hours.

High Attrition Rate Despite High Level of Employee Engagement and Strong Financial

Performance

The high level of employee engagement notwithstanding, a key finding was that

54% of respondents surveyed reported that "scientists are more likely to look elsewhere

for jobs" in response to an open-ended question regarding the company's hiring

landscape, and how it has changed due to COVID-19. The statement that scientists would

move jobs was the highest-ranked choice in the sample overall. Broken out by sample

subset: manager: 55.56% versus nonmanager 52.94%; currently working from home

(WFH): 52.63% versus currently working onsite (OS): (57.14%); of those currently

working from home, was remote before too (WFH/WFH): 46.15% versus was working in

lab or office before (WFH/OS): 66.67%.

To investigate this key finding, data were obtained on case study company's level

of attrition and hiring trends in the course of the COVID-19 pandemic. Available data

from July 2020 to October 2021 (source: private communication) in fact reveal a 140%

increase in attrition (see Figure 4.).

Table 4. How Do You Think the Company's Hiring Landscape Will Change Due to
COVID-19?

Answer	Choice	Count
Scientists are more likely to look elsewhere for jobs	53.85%	14
Scientists will stay where they are	26.92%	7
Scientists are moving/will move from small to larger companies	11.54%	3
Scientists will prefer to move to remote work rather than go to lab	7.69%	2
Scientists are moving/will move from larger to smaller companies	0.00%	0
Total	100%	26

*Responses to this survey question (May 2021) were predictive of company's signifcant
rise in rate of attrition. 54% of respondents predicted that scientists would be more likely
to look elsewhere for jobs.*
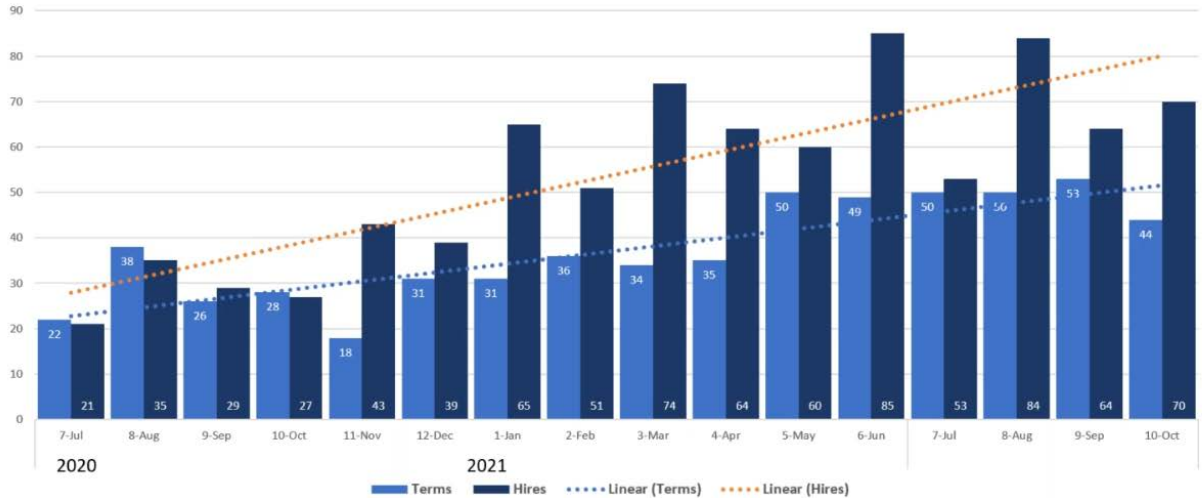
Figure 4. Hired vs. Termed Positions from July 2020 to October 2021

Rate of termed positions (blue dotted line), whether employees quit, retired, or were terminated, significantly increased between July 2020 and October 2021. Rate of hired positions (orange dotted line) increased more rapidly but a 140% increase in attrition was observed over this period. Source: personal communication.

Notably, the hiring rate increased at a steady linear rate, faster than the rate of attrition so that the company had a net growth in workforce over the period of time analyzed. However, while this indicates that the biotechnology job market is dynamic, the case study company has significant attrition. The qualitative interviews were conducted to analyze driving forces behind this significant increase in attrition.

Attrition Rate Primarily Due to Management Not Engaging with Frontline Workforce, and Desire for New Career Opportunities

Phase II of the research was designed to generate a qualitative dataset for analysis of reasons for the significant increase in attrition. From Phase II qualitative interviews, when specifically asked about 'push and pull factors for why someone might change

jobs' in relation to the attrition rate of the case study company, the following dataset was generated. Factors were ranked according to number of times they were specifically mentioned in the qualitative dataset.

Table 5. Push/Pull Factors for Attrition

	Qualitative Interviewee										
Push Factor	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Score**
Management not engaged/not listening	•	•	•	•	•	•	•		•	•	**9**
Lack of career development opportunity		•	•	•	•					•	**5**
Overworked	•					•	•				3
Undercompensated	•				•		•				3
Re-evaluated priorities due to COVID			•					•			2
Requirement to return to site Nov 1									•	•	2
Demand for revenue without adjustment for pandemic's effect on work pace	•										1
Attrition						•					1
Layoffs		•									1
Pull Factor	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Score**
Pay	•	•		•	•	•			•		**6**
New career opportunity		•	•	•	•	•		•			**6**
Flexibility	•						•	•			3
Leadership - new				•						•	2
Job closer to home							•	•			2
Purpose									•		1

Push factors and pull factors for attrition ranked in descending order from most cited to least. Numbered columns correspond with each of the 10 qualitative interviewees. Green-highlighted columns correspond with n=3 subjects who changed companies in between the quantitative survey (May 2021) and qualitative interview (October 2021). Yellow rows highlight factors all n=3 termed employees had in common as reasons they moved on. Red bolded text indicates two highest-scoring factors in each category.

People change jobs for a variety of reasons. They may have incentives to leave (push factors), and/or incentives offered by a new job/different company (pull factors). These could be two sides of the same coin, as in the middle of a Venn diagram, or

unrelated to one another. When the same factor becomes both a reason to leave and a reason to look elsewhere, one can infer this has a particularly strong impact on attrition.

The questions regarding push and pull factors were posed as hypotheticals, such that employees could answer regardless of whether they themselves had recently looked for new opportunities. Of the ten qualitative interviews conducted, three were with people who had actually left the company for new opportunities in between answering the quantitative survey (May of 2021) and the qualitative interview (October of 2021) questions. Not only does this highlight the attrition problem at this company, but these columns are therefore particularly interesting, since these answers are not hypothetical, or based on discussion with other colleagues who have left; these people changed jobs within five months prior to giving this interview. The highlighted yellow rows are the consensus reasons, the reasons common to those who took new jobs in this timeframe. The push factor common to all is the feeling that "management is not engaged with or not listening to" frontline workers, and the pull factor common to all is "new career opportunity."

These data reveal the following: people might seek a job change for a variety of reasons. But by far the primary factor pushing people out of the case study company is feeling a lack of engagement from management or that management "is not listening." This was the strongest association of any factor, push or pull with a score of 9 out of 10 (9/10). Additional insight on this issue was generated through subsequent analysis of the qualitative dataset (discussed below). A second push factor cited by many people (50%) is a lack of career development opportunities in their current role/company (5/10). Career opportunity turned out to be an example of overlap in push factors and pull factors, as

"new career opportunity" also ranked high in the list of pull factors (6/10), and was a factor all three termed employees shared for why they moved on. Tied for top pull factor with "new career opportunity" was the pull factor "pay," or "more money" (6/10). Intuitively, this makes sense since very rarely would someone seek a pay cut in a new job. Furthermore, even if a company offers its employees regular salary increases, moving to a different company gives the job seeker an opportunity to negotiate a significantly higher salary than would be possible when moving internally. This confirms that the primary factors for attrition in the case study company are 1) a lack of engagement by management and 2) desire for opportunities for career growth not being obtainable by staying in current role.

"Undercompensation" was not ranked highly as a push factor (3/10), indicating that all things being equal, most employees do not feel undercompensated. However, further analysis of the qualitative data determined that while most employees don't feel underpaid, frontline employees do *not* feel as though their hard work is being fairly rewarded given the effect on the workforce as a direct result of the COVID-19 pandemic.

Based on these data, the COVID-19 pandemic was not initially implicated in the attrition rate. But in subsequent analysis of the qualitative data, the theme of COVID creating an opportunity to re-evaluate priorities adding to the attrition rate did emerge, as well as attrition in and of itself being a reason for attrition. This is discussed below.

Disconnect and Lack of Communication Between Senior Management and Frontline

Employees

Having established that the attrition problem in this company is primarily due to

two factors, a lack of management engagement with their employees and the desire for

growth opportunities, with compensation as an additional factor, the qualitative data were

further analyzed using this lens. The completely analyzed qualitative dataset is referred to

from here on as the consensus dataset. Here are the results of axial coding of the

qualitative dataset. Six major themes emerged, with two subthemes from the first theme

of disconnect between management and the frontline:

Table 6. Axial Coding of Qualitative Dataset

Theme #		Theme
1		Disconnect between management and frontline workers
	1a	Critical to have more/open channels for communication
	1b	Complication of parent company/subsidiary organizational structure
2		Compensation not sufficient given COVID-created business opportunities and cost-saving
3		With remote work some tasks take some longer, some tasks are more efficient
4		COVID forced a re-evaluation of work-life-balance priorities
5		Flexibility means better quality of life, outweighs the above negatives in remote work
6		Attrition is a feedback loop

Axial coding of qualitative dataset through the lens of determining root causes of attrition

The overarching theme that emerged from the first-pass and deeper analyses of

the qualitative dataset is a disconnect between management and frontline workers. This

theme surfaced again and again in 90% of the qualitative interviews, independent of

interviewee job function or level. All but one interviewee specifically mentioned the need

for better or more open communication, without prompting by the interviewer. Therefore, probing the dataset through the lens of connecting management disengagement to attrition reveals a pattern of employees consistently highlighting a lack of communication especially between senior leadership and frontline workers. See Table 11, Appendix 5. for full key to which personnel each quote is attributed. Selected examples from roles Sales Rep #1 (SR_1), Quality Assurance Personnel #1 (QA_1), Project Manager #1 (PM_1), Tech Support Scientist #2 (TS_2), Quality Assurance Personnel #2 (QA_2), and Sales Rep #2 (SR_2):

> SR_1: "Management is very out of touch with what's going on and how we're making these numbers. But also they don't really ask."

> QA_1: "They need to talk to the worker bees. People are not being heard and we're losing good quality people because we're not being heard."

> PM_1: "…if your team starts to feel that they're voicing their opinion but there is no action that happens in response, you start losing some credibility and some trust from your employees. "

> TS_2: "I think it's ok if people are told what to do. But what they should do is also ask people, 'what do you think about this?'"

> QA_2: "Upper management is the reason a lot of people leave. They're not a very communicative group."

> SR_2: "…we could suggest a lot of things, but it was held up by the politics of being part of a company, but also owned by another company…or it was not really recognized or implemented."

This last excerpt is from interviewee SR_2, a sales representative who left the company in between answering the quantitative survey (May, 2021) and the qualitative interview questions (October, 2021). Given the company's attrition problem, the fact that this interviewee had recently resigned to take an opportunity with a different company was interesting. One could assume this would be a disgruntled employee with harsh criticism to offer; on the contrary, they left with a positive view of management's handling of the pandemic response, more favorable than many other respondents, saying

> SR_2: "I'm leaving the company feeling thankful that given incredibly hard decisions they had to make quickly, keeping all the factors in mind, and still run a business that generates revenue…that's really hard."

But when asked what push factors might be contributing to the attrition rate in general, the response was the above-stated "…we could suggest a lot of things, but…it was not really recognized or implemented."

Communication and visibility are all the more important in the context of remote or hybrid work, in which case not physically being present needs to be compensated for by communication. This theme is exemplified in this quote from interview QA_2:

> QA_2: "It felt like management disappeared. And actually I was one of those, I was told that since I could be offsite I should. I did that for about three weeks, then I realized a change in my team. They weren't as cohesive as they normally are. I know my team really well. They weren't devolving, they weren't not getting their work done…I think they felt abandoned. I don' t know they would have framed it that way. But I know other teams have felt that. I don't think it's just me....but I think having a manager onsite made a difference. So as we were going into the fourth week I just came in. And I've been going in since. But we didn't see any upper management. Until the weekly communication meetings were implemented, we felt like we were on our own and not getting a lot of support from management."

Taken together these data confirm management's role in the attrition problem.

It is clear from the dataset that people value feeling heard by their leaders. It was noted by several respondents that even the perception of being heard would be a motivator, and have a positive effect on employee engagement.

TS_2: "If they just asked us what we think, I think that would be an incentive, even if they don't follow it in the end, I would feel like my role...like I have a more important role. "

QA_1: "I'd rather give some input and give my opinion, and have them weigh that, yay or nay, because sometimes management doesn't really know what's going on down in the trenches. And without that information how can they make an informed decision?"

PM_1: "When people come to you with concerns, at least have a kind ear. Even though maybe you're doing everything you should be doing, make people feel like you're taking care of them."

Also indicated by the qualitative data, barriers to open and honest communication would be surmounted with implementation of smaller group discussions, or circumnavigated completely by sending out anonymous surveys to elicit feedback:

RD_1: "…weekly forums were good, but maybe something more informal or a smaller platform, to make people feel more comfortable in speaking out. Or an anonymous system so people feel comfortable reaching out."

PM_1: "Take feedback from the teams, have pulse surveys, take a monthly check

or quarterly check as to how the teams are feeling. And don't just take a check,

actually act on it."

SR_1: "How do you talk about these challenges with your boss without sounding

like you're complaining. Roundtable discussion? Share what's really going on.

Maybe an anonymous survey…"

The weekly company-wide call that was scheduled for senior management to

communicate updates during the pandemic may have been necessary, but was not

sufficient for establishing open communication between management and the frontline.

As the pressure to deliver on revenue opportunities increased, frustration at the feeling of

a disconnect between management and the frontline rose. The solution to the problem is

management needs to solicit feedback from the frontline, ideally in the form of

anonymous surveys.

Communication Problem Exacerbated by Organizational Structure of Parent Company-
Subsidiary

Not only does the above excerpt from interview SR_2 "…we could suggest a lot

of things, but it was held up by the politics of being part of a company, but also owned by

another company" highlight the existence of the disconnect between management and

frontline employees. This quote is also an example of what emerged as a contributing

factor to the "disconnect" problem: the case study company was acquired by a publicly

traded parent company in 2018 and is therefore one division of a larger organization. In

modern business, companies with promising technology are commonly absorbed into

parent companies via mergers and acquisitions. Accordingly, company employees come under reporting structures of the parent company. It is to be expected that when a start-up is acquired by a parent company there would be an exodus of those who formerly held executive roles as, for example, there can only be one CEO. But this company was acquired in 2018. For there to be an exodus years later attributed to the acquisition was curious.

> TS_1: ""It seems like there are a lot of people leaving….is there something we don't know?" there should be more communication about this. And why. "Is it because as a start-up bought by another big company, are people feeling less secure? Or frustrated because they're having less of an impact in the bigger company?"

> OP_1: "You see a lot of legacy people leaving because of the shift from small company to high growth under a larger company."

Given mergers and acquisitions are a commonplace occurrence, this company's position as a subsidiary was pointed out again and again in the qualitative interviews as being problematic, and connecting back to the problem of disconnect/communication barriers and the attrition rate:

> SR_1: "Management has its own management. There is a lack of engagement by senior leadership in hearing from us. They are relying on the people in between to share what needs to be shared. (But that's not happening)."

> PM_1: "There's senior management, but then there's people managing the team itself that report into senior management. Don't just assume that they know what

they're doing. Don't just share amongst a few people on the team, counting on things to percolate throughout the team. Have explicitly clear directives for every level..."

TS_2: Regarding attrition rate, "Do they inquire as to why people leave? And do they offer an incentive not to leave? Or they can't, because their hands are tied, because we're not our own company anymore. Some decision-making power gets taken away from leadership when a parent company becomes involved. "

QA_1: "They're having upper management meetings, but they're getting feedback from managers who are not listening to their worker bees anyway, so what does higher management really know about what's going on? They're relying on their mid-management to tell them, but mid-management's not listening. I think [senior leadership] need[s] to start having some one-on-ones with people, say 'look you're not going to lose your job, but tell me the truth, what's going on down there'..."

TS_1: "Why is there more information coming from parent company than [our] division?"

SR_1: "We know the other divisions have gotten much higher increases at the annual increase. Our company not being provided that by [the parent company], why are they not treating us the same as the other divisions?"

In this case, the creation of layers of management in between employees and senior leadership appears to have created a dam in the flow of information. It follows that a free flow of information in both directions, from bottom to top and back again, without

dams at the interface of mid-management/senior leadership is key for making sure

employees can give feedback to management and management is able to act on that

feedback. The structure of parent company-subsidiary therefore partially explains the

reported disconnect between management and frontline workers, as well as partly

explaining a lack of communication.

Frontline Perception that Management Prioritized Profitability Over People

At the onset of the pandemic, senior leadership announced that there would be no

layoffs, no restructuring, and no furloughs for at least 3 – 4 months (internal

communication). At the time the announcement was made there was a nationwide spike

in unemployment as a direct result of the hit to business created by the necessity of

shelter-in-place orders (Amadeo, 2020). When asked for their impressions of how

management initially handled the response to the onset of the pandemic and shutdown,

some interviewees cited this announcement as an example of good handling of the

pandemic by management. However, employees were not as appreciative of this as might

be expected. No one interviewed mentioned feeling like this was an example of the

company investing in its employees. There was a range of responses to this commitment

by the company not to let people go:

> TS_3: "In general I felt good about it. They handled it maturely in a type of 'wait
>
> and see.' No initiation of furloughs, we'll see how we weather this and react I we
>
> have to."

> TS_2: "Adequate response given what we knew at the time. When it was clear
>
> [the shutdown] would last for several months, no layoffs felt reassuring and

comforting. In midst of hearing about other people not as lucky. Good to hear, but it was handled well because they never [made false promises], never said 'no layoffs ever.'"

PM_1: "I don't know how comforting I found that, because there was no guarantee after a certain amount of time."

The stronger association was that employees felt the company prioritized profitability over their people, which was de-motivating. Put another way, that an initial commitment in March 2020 to no layoffs/no restructuring gave way to feeling that management prioritized generating revenue than employee engagement. In fact, management did initiate a restructure of the company's salesforce later that year. In light of COVID-19 restrictions on travel and in-person meetings management restructured the inside sales representatives into roles that closely resemble an outside sales rep in everything but title.

QA_1: "They're protecting their assets of a company and division, we make money for them…it was probably more for the bottom line than the personnel. "

The quote from Sales Rep Interview 1(SR_1): "Management is very out of touch with what's going on and how we're making these numbers. But also they don't really ask" highlights both the disconnect as well as a lack of two-way, open communication between management and frontline workers that would solve the problem. The disconnect this person is referring to is how restructuring created additional burden on the salesforce, without any adjustment to target revenue goals. The result was a feeling that

profit was being prioritized over personnel. As this person elaborated, "Inside sales reps generate leads, outside sales reps go in and close the deal." SR_1 continued

> I can see why management did this, they were trying to create additional opportunity for revenue by creating additional reps that also generate their own leads and close their own deals. But restructuring has created a significant additional burden on the outside sales reps, on the people left behind, without any adjustment to their goals, by the way, given the [COVID-19 pandemic] situation. A 30% revenue increase goal, as if nothing had changed, when the whole world has shut down? Not a great management move.

This person concluded with "I physically can't keep up these hours. But you give me a goal I am going to try to attain it no matter how it breaks my back. It's my living to meet my goal."

This theme was highlighted as well in an interview with a scientist in the Research and Development department. While R&D is a separate business unit from the sales team, not reporting to the same managers, this person described the same scenario of their management driving hard seemingly without concern for welfare of frontline workers:

RD_1. "People wanted to get their work done. But maybe acknowledging that the work might take longer because now there's all these hoops to go through, we're in a completely different situation now. So the pace might not be the pace that it was before."

For instance, as discussed above this group was one that was now operating in split shifts, from 6am to 2pm and 2pm to 10pm. Yet

> RD_1 continued "[Management]…was antsy about getting data but not mindful of the fact that people collecting that data were going through all the precautions they can, to stay secure, while still getting the work done. The expectation sometimes was actually that it should be a more *accelerated* pace…The pressure, the quotas. Even if we'd met or exceeded the target, there's always the next target when the next month rolls

around... you're back to square one. And that's exciting for a period of time, but I don't know how sustainable that is. When it's, quarter over quarter, year over year..."

This RD_1 interviewee was one who left the company for another opportunity in between the quantitative survey (May 2021) and qualitative interview (October 2021).

A third interview revealed a similar situation in yet another business unit, a scientific team that runs projects as a service, like a contract research organization (CRO), for other academic or industry research laboratories. PM_1 described how "Focus became all about 'will the team be able to function, will the team be able to function'..." Management prioritized the targets the team needed to hit without asking any questions regarding how people were doing.

This person also left the company for another opportunity in between the quantitative survey (May 2021) and qualitative interview (October 2021).

Others:

RD_1: "A lot of biotech companies did a great job of pivoting, aligning, and stepping up to the business aspect of COVID, saw the opportunity in the market, all of that. It was great to be a part of a company that cared and was helping with the issue. But that should balance out with all the work employees were putting in, and the risks people were taking in still coming in--for instance the risk for people with families, kids, and still had to come in."

PM_1: "The focus became all about will the team be able to function, will the team be able to function… It shouldn't just be all about work, work work…there could be other activities. If someone offered hey let's do a [virtual] team happy

hour, whoever can join can join…. I understand revenue is important, but being

able to keep your team is important."

TS_3: Company didn't change timelines for any of projects, even given COVID.

So then people are having to work crazy split shifts so everyone can be in lab, this

is ridiculous, we're making money hand over fist, and they're not pushing back

our timelines at all?"

Management will necessarily make hard decisions that will not always be popular

with their frontline employees, and that includes decisions to push people to drive more

revenue. The theme that emerges from the qualitative dataset however is the impression

amongst frontline employees that management prioritized profit over the welfare of their

people.

Inadequate Compensation Given Extenuating Circumstances. Compensation was not

initially cited as a primary contributor to the company's attrition rate. Ultimately

however, the data indicate employees did not feel appreciated for their work in the

extreme circumstances of the pandemic, especially during a time when the company was

so profitable, and spending less. This theme emerged in questions related to

compensation. When asked if employees felt fairly compensated by the company, ("Do

you think the company reinvested in employees by paying out bonuses, giving salary

increases and promotions in fiscal year 2020-21?") The answer was a resounding No. Not

one single person pointed to the company's compensation, bonus, and promotion

structure as being incentivizing. At best,

TS_3: "We were still given bonuses and still given raises; other companies could

have pulled back and said 'no, we're going to keep all that money.' And they

didn't. Basically even though we had a COVID year, employees saw the same growth that they would have had it not been COVID."

TS_2: "Compensation was satisfactory, no more brilliant than previous year."

At worst,

SR_1: "NO. Management not fighting for us. We didn't even get a cost of living increase to match the national average…and [the top performing sales rep in the company] only got 0.5% more salary increase than everyone else."

Others:

QA_1: "No. Those things were in place prior to COVID, nothing extra was added. Could have been additional compensation [hazard pay] for those who continued to work onsite."

OP_1: "No. Clearly it wasn't enough because you had huge attrition. People probably waited to get their bonuses and then leave."

QA_2: ""No. Not at all. Not what we would consider fair as opposed to what they would consider fair. And the promotions? As far as what we see, the promotions hit a certain level of the company and do not trickle down. At least within our division."

A silver lining for the biotech industry was the opportunity to generate revenue as a direct result of the COVID-19 outbreak. This is apparent from the quantitative data on the company's financials as well as a theme that was reiterated in qualitative interviews. As several of the interviewees pointed out, not only did the company make more money,

"Biocorp" also experienced significant cost-savings due to the realities of the shutdown. For example, the evaporation of cost to the company of field travel. Examples include the outside sales representative and the field technical support scientist who highlighted that prior to the pandemic there would be significant travel cost (airline flights, taxis/Ubers, rental car cost, hotels, per diem) for every business trip taken. When this cost dropped to zero, as work was conducted via web conferencing instead, it bolstered the company's profit margin.

> SR_1: "They don't have any travel to pay for. The amount of money they normally budget for things like travel…that's nonexistent. And we're still making our goals. Use that money to benefit the people that are working so hard! I don't understand. I feel so disconnected from [the parent company]."

To see greater profits, less cost, but no favorable effect on compensation packages was de-motivating to employees of the case study company. The consensus dataset illustrates that given the profitability of the company, employees felt inadequately compensated, or not incentivized to stay. One interviewee mentioned that a biotechnology company they know of through their professional network gave a blanket 20% raise to all employees, across the board, when the company's management saw the increase in termed employees begin to rise. Increased compensation is not the only incentive that can be offered by biotechnology companies but is certainly a motivating factor.

COVID: Forced Opportunity for Employees to Reevaluate Their Priorities

COVID-19 was not initially cited by many as a driving force for attrition in the case study company. However, after answering questions regarding how the biotech workplace in general may change post-pandemic, the majority (60%) of interviewees determined that the shutdown caused by COVID-19 presented an opportunity for a 'wake-up call' to re-examine our priorities as a workforce.

> SR_1: "I feel like in the US, work-life balance is not prioritized. But this pandemic has opened people's eyes that there needs to be more of that. I'm sure there's going to be more openness than there was. It has everything to do with who's running each individual company."

> OP_1: "My team is engaged, we have our community, they have a vision, goals to work for, a lot of interaction whether we're in office or not. Re: attrition, people now have time to re-evaluate their jobs. They have time to step back in their personal space and say 'you know, initially this is great. I'm re-evaluating my life in general, how does my job fit into that? How do my career goals fit into this? Do I really want to go back to the office and do this job?"

> OP_1: "People who are in positions where they've lost their purpose, or they've lost their motivation, or they're not incentivized…those people are currently looking at their position. Fundamentally, I think the issue is employees being disengaged before COVID taking time to step back and go 'I'm at home in my comfortable space, do I really want to go back to the office? I don't think so.'"…"These people were doing the grind, and then they got to take a quiet, self-

reflective step back and go 'I'm going to use COVID and having to go back to the office as my out.'"

TS_2: "The whole pandemic thing has shaken us up. It's been an eye-opener on things, makes you think about things you're doing on a daily basis. Perhaps if people earlier said 'I wonder if I should change, I'm not sure…'and then the pandemic arrives and you realize who quickly life can change, or disappear, maybe they took an extra step and became a little more courageous and said 'ok, I always kind of wanted to try this new thing I'll do it. A lot of people may have woke up from what was earlier a normal, daily routine. We got a wake-up call from the pandemic."

TS_3: "A lot of other people who had been getting up and going to the lab every day might have really enjoyed not having to do that for six weeks, you know, and then they think 'maybe I want to switch to a, I don't know, product manager role, or whatever. Or get a job closer to my house."

The phrases 'wake-up call,' 'taking a step back,' 'eye-opening,' were all used with respect to the forced opportunity the COVID-19 shutdown presented for employees to re-evaluate their job satisfaction. Specifically the fact that a majority of the workforce abruptly found itself working from home was referenced as a possible reason for someone to resign from their current role. This would be especially true in cases where employee engagement scores are not as high as in the case study company. Added to other push/pull factors such as a desire for more career opportunity, frustration with management's lack of communication, the added pressures of delivering on revenue

goals without additional compensation, this re-examining of priorities could be the final determining factor in someone's decision to resign.

Attrition as a Feedback Loop

One final observation was that attrition can be self-propagating, because as people leave, the pressure on remaining employees left behind to step up and take on the work of those leaving becomes more intense. This in turn leads to frustration, stress, and the desire to explore other opportunities. Only one person identified attrition specifically as being a push factor, but 50% of qualitative interviewees made a reference to attrition itself as being a factor in the increase of people tendering resignations.

Hiring and training new employees takes months to years, whereas industry standard is to give two weeks' notice when leaving a job. If attrition leads to more attrition it is therefore important to get out in front of the problem. The case study company has a culture of encouraging upward mobility and promoting from within (private communication). This is a positive attribute of a company culture; however, there are cases where there is a need to hire from without. As one interview summed up:

TS_2: "They tried to replace the roles that we lost with people from within instead of hiring outside for more people. That's like trying to say you have 10 glasses, you broke 4, then trying to figure out what to do with the remaining 6 instead of buying 4 more. Things were not invested as much as they should have been."

The point this person was making is that in cases where there is a significant loss of talent, there is a real need to hire from without rather than promoting people who may not be prepared to take on the responsibilities of the vacated position above them.

Anecdotally, cross-training is one strategy employed by the Quality Assurance Manager to ensure continuity, in case of or to preempt attrition. An added benefit is cross-training gives a team a sense of solidarity, and confidence that should someone need time off or more flexibility, a team member can step in to cover for them, without detriment to productivity or performance of the team. At the time (October, 2021) this person reported no attrition in their team.

Metadata

A pool of 200 people were invited to participate in the Phase I quantitative survey. Within the sample a majority of job functions/departments is represented, with a relatively large proportion of the salesforce accounting for the sample size (see Appendix 5). The full sample size of who completed the quantitative survey in its entirety was 25, although 32 individuals initially began the survey and useful data was collected from 27 of these survey responses. Managers constituted one third of the survey respondents. In the manager subset of the sample, several reported 1-3 subordinates, one had 31-100 subordinates, the mode was to have 6-15 people reporting to them. Identifying data such as age, gender, years with the company and other demographic data were not collected. Data were analyzed according to Schaufeli, et. al. 2006; see Appendix 3. for full UWES dataset and statistics.

Of the sample who completed the initial survey designed to gather semi-quantitative data, 12 individuals consented to a second follow-up interview intended to gather more qualitative information. An important element of the grounded theory approach is that a saturation point be reached, the point at which new insight is forthcoming (Charmaz, 2006). With a relatively small sample of qualitative interviews

which were conducted (n=10), the speed at which saturation was reached indicates the strength of corroboration by employees as to the connection between attrition rate and management at this biotechnology company. See Appendix 4. for full initial coding that illustrates no new themes emerged in the last four interviews conducted.

Chapter IV.

Discussion: Implications for Biotech Management Best-Practices

This mixed methods case study analyzed a mid-sized biotechnology company management's success in navigating the COVID-19 crisis. Using grounded theory, based on quantitative and qualitative datasets generated from surveys and interviews conducted with workers in the case study biotechnology company, the following are key findings that have implications for the biotech industry at large**: remote work and flexible scheduling are desirable, and had no detriment to employee engagement or productivity. Attrition became a problem primarily due to a perceived disconnect by frontline employees between them and management, with lack of communication being a factor.**

These are the proposed best practices for biotechnology managers moving forward:

1. Solicit regular feedback from employees in the form of anonymous surveys and roundtable discussions

2. Flexible scheduling and remote work opportunities should be extended to all employees to the greatest extent possible

3. Onsite meetings should nonetheless be held regularly to maintain connection and collaboration company-wide

4. Leverage established tenets for success in the face of volatility: consistency in striving to meet aggressive goals without overextending the workforce and

5. Mitigate impact of possible attrition by cross-training, and developing talent pipeline (e.g. using professional external recruiters if necessary).

Establishing and Maintaining Open Lines of Communication Between Management and
the Frontline

In 90% of qualitative interviews the problem of a disconnect between management and frontline workers was highlighted. Lack of communication was specifically cited in 60% of interviews, with the theme of "management doesn't listen" emerging. This was determined to be the primary reason for the 140% increase in attrition between July 2020 and October 2021. See Results chapter for full details but two excerpts:

> QA_1: "They need to talk to the worker bees. People are not being heard and we're losing good quality people because we're not being heard."

> QA_2: "Upper management is the reason a lot of people leave. They're not a very communicative group."

Furthermore, the case study company is a subsidiary of a larger parent company. Mergers and acquisition (M&A) is a way for companies to drive inorganic and organic growth, as well as create synergies between technologies or product offerings. The challenge with M&A is this creates more layers of management in between senior leadership decision-makers and frontline workers. This was highlighted by 60% of qualitative interviewees as being a contributing factor to the disconnect between management and frontline.

Fortunately, the solution to the problem of management "not listening" is obvious and simple: "management needs to ask." Establishing regular anonymous surveys to solicit feedback and check in on frontline workers was suggested by 50% of the qualitative interviewees (completely independent of one another). Anonymous "pulse"

surveys would be a straightforward way of gathering feedback from frontline workers

without any respondents fearing for their jobs, as behind a curtain of anonymity people

would feel comfortable in providing honest feedback. Management would get visibility

on issues and be able to plan accordingly. Biannually, if not quarterly, anonymous

surveys would be the recommended cadence. A strong basis for such anonymous surveys

would be to leverage the UWES questionnaire, specifically the shortened UWES-9

(Schaufeli, 2006). Based on anonymous survey results, management could also institute

roundtable small group discussions with their teams, using the survey data as a jumping-

off point to raise any issues. There, in a small group setting, with issues already raised,

people would feel more comfortable in speaking up about challenges. Managers should

be soliciting one-on-one meetings with team members in any case. Especially in times of

upheaval such as the onset of the COVID-19 pandemic.

These same issues have plagued organizations for decades. This excerpt from an

article published in Harvard Business Review in 1974 precisely mirrors the challenges

faced in this case study company, including the parent-subsidiary levels of management:

> Upward communications are poor in most hierarchical organizations
> because perception downward is poorer than perception upward. Add to
> that the "filters" of management levels that dilute upward
> communications. As you go higher, the word gets more garbled, edited, or,
> even worse, eliminated entirely (Harriman, 1974).

The solution?

> Our upward communications program started with "private lines," which
> permit all employees to question or discuss anonymously any matter of
> concern, from corporate policies to personal job-related problems, with
> any responsible official in the company (Harriman, 1974).

The only difference is 47 years ago, the anonymous feedback would come in the form of mailed-in letters or landline phone calls, as opposed to the myriad of digital survey tools we have available today.

These data illustrate that management "not listening" but also "not asking" is a problem within the case study company, but this has implications for the broader biotechnology industry as well. The issue would be ameliorated if management were more engaged in communicating with frontline workers, whether via smaller forums or even more advantageously, anonymous surveys of employees.

A New Paradigm of Remote Work/Flexible Scheduling

The COVID-19 pandemic created a large-scale forced experiment in how giving employees autonomy over their work schedules would affect productivity and engagement. Those who were sent home to work remotely suddenly found themselves without a commute to an office, or the bounds of the normal American work week schedule of Monday through Friday, 9 am to 5 pm. In case study company Biocorp, no significant difference was observed in workplace engagement scores between remote employees and onsite employees (UWES mean score 4.396 and 4.336 respectively, t-test p-value=0.295). The fact that there was no detriment to engagement in remote employees, coupled with the excellent financial performance of the case study company (20-30% organic growth, 88% increase in valuation by investors) over the time period when 74% of its workforce was working remotely, indicates that a future of productive remote work is possible.

Through a thorough analysis of the realities of work in the time of COVID, the following themes emerged: work can take longer when a large percentage of the

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workforce is working from home. The work-life boundary dissolves, resulting in more hours overall worked. However, these drawbacks to remote work were far outweighed by the positive aspects, above all that having a flexible schedule creates a better work-life balance. While there may be more hours worked overall, there is no detriment to productivity, because on the other hand some tasks are more efficiently completed at home.

More Hours Worked, but More Efficiently, at Home

The fact that employees are working overall more hours when remote was evident from quantitative data, see Figure 3. Tasks taking longer to complete in a remote work situation was additionally highlighted by several interviewees in the qualitative dataset:

QA_2: "Because I'm onsite and other people are not, I can't get questions answered in 10min, it takes me 30 min to an hour to get an answer to a question…Things take so much longer."

SR_1: "Due to a lack of face-to-face time with customers, it takes longer to close deals. I have to work more, to get the same amount of output."

However, this theme came up over and over again: office work life is full of distractions, with watercooler breaks, hearing colleagues on phone calls, being interrupted while deep in train of thought, etc. It became clear that focused tasks may be completely more efficiently at home, plus employees were willing to work more hours for the sake of having flexibility.

An extreme example was the Operations Manager who described how not only on an individual personal level, their team as a whole has been significantly more productive since shelter-in-place orders moved the entire team to work from their homes, significantly more productive than they ever were when the team worked in-office. The time spent commuting to work evaporates when the "commute" turns into a commute from bedroom to living room, or kitchen to home office. In the case of the Operations Manager, time their team had spent commuting was converted into time spent working instead.

> OP_1: ""My team specifically is extremely efficient at home. The general consensus: we would all prefer not to commute, and have that flexibility. We agree that collaboration is very important. But we will be doing less when we're back in office. Full stop."

> PM_1: "lack of distraction in not having water fountain conversation, walking between conference rooms; Some days, depending on issue, work is more productive at home. Fewer distractions. Even pre-Covid, having one work from home day to catch up on paperwork for instance, made me more efficient."

> RD_1: "If there's something you can be more productive at home, like if you need a place to be able to really concentrate, sometimes the work environment is really distracting…depending on the type of work you're doing that particular day maybe one is more suitable than the other."

> SR_1: "Those of us who have been remote before, this was something we knew, that we could be very productive without someone walking in our office every

five minutes, interrupting our train of thought, you know, to have that focused

time [at home], was actually much more productive."

Further underscoring this point, those who continued to work onsite throughout

the course of pandemic noticed that

QA_2: "Having more people start to come back to the office is incredibly

distracting."

Flexibility is a Priority for Biotech Employees

The theme of flexibility in work schedule leading to a better quality of life was

specifically highlighted by 80% of those interviewed in the qualitative dataset. The

qualitative data indicate that people value flexibility in their work schedules to attend to

family or personal matters when necessary.

TS_3: "Flexibility is a positive. You're still working a lot of hours but you can do

it within certain hours that work for your family life."

Even those whose job functions require them to be onsite would prefer some

amount of flexibility wherever possible. Whereas prior to COVID, flexible scheduling

was seen as a perk, something that could be negotiated as an added benefit, the American

workforce is moving toward a paradigm where flex schedules are the norm.

PM_1: "Everyone has become accustomed to the fact that they can get work done

at home as well. And companies running with better operating margin."

OM_1: "It should be per team, based on your success rate and efficiency, a hybrid model. Everybody in three days per week, with two days at home. I think in the office five days a week, that's dead."

SR_1: "There will be more openness than before. Higher employee retention with more flexibility. We have proven that working from home has no detrimental effect on productivity…and better quality of life—it allows people to move to places they couldn't before."

TS_1: "the work landscape has changed. There is more internet…maybe COVID accelerated something that would have happened anyway, but it happened in two years instead of maybe 20 years. People moving to work more remotely now it is so possible."

TS_3: "COVID has proven to the world that adults can be productive even when they're not working in the building."

RD_1: "We probably never imagined having the option of working from home, but now that we've tasted the forbidden fruit so to speak, it will be hard to go back. Apple for instance built this massive campus, but employees don't want to go back. And I get it. Everyone wants that balance, and they want to be efficient. I think everyone was very efficient over the past year. So, listening to what works for people. Maybe not a completely remote role, because interaction is still important. But the option to choose."

This last excerpt from an interview with an R&D scientist, whose role does require onsite work the majority of time, ties everything together. Some tasks are more

suitable for completion at home, autonomously, isolated from distractions offered by the workplace. The biotech industry has now experienced a large-scale forced experiment in whether employees can be productive in a remote environment. The data clearly indicate a future of remote work is possible without negative impact on productivity.

When asked if they would consider working for a company in the future if that company had a rigid requirement for onsite work, for example the historical standard of requiring workers to be in office Monday through Friday from 9am to 5pm, not one single interviewee said they would consider it. See Table 7.

Table 7. Responses to Question of Remote Work in the Future

Role	In future, would you consider working for company with no flexibility? Yes/No
Sales Representative #1 (SR_1)	N
Technical Support Scientist #1 (TS_1)	N
Senior Project Manager #1 (PM_1)	N
Sales Representative #2 (SR_2)	N
Technical Support Scientist #2 (TS_2)	N
R&D Scientist #1 (RD_1)	N
QA Specialist #1 (QA_1)	N
Technical Support Scientist #3, Mgr (TS_3)	N
Operations, Mgr #1 (OP_1)	N
QA Specialist #2, Mgr (QA_2)	N

Respondents to the qualitative interview were asked if they would consider working for a company that provides no flexibility or option for remote work. n=0 respondents said they would consider this in future.

The desire for more remote work was shared by workers whose jobs necessitate an onsite presence because there are benefits to them as well. Specific benefits onsite

workers pointed to also included having fewer people around, less distraction, less time wasted, less traffic on the road.

Biotechnology companies are highly concentrated in specific locations around the country including Boston, and the San Francisco Bay area, followed by New York/New Jersey (Philippidis, 2021). These are urban centers, highly populous, with a high cost of living—all make the list of top 10 most expensive cities in the country (Dehan, 2021). This increases the percentage of people who must live further out from city centers, and commute into the area. Remote workers could move from high cost-of-living areas in the San Francisco Bay area (SF is #2 on both the list of most expensive cities in the US and top biotech clusters in the US (Dehan, 2021; Philippidis, 2021)) to further away, and enjoy a better cost of living. Remote workers could move close to family members, rather than having to move close to company headquarters. Especially in locations of high population density, traffic significantly impacts the morning commute to the office and the evening commute back home. Not to mention a reduction in commuters on the road would have a hugely positive impact on the environment. In the SF Bay area "during the first 6 weeks that the [shelter-in-place] orders were in place, traffic was down by about 45%. BEACON data show that total CO_2 emissions fell by about a quarter during that period compared with the previous 6 weeks (Bourzac, 2020)."

Not only does giving the workforce permission to work from home alleviate commuting time and traffic, and the opportunity for a better cost of living. It increases the talent pool from which a company may hire from. Work from home becomes "work from wherever" in the case of remote workers. Workers may be hired from other countries. One example of this was the sales representative who was living in another country,

while working for an American company. It was beneficial to the employee since the US Dollar was stronger than the currency in their home country, and beneficial to the company because it increases the pool of talent they may hire from. A company no longer needs to limit the hiring pool for talent to those who are live in the area; rather, the whole world opens as a possible talent pool. When it comes to compensating for attrition, being able to hire from a wider pool is an advantage. When it comes to hiring the best talent for such an innovative industry as biotechnology, being able to hire from a wider pool is crucial for success.

Most importantly, employees report a better quality of life when they have control over their work schedule. Many interviewees talked about having the newfound ability to pick children up from school thanks to working remotely; being able to take a break from work, run an errand, and return to work, rather than having to take time off; the ability to have a work-life balance.

The irony of this is how the remote work paradigm dissolves the physical and mental separation of work and home life. When the workday does not have clear start and end timepoints, but work can be done from wherever, it can be easy to continue work well outside of the standard 40 hours per week. This led to overall more hours being worked by employees since the start of the pandemic. The increase in hours worked per week could have additionally been due to pressure from management to meet aggressive revenue goals, and as attrition increased, the need to pick up slack for termed employees—but the qualitative dataset indicates the dissolution of work-life boundary was a primary factor. Nevertheless, the overwhelming consensus is biotech employees would rather have flexibility in remote work. When asked if they would consider working

for a company in the future if the company offered no option for flexibility in one's schedule, exactly zero respondents said 'yes.' (see Table 7).

Technological advancements in the last decade have enabled remote work in ways unimaginable in decades gone by. The advent of video conferencing systems (Zoom, Microsoft Teams, Webex, Skype, and others) make it possible to be "face to face" with coworkers, no matter where colleagues are physically situated. Email is a given. Chat apps allow for colleagues to converse in a slightly less formal manner (programs like Teams, Slack, etc.) or to have formal channels, files may be uploaded and shared via cloud-based programs (like Dropbox, Box, Egnyte), multiple parties can edit the same document via Microsoft's cloud-based Office suit, Google Docs/Sheets…the list of software programs that allow people to work together no matter how far apart they are goes on.

Even workers whose job responsibilities require onsite work could be allowed the opportunity for flexible schedules. For example, the standard American work week consists of 40 hours worked in 5 consecutive days. One can imagine alternative arrangements where an employee works 10 hours every day for 4 days instead; or works 80 hours total spread out over two weeks, but how those hours are distributed is up to the employee. Advances in software and technology apply in this context as well. Remote control over microscopes has been in development since the 1990s (James, Donald, & Somsak, 1996), (Maturo & al., 1997). Images from automated scanning microscopes are accessible remotely, with a user able to remote into a computer and share its screen.

Having demonstrated the capability to maintain productivity and meet goals within a framework of remote work, offering flexibility to biotech employees will be

imperative in the future. It should be noted that not every industry allows for this type of flexibility. But the biotechnology industry is uniquely poised to be able to adopt a new work paradigm, since the nature of the work for many job functions is goal- and task-oriented rather than requiring bodies to be in a particular place at a particular time. Biotech employees value flexibility to the point where they would not even consider working for a company that adheres to rigid requirements for an in-person workweek. Moving into the future, flexibility will be a requirement, rather than an incentive, to attract talent.

<div align="center">Regular Onsite Meetings</div>

There are downsides to remote work. One major drawback is missing in-person interaction with colleagues. 50% of respondents in the qualitative dataset specifically mentioned this was a negative attribute of a work-from-home paradigm.

> TS_2: "Some people may prefer to be always hermits at home. For me, work-from-home is great but there is an importance to having opportunity for interpersonal, in-person connection with colleagues."

Examples from the qualitative interview dataset of positive aspects of in-person work include benefitting from training together with other new hires, which forms a coalition of collective learning. As a young person just starting in a career, the opportunity to train and learn from more senior colleagues is lost in a fully remote paradigm. As opposed to email, in-person communication allows for context of body language—a nuance lost in text onscreen. The chance to get to know coworkers in casual in-person settings forming stronger bonds, and leading to better work relationships, was another benefit highlighted in the data. The feeling that management prioritized profit

over people would additionally be helped by placing value in employee appreciation-focused events that are not strictly tied to meeting revenue goals.

To capitalize on the benefits of remote work as detailed above, without losing all in-person interaction and the benefits therein, regular onsite meetings with activities should be scheduled. "Regular" means different things depending on company size and how globally employees are spread. For the case study company of approximately 250 employees in the US, a regular cadence would ideally be twice per year if not quarterly, to organize a company-wide, in-person meeting at company headquarters.

Set Aggressive Goals Without Overextending Employees

In times of uncertainty, the temptation is to push for everything one can get, because who can predict what the future holds? In times of opportunity, the temptation is to capitalize as much as possible, because who can predict how long it will last? During COVID-19 both uncertainty and opportunity collided for biotech companies. The qualitative dataset was full of examples of case study company Biocorp's management continuing to pressure for revenue, even once goals had been met or targets even exceeded, and how unsustainable that became for the frontline. One excerpt from Research & Development Scientist:

> RD_1 "[Management]…was antsy about getting data but not mindful of the fact that people collecting that data were going through all the precautions they can, to stay secure, while still getting the work done. The expectation sometimes was actually that it should be a more *accelerated* pace…The pressure, the quotas. Even if we'd made or exceeded the target… that's exciting for a period of time, but I don't know how sustainable that is."

For this person it was not sustainable, and they left for a new position in between answering the quantitative survey and giving the qualitative interview. The company

achieved record revenue and an 88% increase in price per share of company stock, but at the expense of a high and rising attrition rate. Another example was the Sales Representative who described the continued pressure even when revenue goals had been met. Management made no adjustment for how the shutdown would affect numbers in the financial year of 2020:

> SR_1: "I physically can't keep up these hours. But you give me a goal I am going to try to attain it no matter how it breaks my back. It's my living to meet my goal."

This evokes the work of Jim Collins, *Great by Choice.* This book was the conclusion of a nine-year inductive research project into companies who consistently achieved success and thrived despite chaos. A key tenet of the book is the concept of the '20-Mile March:' "a lower bound and an upper bound, a hurdle that you jump over and a ceiling that you will not rise above, the ambition to achieve and the self-control to hold back (Collins, 2011)." According to Collins' research, companies who thrive despite chaos are ones whose management makes the distinctive choice not to keep up constant pressure. This is not sustainable. The key is striving to achieve aggressive goals without continuing to push past them once the goals are met, only to exhaust the team. This is what allows companies to continue to be successful in chaotic uncertainty that is not possible to predict or control (Collins & Hansen, 2011). When targets are met, it is as important to rest as it was to push to reach said goal. This tenet was not observed by management in the current case study. Biotech managers need to remember this lesson learned the hard way by the case study company.

Get Out Ahead of Attrition

Once attrition becomes a real problem it can have a domino effect. In 50% of qualitative interviews, attrition itself was referenced as a reason for attrition. As people leave, the pressure on remaining employees left behind to step up and take on the work of those leaving becomes more intense. This in turn leads to frustration, stress, and the desire to explore other opportunities. The psychology of seeing people leave en masse may make one feel left behind, wondering "what don't I know? Why is everyone jumping ship?" This intuition is backed by scientific research into this phenomenon. Researchers coined the term "turnover contagion" in 2009—where the decision to leave a job may be influenced by colleagues doing the same (Felps et al., 2009).

Ideally attrition should be prevented but once a rise in attrition is detected, managers should reassure employees, consider offering additional incentives. Above all, management needs to get out ahead of the problem. Preemptively establishing a talent pipeline through networking, employee referral programs, or leveraging recruiters are all valid strategies.

Promoting from within and offering mobility within an organization are excellent attributes. But when necessary it is important to invest in hiring qualified external candidates. Otherwise, it stressed the organizational capacity to handle the workload, and leads to the impression that management thinks it is possible to do more with less.

Hiring and training new employees takes months to years, whereas industry standard is to give two weeks' notice when leaving a job. To navigate the interim between loss of an employee and onboarding of the new hire without losing more team members, cross-training is key. Less stress is placed on a team when there is redundancy

in tasks and capabilities amongst its members. Furthermore, cross-training can foster better solidarity and workplace engagement as well as prevent any loss of productivity in case a team member takes time off or moves on. A microcosm of this was highlighted by the Quality Assurance Manager who has seen no attrition in their team partly because this manager makes sure team members are all cross-trained and can fill in for one another when necessary. It has fostered a sense of camaraderie in the team, allowed team members to cover for each other in case of emergencies, and in case of attrition, the loss of any one person can be compensated for by all remaining team members while a new hire is secured.

Lastly, research may show that monetary incentives are not as motivating as autonomy when it comes to abstract tasks (Pink, 2009). But if HR is stingy with competitive salaries and benefits packages it will be hard to retain people and even harder to attract new talent especially in times where the job market is hot. One respondent knew a biotech company who offered a 20% raise across the board to retain its workforce. While this may be an extreme measure, not feeling fairly compensated was a theme that emerged in the qualitative dataset with 60% of respondents feeling undercompensated given the extenuating circumstances of the COVID-19 workplace.

Chapter V.

Conclusion

The case study company used for this mixed-methods research thesis is a small-to-mid-sized biotechnology company, "Biocorp," that makes products and reagents used by the biomedical industry. Biocorp navigated the COVID-19 crisis successfully given the company's performance in three metrics: 1) zero cases of COVID-19 transmission onsite 2) excellent financial performance (88% increase in price per share of company stock) and 3) high levels of employee engagement. The first measure indicates how well the workforce was protected from exposure to the virus while at work, and the second, how well the business was protected from the economic impact of the COVID-19 induced shutdowns and shelter-in-place orders. The third was used to further assess how well management responded to the COVID-19 crisis.

The quantitative dataset proves that employees can be trusted to conduct themselves professionally, whether working onsite or working remotely. The level of workplace engagement in this biotech company has parity in both onsite and remote groups, is high, and workplace engagement is positively correlated with productivity. To some managers, it will seem counterintuitive that workers can be productive without a manager controlling how employees conduct their work. Biocorp's record-breaking financial peformance (20-30% organic growth, and an 88% increase in valuation by investors) during a timeframe when 75% of employees were working remotely clearly indicates that allowing employees flexibility and autonomy over their schedules has no detrimental effect on productivity.

Strikingly, however, data on the company's attrition rate showed a 140% increase in attrition from July 2020 to October 2021.

As a direct result of the 2020 pandemic, industries including travel, entertainment, and shipping were forced to roll out significant layoffs or restructuring. For instance, United Airlines furloughed a third of its pilots, and expected to issue layoff notices to minimum 30% of its administrative staff in the fall of 2020 due to a sharp drop in demand, due to COVID-19 -caused travel restrictions (Borden, Akhtar, Hadden, & Bose, 2020). In contrast, the biotechnology industry saw increased demand for their products and services. Why then the increase in workers leaving jobs voluntarily, evidenced by the significant increase in attrition in case study company Biocorp?

One thing is clear: the rise in attrition observed within the case study company, and by extension the American workforce as a whole, cannot be fully explained by burnout. Much of the media reporting around the so-called "Great Resignation" of 2020-21, the term coined to describe the rise in worker resignations across industries in the USA since the onset of COVID-19, has focused on the explanation that American workers are resigning in large numbers due to burnout (Ducharme, 2021). However, workplace engagement is negatively correlated with burnout (Schaufeli, 2006). Employees in the biotechnology company surveyed for this dataset have a high level of engagement, which indicates that employees in this biotech company are not burnt out. Yet they are still resigning in increasing numbers.

The data indicate that attrition was accelerated by a perception of major disconnect between frontline employees and their leadership. 90% of qualitative interview respondents reported that management "is not engaged with or not listening to"

frontline workers as precipitating attrition. A lack of communication is partly to blame. The organizational structure of parent company-subsidiary company is a contributing factor.

Taken together this case study offers the following lessons in best practices for biotechnology managers, not only in times of volatility, but as the American workforce moves into a new work paradigm: solicit regular feedback from employees in the form of anonymous surveys and roundtable discussions, flexible scheduling and remote work opportunities are the way of the future, onsite meetings should nonetheless be held regularly, striving to meet aggressive goals without overextending the workforce and lastly, get out ahead of possible attrition to avoid turnover contagion, by cross-training, and developing a talent pipeline**.**

Interestingly, in the 2009 paper where researchers coined the term "turnover contagion" they discuss how "both perceived supervisor support and perceived organizational support have been demonstrated to positively predict levels of on-the-job embeddedness and reduced voluntary turnover. Other suggestions include developing schedules that fit employee needs… (Felps et al., 2009)". This thesis further strengthens the position that management engagement plus flexible scheduling should be viewed as antidote to attrition, specifically in the biotechnology industry.

This was a relatively small case study in a small- to mid-sized biotechnology company. Further research with a larger sample size across multiple companies of varying size will reveal additional insight. Future research into the specifics of how best to enable remote work in the biotech industry will be forthcoming as we move out of the forced experiment in work-from-home as initiated by the onset of the COVID-19

pandemic. The increase in employees leaving jobs is not unique to the biotechnology industry. On the contrary; data from the Bureau of Labor Statistics show over 15 million people quit jobs in between April 2021 and October 2021 (Carucci, 2021). But particularly given the COVID-19 business prospects for biotechnology, the biotech job market is hot and people are moving for new opportunities. Since biotech managers are in the business of innovation, the biotech industry is uniquely capable of rising to meet the challenges of the emerging new work paradigm.

Appendix 1.

Quantitative Survey

IRB21-0011

Instruction **Thank you for being a survey participant!**
This survey is three parts (A, B, and C) and should take about 10-15 minutes of your time.

Part A The following questions are about your role in the biotech company where you work.

Q1 Choose the category that best describes your job:

○ Office personnel (Marketing, Administration, Finance, etc.) (1)

○ Laboratory personnel (2)

○ Sales Representative/Account Manager (3)

○ Technical Support (4)

○ Manufacturing personnel (5)

○ Shipping personnel (6)

○ Executive (CSO, CMO, CEO, CFO) (7)

○ Other (type category here): (8) _____

Q2 What is your job title? (Type below):

_____

Q3 Are you a manager?

○ Yes (1)

○ No (2)

Q3A How many people report to you?

○ 1 - 5 (1)

○ 6 - 15 (2)

○ 16 - 30 (3)

○ 31 - 100 (4)

○ 101 - 500 (5)

○ more than 500 (6)

Q4 Think back to last year, January - February of 2020. How has your job changed since then?

○ I spend more time working from home now (1)

○ I spend less time working from home now (2)

○ I currently spend the same amount of time working from home (3)

Q5

○ My work travel has increased since then (1)

○ My work travel has decreased since then (2)

○ I currently travel the same amount for work (3)

Q6

○ I work more hours overall (1)

○ I work fewer hours overall (2)

○ No change in number of hours I work overall (3)

Q7 Are you currently an at-home, or remote, worker?

○ Yes, I'm currently a remote employee, or working from home (1)

○ No, I mostly work in an office, in a lab, or in an onsite facility (e.g. shipping, manufacturing) (2)

Q8 Were you also an at-home or remote employee last year, in Jan - Feb of 2020?

○ Yes I am remote now, and I was remote last year before COVID as well (1)

○ No, I mostly worked in an office, lab, or onsite facility before COVID (2)

Q9 Think back to Jan - Feb of 2020. How has your workplace changed since last year?
(Select all that apply)

☐ There are limits on the max number of people allowed in rooms/lab at my workplace (1)

☐ There are staggered shifts for people working in my workplace (2)

☐ There are physical dividers (e.g. made of plexiglass) in my workplace (3)

☐ We are required to wear masks at my workplace (4)

☐ More people are working from home (5)

☐ There are temperature screenings at the entrance (6)

☐ I have to sign in/sign out when I arrive and leave (7)

☐ No change since last year (8)

☐ COVID tests are administered on a regular basis to employees (9)

Q10 Are COVID tests administered or made available to company employees on a regular basis?

○ Yes (1)

○ No (2)

○ If necessary they are made available (3)

End of Block: Part A

Start of Block: Part B

Instruction **Part B** The following statements are about your company. Please read carefully, some questions will allow multiple choices to be selected

---

Q11 What is the best way to measure a company's success? (The Economist Intelligence Unit Ltd, 2010)

○ Employee satisfaction (1)

○ Customer satisfaction (2)

○ Innovation and development of new products/technologies (3)

○ Avoid company layoffs/restructuring (4)

○ Revenue growth (5)

○ Acquisition of new companies (6)

○ Stock price (7)

○ Brand name recognition (8)

Q12 To you, what is most important in your company's response to the COVID-19 crisis? (The Economist Intelligence Unit Ltd, 2010)

○ Keep research/science moving forward (1)

○ Developing new products – innovation (2)

○ Cut costs/overhead (3)

○ Increase revenue (4)

○ Avoid layoffs/restructuring (5)

○ Employee safety (6)

Q13 Which method of communication is better:

○ Keep me informed even if no new updates. I'd rather join a conference call to hear "no news" than hear nothing either way. (1)

○ Update me only when there's something I need to know. I have too much going on to join a conference call just to hear "no news." (2)

Q14 As a manager, what source(s) of information did you most rely on to make policy decisions for your employees regarding COVID? (select all that apply)

☐ CDC guidelines (1)
☐ Gut instinct (2)
☐ Polling of company employees/data gathered internally (3)
☐ My company's leadership (e.g. CEO) (4)
☐ My subordinates in the company (5)
☐ Personal network of other business officials outside my company (6)
☐ State and local guidelines (e.g. California) (7)
☐ Guidelines per location of the company's HQ (e.g. Minnesota) (8)
☐ President Donald J. Trump (9)
☐ Vice President Mike Pence, leader of the Coronavirus Task Force (10)
☐ Dr. Anthony Fauci (11)
☐ American news media outlets (12)
☐ International news media outlets (13)
☐ Social media outlets (Facebook, Twitter, Instagram, etc.) (14)
☐ Not a manager, I don't have decision-making power that affects others in my company. (15)

Q15 How do you believe the company's hiring landscape has changed in response to COVID-19? (The Economist Intelligence Unit Ltd, 2010)

○ Scientists will stay where they are (1)

○ Scientists are more likely to look elsewhere for jobs (2)

○ Scientists will prefer to move to remote work rather than go to lab (3)

○ Scientists are moving/will move from small to larger companies (4)

○ Scientists are moving/will move from larger to smaller companies (5)

Q16 Which of the following strategies will be the most important in securing the company's future success? (select up to 3) (The Economist Intelligence Unit Ltd, 2010)

☐ Developing a robust R&D pipeline (1)

☐ Forming alliances/partnerships with other pharma/biotech/medical device firms (2)

☐ Developing a closer relationship with our customers (3)

☐ Acquiring strategic business (M&A) (4)

☐ Recruiting and retaining top-tier managers and scientists (5)

☐ Fueling growth of core business with more products and price increases (6)

☐ Streamlining and shortening commercialization process (7)

☐ Cutting operational costs (the bottom line!) (8)

☐ Improving company's ethical and financial reputation (9)

Q17 Please read the following statements carefully. Indicate the relative importance of the statements by dragging them into rank-order of importance from top, MOST important (1) down to bottom, LEAST important (6) (The Economist Intelligence Unit Ltd, 2010)

_____ I care most that my company is in a good financial place (1)
_____ I care most that the company invests in its employees, in paying bonuses and giving salary increases (2)
_____ I care most that management clearly communicates its decisions (3)
_____ I care most about innovation in R&D (4)
_____ I care most about being consulted by management during their decision-making process (5)
_____ I care most that my company avoids layoffs/restructuring (6)

End of Block: Part B

Start of Block: Part C

Instruction
You're almost done. Thank you! The last section **Part C** is about how you feel at work.

Please read each statement carefully and decide if you ever feel this way about your job. If you have never had this feeling, select "0" (zero) in the space after the statement. If you have this feeling, indicate how often by selecting the number (from 1 to 6) that best describes how frequently you feel that way. (Schaufeli, 2004)

Q18 If you never have this feeling, select "0" (zero) in the space after the statement. If you have this feeling, indicate how often by selecting the number (from 1 to 6) that best describes how frequently you feel that way. (Schaufeli, 2004)

	(0) Never (1)	Almost Never (1) A few times a year or less (2)	Rarely (2) Once a month or less (3)	Sometimes (3) A few times a month (4)	Often (4) Once a week (5)	Very Often (5) A few times a week (6)	Always (6) Every day (7)
At my work, I feel bursting with energy (1)	○	○	○	○	○	○	○
I find the work that I do full of meaning and purpose (2)	○	○	○	○	○	○	○
Time flies when I am working (3)	○	○	○	○	○	○	○
At my job I feel strong and vigorous (4)	○	○	○	○	○	○	○

Q19 If you never have this feeling, select "0" (zero) in the space after the statement. If you have this feeling, indicate how often by selecting the number (from 1 to 6) that best describes how frequently you feel that way. (Schaufeli, 2004)

	(0) Never (1)	Almost Never (1) A few times a year or less (2)	Rarely (2) Once a month or less (3)	Sometimes (3) A few times a month (4)	Often (4) Once a week (5)	Very Often (5) A few times a week (6)	Always (6) Every day (7)
I am enthusiastic about my job (1)	○	○	○	○	○	○	○
When I am working, I forget everything else around me (2)	○	○	○	○	○	○	○
My job inspires me (3)	○	○	○	○	○	○	○
When I get up in the morning I feel like going to work (4)	○	○	○	○	○	○	○

Q20 If you never have this feeling, select "0" (zero) in the space after the statement. If you have this feeling, indicate how often by selecting the number (from 1 to 6) that best describes how frequently you feel that way. (Schaufeli, 2004)

	(0) Never (1)	Almost Never (1) A few times a year or less (2)	Rarely (2) Once a month or less (3)	Sometimes (3) A few times a month (4)	Often (4) Once a week (5)	Very Often (5) A few times a week (6)	Always (6) Every day (7)
I feel happy when I am working intensely (1)	○	○	○	○	○	○	○
I am proud of the work that I do (2)	○	○	○	○	○	○	○
I am immersed in my work (3)	○	○	○	○	○	○	○
I can continue working for very long periods at a time (4)	○	○	○	○	○	○	○

Q21 If you never have this feeling, select "0" (zero) in the space after the statement. If you have this feeling, indicate how often by selecting the number (from 1 to 6) that best describes how frequently you feel that way. (Schaufeli, 2004)

	(0) Never (1)	Almost Never (1) A few times a year or less (2)	Rarely (2) Once a month or less (3)	Sometimes (3) A few times a month (4)	Often (4) Once a week (5)	Very Often (5) A few times a week (6)	Always (6) Every day (7)
To me, my job is challenging (1)	○	○	○	○	○	○	○
I get carried away when I am working (2)	○	○	○	○	○	○	○
At my job, I am very resilient, mentally (3)	○	○	○	○	○	○	○
It is difficult to detach myself from my job (4)	○	○	○	○	○	○	○
At my work I always persevere, even when things do not go well (5)	○	○	○	○	○	○	○

Q22 Thank you for your answers!
Can I contact you for a follow-up survey? I am the only one who will see your contact info, no identifying information will ever be disclosed.

○ Sure! By selecting this option I'll enter my contact info in the Next screen. (1)

○ No, but I agree to submit this anonymous survey by clicking the Next button. (2)

Display This Question:

    If Q22 = 1

Q23 Thank you! Please add your name, email, and phone below so I may reach out about a follow-up questionnaire. You may or may not receive a request for a follow-up. Regardless, no identifying information will ever be released.

Then hit Next to submit this survey.

○ Name (1) _____

○ Email (2) _____

○ Phone (3) _____

End of Block: Part C

Appendix 2.

Qualitative Interview Question Template

Consent script to participate and record Phase II interview:

"Thank you for participating. This study has been approved by Harvard's Institutional Review Board (IRB). You will not receive any immediate benefit from participating, this study is not compensated. You may stop the interview and quit at any time. We can come back to it to complete it later if you wish. The completed master's thesis will be accessible through Harvard's library catalog. However, all information will be completely de-identified. No one but me will know whether or if you participated. This should take about 30min to complete. Do I have your consent to participate?

[respondent answers Yes → proceed]

I'd like to record the audio for my note-taking purposes. Recordings will be destroyed following the completion of the final draft of the thesis and no identifying information will be attached to anything we discuss today. If no, I take notes. Do I have your consent to record the audio?"

[respondent answers Yes → record]

Something to keep in mind throughout course of this interview: Definition of Workplace Engagement: 1) extent of employees commitment to helping organization achieve its goals 2) the level of enthusiasm and dedication an employee feels toward his or her job 3) the extent to which employees feel passionate about their jobs, are committed to the organization, and put discretionary effort into their work.

For codifying data

1. What is your current role?
2. How long have you been in this role?
3. Y/N Were you working in this role in May of this year (quant survey administered in May 2021)
4. Are you a manager of any direct reports?

Prior to the onset of COVID-19 – think back to last year, Jan – Feb of 2020

5. Were you working onsite (either in an office or in a lab) pre-pandemic, say February of 2020?
6. How many hours per week did you work prior to the pandemic / over what time frame? (M-F?)

As of now (October 2021)

7. Y/N Are you working on site now in a lab or office?
8. How many hours per week are you working now? And over what time frame? (M-F?)
9. Talk about the challenges/negatives in working from home/continuing to go to campus
10. Talk about the benefits/positives of working from home/continuing to go to campus
11. Do you recall your initial impressions of how company management's handling of pandemic response was, in March 2020? What were the organizational goals as stated by CEO, or GM at the onset of the pandemic?
    a. do they remember in March, CEO stated that there would be no layoffs, no furloughs, and no restructuring for 4 months, until July 2021.

12. How did that affect your level of engagement? did that make an impression?
13. What were you looking for in your leadership, decisive decision-making…? Prioritization of employee safety? Keeping the business going?
14. Did you feel like you were incorporated in the decision making process?
15. Yes/No do you care either way?
16. When the company reported record revenue and profitability numbers one year later, How did that make you feel?
17. The company placed an emphasis on paying out bonuses, giving raises and promotions. Did you feel impacted by that? (pos/neg?)
18. Your perception of how much management is currently investing in its employees? And what does that mean for you, "investing?"
19. What is motivating to you, in your current role?
    a. give examples if necessary: customer satisfaction? The paycheck? The contribution to science?

Attrition

20. One of the questions on the survey you answered back in May, 2021, was " How do you believe the company's hiring landscape has changed in response to COVID-19?" a majority of survey respondents picked "Scientists are more likely to look elsewhere for jobs" Why do you think this is? Do you agree/disagree?
21. Did you consider changing jobs during the timeframe between March 2020, onset of pandemic and May of 2021? If so, why? If not, why not?
22. What are you not getting right now that you wish you were? (What are pushes to jump)
23. If you looked for a new job or were approached about a new job, what could the new opportunity offer you that you aren't currently getting? (What are incentives—pulls—to jump)

Remote work in future

24. The CEO gave this statement regarding the future of working from home/bringing people back to site: " we are a company that values bringing people physically together onsite to learn and collaborate with one another." How do you feel about stated desire of company CEO to avoid remote work as much as possible in the future? Is that decentivizing?
25. Would you consider working for a company that offers no option to work from home part-time in future or flexible scheduling?
26. If you could give senior leadership advice, how would you suggest improving workplace engagement? (How would you suggest mitigating the attrition rate)

Thanks for participating!

Appendix 3.

UWES Data

	VI1	DE1	AB1	VI2	DE2	AB2	DE3	VI3	AB3	DE4	AB4	VI4	DE5	AB5	VI5	AB6	VI6		
	Q18_1	Q18_2	Q18_3	Q18_4	Q19_1	Q19_2	Q19_3	Q19_4	Q20_1	Q20_2	Q20_3	Q20_4	Q21_1	Q21_2	Q21_3	Q21_4	Q21_5	Q22	Q23_1
	At my work, I feel bursting with energy	I find the work that I do full of meaning and purpose	Time flies when I am working	At my job I feel strong and vigorous	I am enthusiastic about my job	When I am working, I forget everything else around me	My job inspires me	When I get up in the morning I feel like going to work	I feel happy when I am working intensely	I am proud of the work that I do	I am immersed in my work	I can continue working for very long periods at a time	To me, my job is challenging	I get carried away when I am working	At my job, I am very resilient, mentally	It is difficult to detach myself from my job	At my work I always persevere, even when things do not go well	follow-up candidate	qual code
1	5	6	5	5	6	4	5	5	4	6	4	5	4	4	4	2	3	1	N/A
2	2	4	4	3	3	4	3	1	1	5	4	2	6	4	3	4	3	0	
3	2	2	4	2	1	3	0	0	1	6	5	5	4	4	5	0	3	1	QA_1
4	6	6	6	5	6	6	6	5	5	6	6	6	5	3	6	3	6	1	OM_1
5	3	3	6	3	3	4	3	2	5	5	4	4	2	5	5	4	6	1	QA_2
6	5	6	6	5	5	5	5	5	5	5	5	5	4	3	5	5	5	1	SR_2
7	1	3	3	3	2	3	1	3	3	3	3	3	3	1	3	4	5	0	
8	3	2	6	4	4	2	3	0	4	5	3	2	4	3	4	2	6	0	
9	2	3	5	3	3	3	2	2	3	4	5	4	5	4	3	3	4	0	
10	3	4	5	4	4	5	4	4	3	6	6	5	5	4	4	5	5	1	N/A
11	4	4	5	3	4	3	4	5	3	4	4	4	3	3	3	2	3	1	TS_2
12	5	5	6	5	5	5	5	5	4	5	5	5	5	4	4	6	5	1	RD_1

13																			
14																			
15	3	4	6	5	4	4	4	5	5	5	5	5	5	2	4	5	5	1	TS_3
16	3	3	3	3	3	3	3	3	4	4	3	5	4	4	4	3	5	0	
17	5	6	6	5	6	6	6	6	6	6	6	6	6	3	5	5	6		
18																			
19	6	2	6	3	2	6	3	2	4	3	6	6	4	6	5	6	6	0	
20	5	6	6	6	6	5	6	6	6	6	6	6	5	6	5	0	5	0	
21	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	0	
22	5	5	6	6	5	4	5	5	5	5	6	5	3	5	4	4	5	0	
23																			
24	3	3	5	2	4	1	4	4	5	3	5	5	4	5	4	4	4	0	
25	4	6	6	4	5	4	5	5	5	5	5	6	5	5	5	6	5	0	
26	5	6	6	6	5	5	6	6	4	6	5	4	6	4	5	5	5	0	
27	6	6	6	4	5	6	4	4	1	5	6	6	6	6	6	6	5	1	SR_1
28	3	5	4	4	4	5	5	4	5	5	5	5	6	3	5	5	5	1	TS_1
29																			
30																			
31	3	4	3	3	4	3	4	4											
32	3	2	3	2	3	2	3	3	6	5	3	5	3	3	4	3	4	1	PM_1
total sum	*101*	*112*	*133*	*104*	*108*	*107*	*105*	*100*	*103*	*124*	*121*	*120*	*113*	*100*	*111*	*98*	*120*		
mean	*3.88*	*4.31*	*5.12*	*4*	*4.15*	*4.12*	*4.04*	*3.85*	*4.12*	*4.96*	*4.84*	*4.8*	*4.52*	*4*	*4.44*	*3.92*	*4.8*		
#	**26**	**26**	**26**	**26**	**26**	**26**	**26**	**26**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**		

Table 8. Statistics of UWES Dataset

	UWES-17 Question	Min	Max	Mean	Std Deviation	Variance	Count
1	At my work, I feel bursting with energy	2	7	4.88	1.42	2.03	26
2	I find the work that I do full of meaning and purpose	3	7	5.31	1.49	2.21	26
3	Time flies when I am working	4	7	6.12	1.12	1.26	26
4	At my job I feel strong and vigorous	3	7	5	1.27	1.62	26
5	I am enthusiastic about my job	2	7	5.15	1.35	1.82	26
6	When I am working, I forget everything else around me	2	7	5.12	1.37	1.87	26
7	My job inspires me	1	7	5.04	1.53	2.34	26
8	When I get up in the morning I feel like going to work	1	7	4.85	1.75	3.05	26
9	I feel happy when I am working intensely	2	7	5.12	1.48	2.19	25
10	I am proud of the work that I do	4	7	5.96	0.96	0.92	25
11	I am immersed in my work	4	7	5.84	1.05	1.09	25
12	I can continue working for very long periods at a time	3	7	5.8	1.13	1.28	25
13	To me, my job is challenging	3	7	5.52	1.14	1.29	25
14	I get carried away when I am working	2	7	5	1.26	1.6	25
15	At my job, I am very resilient, mentally	4	7	5.44	0.9	0.81	25
16	It is difficult to detach myself from my job	1	7	4.92	1.72	2.95	25
17	At my work I always persevere, even when things do not go well	4	7	5.8	0.98	0.96	25

Statistics of UWES data aggregated from all responses. Min 1, Max 7.

Table 9. UWES scores of sample subsets for statistical analysis

	Absorption	Dedication	Vigor	**Aggregate WE**
WFH	4.3	4.41	4.3	**4.34**
OS	4.52	4.37	4.3	**4.4**
WFH/WFH	4.35	4.23	4.35	**4.31**
WFH/OS	4.19	4.8	4.19	**4.4**
Manager	4.57	4.71	4.63	**4.64**
Non Manager	4.25	4.24	4.13	**4.2**

UWES data used in statistical analysis within subgroups of interest. WFH: employees currently working from home, OS: employees working onsite, WFH/WFH: employees of the WFH group who worked from home pre-pandemic as well, WFH/OS: employees of WFH group who worked onsite pre-pandemic, Manager: personnel who manage at least one direct report, Non Manager, no direct reports.

Qualitative Data

	Initial Coding	1	2	3	4	5	6	7	8	9	10	Score
A	Disconnect b/n mgmt. and frontline	1	1	1	1	1		1		1	1	8
B	Benefit of WFH= focus	1		1		1	1			1		5
C	WFH=better QOL (flex)	1	1		1	1	1	1	1	1		8
D	Reduced op cost – better bottom line	1		1		1						3
E	Mgmt not listening	1	1	1	1			1			1	6
F	Mgmt not asking	1		1		1		1				4
G	Anon survey	1		1		1	1	1				5
H	Wfh=wfw	1	1		1					1	1	5
I	Wfh=blur boundaries b/n work/life	1				1	1		1	1		5
J	Need for more/open comms	1	1	1	1	1	1	1	1		1	9
K	COVID->forced re-eval for priorities /WLB	1	1			1			1	1	1	6
L	Lack of F2F = work takes longer	1		1							1	3
M	COVID -> Business opp	1	1		1	1	1					5
N	Compensation not fair	1		1				1	1	1	1	6
O	Parent vs local co	1	1		1			1		1	1	6
P	Priority of profit over ppl	1		1				1	1		1	5
Q	Revenue not sustainable w/o adjustment for situation	1	1	1			1					4
R	Attrition = feedback loop		1			1	1			1	1	5
S	No impact on productivity			1		1		1	1	1		5
T	WFH things may get lost in translation (xtra important for clear comms)			1								1
U	Importance of giving ppl purpose			1						1	1	3
V	Miss comradery/interpersonal cxn				1	1	1			1	1	5
W	Harder to train in new role remote				1		1					2
X	WFH=less ppl onsite, better for onsite workers						1				1	2

Table 10 of initial coding of themes (A-X) to emerge in qualitative dataset in order of their surfacing in interview (1st through 10th) to illustrate data saturation point. As shown, data reached saturation after 6th qual interview—see row X; last time a new theme emerged in an interview, which was 6th interview. Content of subsequent four

	Initial Coding'	1	2	3	4	5	6	7	8	9	10	Score
J	Need for more/open comms	1	1	1	1	1	1	1	1		1	9
A	Disconnect b/n mgmt. and frontline	1	1	1	1	1		1		1	1	8
C	WFH=better QOL (flex)	1	1		1	1	1	1	1	1		8
E	Mgmt not listening	1	1	1	1			1			1	6
K	COVID->forced re-eval for priorities /WLB	1	1			1			1	1	1	6
N	Compensation not fair	1		1				1	1	1	1	6
O	Parent vs local co	1	1		1			1		1	1	6
B	Benefit of WFH= focus	1		1		1	1			1		5
G	Anon survey	1		1		1	1	1				5
H	Wfh=wfw	1	1		1					1	1	5
I	Wfh=blur boundaries b/n work/life	1				1	1		1	1		5
M	COVID -> Business opp	1	1		1	1	1					5
P	Priority of profit over ppl	1		1				1	1		1	5
R	Attrition = feedback loop		1			1	1		1	1		5
S	No impact on productivity			1		1			1	1	1	5
V	Miss comradery/interpersonal cxn				1	1	1			1	1	5
F	Mgmt not asking	1		1		1		1				4
Q	Revenue not sustainable w/o adjustment for situation	1	1	1			1					4
D	Reduced op cost – better bottom line	1		1		1						3
L	Lack of F2F = work takes longer	1		1							1	3
U	Importance of giving ppl purpose			1						1	1	3
W	Harder to train in new role remote				1		1					2
X	WFH=less ppl onsite, better for onsite workers						1				1	2
T	WFH things may get lost in translation (xtra important for clear comms)			1								1

Table 10' codified themes (A-X) ranked by total number of times in qualitative dataset the theme emerged, irrespective of interview order in which the theme first appeared.

Appendix 5.

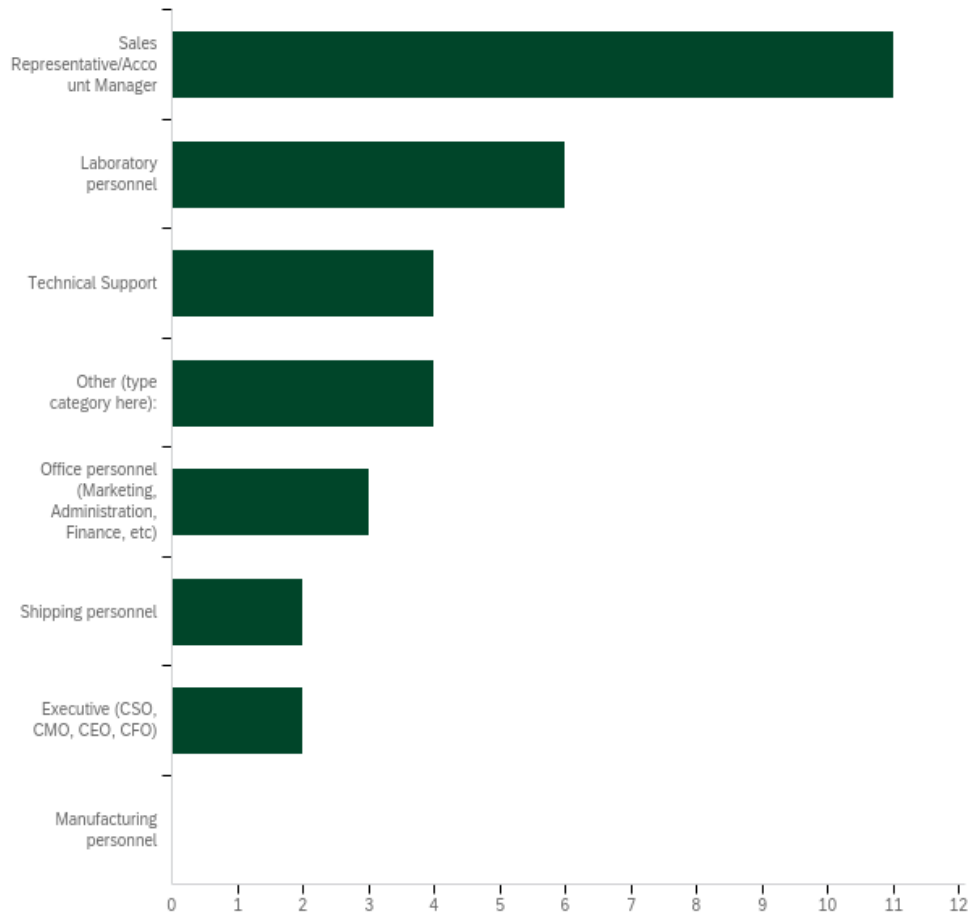Quantitative Survey and Qualitative Interview Metadata

Figure 5. Job Categories of Quant Survey Respondents

Job functions included in sample. The category "Other" (4) includes Quality Assurance Specialist, Quality Assurance Manager, Order Management Supervisor, and Sales Manager.

Table 11: Phase II Qualitative Interview Metadata

Role	Time in current role (years)	Manager Y/N	# of direct reports	Same role in May 2021?	Same role pre-COVID? Y/N	Onsite pre-COVID?	Hours/ Week Worked pre-COVID	Onsite Oct 2021?	Hours/ Week Worked Oct 2021
Sales Representative #1 (SR_1)	3	N	N	Y	Y	N	40 -45	N	50-55+
Technical Support Scientist #1 (TS_1)	0.6	N	N	Y	N	Y	40 - 45	N	40 - 45
Senior Project Manager #1 (PM_1)	0.115	N	N	N	N	0.5	60 - 70	0.5	40 - 42
Sales Representative #2 (SR_2)	0.16	N	N	N	N	N	45	N	45
Technical Support Scientist #2 (TS_2)	4	N	N	Y	Y	N	40	N	40
R&D Scientist #1 (RD_1)	0.08	N	N	N	N	Y	43	Y	40
QA Specialist #1 (QA_1)	4.5	N	N	Y	Y	Y	40	Y	40
Technical Support Scientist #3, Mgr (TS_3)	2	Y	7	Y	Y	N	50	N	50-60
Operations, Mgr #1 (OP_1)	1	Y	15	Y	Y	Y	45-50	N	70
QA Specialist #2, Mgr (QA_2)	8.5	Y	6	Y	Y	Y	50-60	Y	50 to 60+

References

Amadeo, K. (2020). Unemployment rate by year since 1929 compared to inflation and GDP. Retrieved from https://www.thebalance.com/unemployment-rate-by-year-3305506#citation-8

Angell, S. Y. (2020). *Order of the State Public Health Officer March 19, 2020*. USA Retrieved from https://www.cdph.ca.gov

Aragon, T. J. (2021). *State Public Health Officer Order of June 11, 2021*. Retrieved from https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/COVID-19/Order-of-the-State-Public-Health-Officer-Beyond-Blueprint.aspx

Arbeitskreis Blut, U. B. B. K. (2009). Influenza Virus. *Transfusion medicine and hemotherapy : offizielles Organ der Deutschen Gesellschaft fur Transfusionsmedizin und Immunhamatologie, 36*(1), 32-39. doi:10.1159/000197314

Borden, T. B., Akhtar, A., Hadden, J., & Bose, D. (2020). The coronavirus outbreak has triggered unprecedented mass layoffs and furloughs. Here are the major companies that have announced they are downsizing their workforces. Retrieved from https://www.businessinsider.com/coronavirus-layoffs-furloughs-hospitality-service-travel-unemployment-2020#exxon-was-laying-off-1600-employees-in-europe-as-of-october-5-the-cuts-represent-2-of-its-global-workforce-5

Bourzac, K. (2020). COVID-19 lockdowns had strange effects on air pollution across the globe. Retrieved from https://cen.acs.org/environment/atmospheric-chemistry/COVID-19-lockdowns-had-strange-effects-on-air-pollution-across-the-globe/98/i37

Bureau of Labor Statistics. (2020). Unemployment rate rises to record high 14.7 percent in April 2020. In *The Economics Daily*: U.S. Department of Labor.

Carucci, R. (2021). To Retain Employees, Give Them a Sense of Purpose and Community *Harvard Business Review*. Retrieved from https://hbr.org/2021/10/to-retain-employees-give-them-a-sense-of-purpose-and-community

Centers for Disease Control and Prevention. (2019a). 1918 Pandemic (H1N1 virus). Retrieved from https://www.cdc.gov/flu/pandemic-resources/1918-pandemic-h1n1.html

Centers for Disease Control and Prevention. (2019b). 2009 H1N1 Pandemic (H1N1pdm09 virus). Retrieved from https://www.cdc.gov/flu/pandemic-resources/2009-h1n1-pandemic.html

Charmaz, K. (2006). *Constructing Grounded Theory*. London, UK: SAGE Publications Ltd.

Collins, J. (2011). 20 Mile March. Retrieved from https://www.jimcollins.com/concepts/twenty-mile-march.html

Collins, J., & Hansen, M. T. (2011). *Great by Choice*. New York, NY: HarperCollins.

Congressional Research Service. (2020). *Global economic effects of COVID-19*. Retrieved from https://fas.org/sgp/crs/row/R46270.pdf

Dehan, A. (2021). 10 Most Expensive Cities In The US. Retrieved from https://www.rocketmortgage.com/learn/most-expensive-cities-in-the-us

Ducharme, J. (2021, October 14, 2021). The 'Great Resignation' Is Finally Getting Companies to Take Burnout Seriously. Is It Enough? *TIME*. Retrieved from https://time.com/6106656/workplace-burnout-pandemic/

Encyclopaedia Britannica. (2006). History of Flight. Retrieved from https://www.britannica.com/technology/history-of-flight/The-first-airlines

Felps, W., Mitchell, T. R., Hekman, D. R., Lee, T. W., Holton, B. C., & Harman, W. S. (2009). Turnover contagion: How coworkers' job embeddedness and job search behaviors influence quitting. *Academy of Management Journal, 52*(3), 545-561. Retrieved from https://leeds-faculty.colorado.edu/dahe7472/Hekman%20turnover%20AMJ%20final.pdf

Harriman, B. (1974). Up and Down the Communications Ladder *Harvard Business Review*.

Heng, Y. T., & Schabram, K. (2021). Your Burnout Is Unique. Your Recovery Will Be, Too. *Managing Yourself* Retrieved from https://hbr.org/2021/04/your-burnout-is-unique-your-recovery-will-be-too

James, K., Donald, E. T., & Somsak, K. (1996). *Internet remote microscope*. Paper presented at the Proc.SPIE.

MA Department of Health. (2020). Information on the Outbreak of Coronavirus Disease 2019 (COVID-19). Retrieved from https://www.mass.gov/resource/information-on-the-outbreak-of-coronavirus-disease-2019-covid-19

Martin, P. Y. T., Barry A. (1986). Grouded Theory and Organizational Research. *Journal of Applied Behavioral Science, 22*(2), 141-157. Retrieved from https://journals.sagepub.com/doi/pdf/10.1177/002188638602200207

Maturo, R., & al., e. (1997). Control of a Remote Microscope Over the Internet. *BioTechniques, 22*(6), 1154- 1157. Retrieved from https://pdfs.semanticscholar.org/0ee3/f6ce7c51aa132939c981bc087cbe88b82691.pdf

Moss, J. (2021). Beyond Burned Out. *The Big Idea Series.* Retrieved from https://hbr.org/2021/02/beyond-burned-out

Order of the County Health Officer to Shelter in Place March 16 2020, California Health and Safety Code § 120295 C.F.R. (2020).

Philippidis, A. (2021). Top 10 U.S. Biopharma Clusters. Retrieved from https://www.genengnews.com/a-lists/top-10-u-s-biopharma-clusters-8/

Pink, D. (Writer). (2009). The puzzle of motivation. In *TEDGlobal 2009*: TED.

Plotkin, S. (2014). History of vaccination. *Proceedings of the National Academy of Sciences of the United States of America, 111*(34), 12283-12287. doi:10.1073/pnas.1400472111

Rich, R. (2013). The Great Recession December 2007–June 2009. *Federal Reserve History.* Retrieved from https://www.federalreservehistory.org/essays/great_recession_of_200709

Russell, H. B. (2011). *Research Methods in Anthropology : Qualitative and Quantitative Approaches* (5th ed.). Plymouth, UK: AltaMira.

Schaufeli, W. a. B., Arnold. (2004). *UWES: Utrecht Work Engagement Scale*. [Preliminary Manual to UWES]. (Version 1.1).

Schaufeli, W. a. B., Arnold. (2006). The Measurement of Work Engagement With a Short Questionnaire: A Cross-National Study. *Educational and Psychological Measurement, 66*(4), 701-716. doi:10.1177/0013164405282471

Shuck, B. a. W., Karen. (2010). Employee Engagement and HRD: A Seminal Review of the Foundations. *Human Resource Developmental Review, 9*(89). doi:DOI: 10.1177/1534484309353560

ST. (2021). *2021 Investor Day Presentation September 2021*. Retrieved from https://investors.bio-techne.com/

Stockman, F. a. B., Kim. (2020, April 12 2020). How a Premier U.S. Drug Company Became a Virus 'Super Spreader'. *The New York Times.* Retrieved from https://www.nytimes.com/2020/04/12/us/coronavirus-biogen-boston-superspreader.html

Strochlic, N. a. C., Riley D. . (2020). How some cities 'flattened the curve' during the 1918 flu pandemic. Retrieved from https://www.nationalgeographic.com/history/2020/03/how-cities-flattened-curve-1918-spanish-flu-pandemic-coronavirus/#close

Taliesin, J. (2020). Somerville mayor declares local state of emergency in response to coronavirus. Retrieved from https://somerville.wickedlocal.com/news/20200316/somerville-mayor-declares-local-state-of-emergency-in-response-to-coronavirus

The Economist Intelligence Unit Ltd. (2010). *The future of the life sciences industries: Aftermath of the global recession* Retrieved from https://www2.deloitte.com/content/dam/Deloitte/de/Documents/life-sciences-health-care/lshc_DE_Future_of_Life_Science_industry_2010.pdf

The New York Times. (2020). Covid in the U.S.: Latest Map and Case Count. Retrieved from https://www.nytimes.com/interactive/2020/us/coronavirus-us-cases.html

USA.gov. (2020). Government Response to Coronavirus, COVID-19. Retrieved from https://www.usa.gov/coronavirus

World Health Organization. (2020). Pneumonia of unknown cause – China. Retrieved from https://www.who.int/csr/don/05-january-2020-pneumonia-of-unkown-cause-china/en/

World Health Organization. (2021). Daily cases and deaths by date reported to WHO. *WHO Coronavirus (COVID-19) Dashboard.* Retrieved from https://covid19.who.int/info

Zhu, Z., Lian, X., Su, X., Wu, W., Marraro, G. A., & Zeng, Y. (2020). From SARS and MERS to COVID-19: a brief summary and comparison of severe acute

respiratory infections caused by three highly pathogenic human coronaviruses. *Respiratory Research, 21*(1), 224. doi:10.1186/s12931-020-01479-w