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The Economic Impact of a US Tech Talent Shortage on Midwest Companies

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The Economic Impact of a US Tech Talent Shortage on Midwest Companies

University Honors Program Thesis

University of Nebraska Omaha

Submitted by

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UNIVERSITY OF NEBRASKA AT OMAHA

HONORS THESIS ABSTRACT

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This thesis examines the economic impact that a pervasive shortage of tech talent nationwide is having on various companies in the Midwest. Per the Mid-America Regional Council, four computer-related job openings existed for every unemployed person in the Midwest in 2015. In Nebraska alone, there were 2,318 open computing jobs, with only 438 computer science graduates in the state that year. By examining this contemporary issue, I explore both the extent to which companies in the Midwest are affected by the shortage and the common practices currently in place by Midwest companies to deal with the shortage. For the scope of this thesis, tech talent will refer to any individual who possesses on-demand computing skills (e.g. proficient in on-demand programming languages). I use two major research strategies: (1) conducting interviews with IT and HR leadership from various established companies in Omaha and (2) reviewing published literature and other related secondary reports. After the collection of this data, I conduct a thorough analysis of common solutions, biases, and other general trends in IT strategy used by the interviewed companies. Additionally, I propose two recommendations regarding initiatives that may further alleviate the shortage.

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Introduction

The United States is experiencing a massive shortage of tech talent. For the scope of this thesis, tech talent will refer to any individual that possesses on-demand computing skills (e.g. proficient in on-demand programming languages). In 2015, there were more than half a million computer job openings and less than 60,000 computer science graduates in the United States (Kessler, 2017). The United States Bureau of Labor Statistics projects that there will be approximately one more million computer jobs than computer science (CS) graduates by 2020 ("Coding Dojo," 2017). Also, it stated that 51% of all STEM jobs are projected to be in computer science-related fields by 2018. The need mostly comes from small to medium-sized businesses who lack access to qualified tech talent ("Coding Dojo," 2017). They are the bread and butter of the economy. These occupations range from computer software engineers to database administrators. With the advent of artificial intelligence/machine learning, cloud computing, and other sweeping technology, new jobs that we cannot predict today are destined to surge in the future as the demand for computing jobs continues to increase. As we enter the next "industrial revolution," some of these technologies are certain to disrupt various industries, from manufacturing to healthcare to finance, resulting in the elimination of traditional jobs and the liberation of a new workforce that will need to retrained. This workforce may alleviate the overall shortage to some extent.

The Shortage in the Midwest

The Midwest region is hurting the most from this shortage of tech talent because less talent exists in this area, and it is even harder to win recruiting battles due to brain drain and

geographical biases. (In the context of this thesis, I refer to the Midwest as the geographical area covering Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin.) Dice, a job matching site, conducted a survey that ranked the toughest Unites States cities for recruiting tech talent; five out of the top 12 ranked cities are in the Midwest: St. Louis, Milwaukee, Little Rock, Chicago and Detroit (Goli, n.d.). According to the Mid-America Regional Council, four math or computer-related job openings existed for every unemployed person in the Midwest in 2015 ("Featured Data," n.d.). This economic situation can be largely attributed to a combination of geographical biases and brain drain emerging within this region of the United States. Generous salaries offered by profitable corporations outside of the Midwest attract the limited tech workforce that lies in the Midwest (Goli, n.d.). By the same token, tech talent that resides outside of the Midwest is largely disinterested by the sluggish tech scene in the Midwest (Goli, n.d.).

Computing jobs are not only important for the tech sector, but for many industries, including transportation, healthcare, education, e-commerce, and financial services. Inevitably, numerous corporations of all sizes in the United States are significantly impacted by this shortage of tech talent. Companies are having to operate with under-staffed and under-skilled tech talent to meet immediate technical needs, hurting their business in various aspects (Rayome, 2016). Per a survey done on 1,000 human resource managers and recruiters by Indeed in 2016, "83% of hiring managers said the inability to fill tech roles has hurt business with lost revenue, slower product development, sluggish market expansion, increased team tension, and employee burnout" (Rayome, 2016). More than half of the respondents reported

having to hire individuals that did not meet the company's job description to fill an immediate

need (Rayome, 2016). This all results in stifling innovation and productivity.

Methods

Given that the companies in the Midwest experience an abnormal level of shortage in

tech talent compared to other regions of the country, the shortage may uniquely be affecting

corporations residing in this region. As a result, these corporations may be utilizing recruiting

tactics that differ significantly from those of companies in the west and east coast of the

country. In order to compile information on the various operational deficiencies being

experienced and current strategies being employed by companies in the Midwest in the light of

this talent shortage, I conducted a series of interviews with pertinent stakeholders of various

companies in the Midwest that were able to speak on this contemporary issue.

Table 1. Respondents of Conducted Interviews

RESPONDENTS	SIZE (Employees)	INDUSTRY
First National Technology Solutions	75	IT Services
Automated Systems, Inc.	80	Computer Hardware & Software
Proxibid	200	Computer Hardware & Software
Berkshire Hathaway Homestate Companies	750	Insurance Carriers
Oath, Inc.	12,000+	Digital Content
Valmont	10,000+	Industrial Manufacturing

The research was a convenience sample of companies residing in Omaha, NE and so may not easily generalize to the entire Midwest. The list of the companies that I interviewed can be seen on Table 1. I principally interviewed with IT and HR leadership from among these companies - ranging from IT Managers to Sr. Directors of IT to Talent Acquisition Advisors – in an attempt to not only understand unique operational deficiencies regarding the shortage that they may be experiencing, but also capture any short-term and long-term corporate strategy that they may be upholding to alleviate any experienced shortage of their tech workforce. Respondents requested that their identities remain confidential and any company-related information be used only for educational purposes.

After conducting extensive preliminary research on this topic, I determined that the questions I would ask in these interviews would be centered around the aspects listed on Table 2. Data addressing these aspects provides a comprehensive set of information for an analysis on the state of tech needs for these companies. More information on the qualifications for these facets will be provided throughout the presentation of the findings. I developed these focus areas into a set of questions (Table 3) that I used consistently throughout the interviews.

Table 2. Facets for Data Collection

Prior Experience with Recruiting Tech Talent	Attrition Rate
The Impact of the Shortage of Business Performance	Hiring Talent from Coding Boot Camps
The Need to Retrain Talent	Long-Term Strategy to Attract and Retain Tech Talent
Short-Term Strategy to Attract and Retain Tech Talent	Consideration of Outsourcing and Off-Shoring Teams

Table 3. List of Questions

What has been your experience with recruiting tech talent?
[If Applicable] What aspects of your company's business, can be both direct or indirect, does this inadequacy in your talent pool affect?
With new, radical technological advancements surfacing at rapid rates, how do you keep your company's IT workforce up to date with new skills (programming languages, etc.) that might be necessary to integrate better technology into your company?
[If Applicable] How often does your team find yourself doing this (e.g. every 6 months)?
What are some of the principal strategies that you are putting in effect to attract and retain IT talent?
What is your company's turnover rate for your company?
Have you hired any IT talent that graduated from a coding boot camp (versus traditional CS degrees)?
If so, do you know to what extent are they satisfying your company's IT needs?
As leadership of this company, what is your company's tech strategy for 5 years from now…10 years…etc.?
What are your thoughts about hiring tech talent outside of the US? Outsourcing? Offshore teams?
Would you be open to working with companies that specialize in offshore teams? What are concerns with doing so?
[If applicable] If you already do, what are pros/cons?
Anything else you would like to bring up regarding this topic?

Results

In this section, I subdivide the data collected from the interviews into the facets listed on Table 2, and I disclose the most common responses, average rates, ranges of rates, and other notable trends.

Prior Experience with Recruiting Tech Talent

Gauging the level of experience with recruiting tech talent is important for various subtle reasons. First, if the respondent had previously worked at a company in an industry unrelated to the one that they worked in at the time of the interview, any information regarding their experience with recruiting tech talent in that company may provide valuable information about how the shortage is affecting comparable companies in that industry. Lastly, it is important to note the type of tech talent that the respondent has experience recruiting. Any differences, such as senior-level vs. entry-level talent, may be an important factor to note in the data analysis. By the same token, capturing average time periods for recruiting cycles may prove equally important.

From all the respondents, whose industries varied widely, 100% expressed abnormal struggle in recruiting tech talent. A third of the respondents mentioned that they had experienced a similar struggle in industries that they had previously worked in; these industries were retail and food processing, leading to the inference that companies in the retail and food processing space are having similar issues. Half of the respondents held over 5 years of experience recruiting tech talent, whereas the rest held at least one year of experience. The average time for recruiting cycles of the respondents was 60 days, where the minimum was 30 days and the maximum was 120 days. Additionally, the majority expressed that their companies had a lengthy process of background checks and interviews. Two of the respondents specifically expressed struggles with recruiting tech talent for data centers and senior tech talent – the rest expressed equal struggle in all levels of tech talent.

The Impact of the Shortage on Business Performance

Understanding the impact that the shortage of tech talent is having on business practices and company performance is important for various reasons. Companies who struggle today with a shortage of tech talent can suffer from a lack of innovation to project delays. Understanding this variety of operational deficiencies is useful in identifying any tech talent hiring strategies that are in place by a company. This variety of operational deficiencies may also manifest due to the varying sizes of the companies. It tends to be harder for smaller organizations to recruit qualified tech talent given that these organizations tend to struggle to match the benefits that other large, well-resourced organizations can offer ("Is There Tech Talent," 2016). From a financial perspective, it is useful to understand to what extent the shortage is impacting spending on tech talent recruitment, and in turn, how this level of spending is impacting the company's overall financial performance. Lastly, the culmination of all the aforementioned factors may be causing a company to perform ad hoc hiring practices; these practices may provide insight to the level of severity in the company's tech talent shortage.

In the light of this shortage, the majority of respondents expressed that they commonly had to press forward with initiatives and attempt to over-utilize existing staff periodically. They expressed that hiring may be time-consuming at times, resulting in the potential loss of an applicant as they consider others. They typically resorted to hiring someone internally from a lower level. Most expressed that internal projects were often pushed back, with projects delayed at an average rate of 30% of the project time span (e.g. if a project is 6 months long and is delayed by two months, then this would constitute a 33% rate in delays); the minimum

rate was 15% and the maximum was 40%. These delays affected business operations as a result

of extended outages of IT services . Some expressed that if they were not able to fulfill the role

within a timely manner, the role may be re-scoped, rescinded or delayed. They also expressed

that they tend to look at contracting firms as a last resort. All the respondents with a small

company size (in comparison) expressed that they did not have the resources to provide

everything their businesses need from technology. They found themselves in a space that is

changing at such a rapid rate that it proved difficult to secure the right talent that would keep

them competitive. On the other hand, global companies, like Oath and Valmont, stated that

they possessed the ability to hire in other markets, reducing the impact of any local skills

shortage. Regarding spending for tech talent recruitment, most expressed that it was

abnormally costly to have long hiring cycles and extensive training sessions. They also

expressed that their spending was similar for upskilling their current workforce through

retraining. One of the smaller organizations expressed that they have resorted to hiring

temporary workers with the intent of converting them to full-time if the skills match their

needs.

The Need to Retrain Talent

Understanding how the shortage of tech talent is affecting the retraining practices of

companies is important for various reasons. In the progressively competitive market for tech

talent and ever-changing skill sets, companies are turning to labor development and retraining.

Although expenditures in technical education and vocational schools are critical in the long run,

retraining offers a quicker fix. In the light of this nationwide shortage, companies are resorting

to reskilling existing workforces to fill the gap when talent acquisition costs are higher than

retraining costs. Box, an enterprise content platform, has been one of the pioneers in pursuing this strategy by enabling its employees from the customer support team to retrain as engineers. Box benefits from this practice because it retains institutional and product knowledge from each of its employees ("Why Retraining," 2018). In addition, retraining may reduce the overall turnover rate of a company.

All but one respondent confirmed that they provided a robust, continuous training program, both directed or self-directed. Some even established ongoing mentorship programs that accompany training sessions. Most offered tuition reimbursement benefits for continuous education opportunities and certifications outside of the workplace. One of the respondents said that even though the IT sector requires a greater degree of continuous education to keep up with the new technological advances, the motivated employees will be the ones to continue to enhance their skills/expertise. However, he expressed difficulties acquiring talent with this trait as most of this type of talent gravitates towards high-tech companies. Most provided retraining for projects at hand and built strategic goals that were tied to the company's deliverables. They expressed that this allows them to manage what skills are needed and how rapidly they can proceed or resort to retraining initiatives. On the other hand, one of the respondents that worked in a small to medium-sized business (SMB) expressed a preference on hiring experienced individuals over unexperienced ones given the potential cost of substantial training. Another SMB respondent stated that they deliberately hired for new skills and did not seek to develop talent from within the organization. From this, we can conclude that SMBs are not utilizing retraining practices due to the high costs associated with it. Furthermore, when the respondents with retraining practices were asked how frequently they needed to retrain

internal tech talent, the average response was annually, where the minimum was 3 months and the maximum was 18 months. Most expressed that they had a long-term strategic vision, and that every year it was reviewed to ensure that it stayed current to the company needs.

Short-Term Strategy to Attract and Retain Tech Talent

Understanding the current hiring practices employed by a company to attract and retain tech talent in the light of a shortage is important for various reasons. First, this information will be useful in any assessment of the effectiveness of a current recruiting practice in comparison to other effective practices used by other companies from a similar size or industry. Secondly, respondents may provide insights about previous practices that have been employed by their respective companies to recruit tech talent. These previous practices may be compared with current practices in place by these companies, resulting in notable trends of changes in strategy over time. In addition, short-term strategies are usually aligned with the long-term vision and mission of the organization; a complex long-term strategy is broken down into short-term strategies. Therefore, gauging the short-term recruiting strategy of a company can provide insights regarding the company's long-term recruiting strategy. In like manner, any current recruiting practices can provide insights on the company's tech talent attrition rate and the company's overall business performance.

The majority of the respondents expressed that offering generous salary packages and generous work benefits was their principal current strategy for the recruitment of tech talent. For many of these companies, this translated into a lower tech talent attrition rate and the decrease in other administrative and support areas, resulting in leaner business practices in order to compensate for increased IT overhead. Benefits mentioned included: offering the

ability to work with state-of-the-art technology, existing and new training programs and other continuous education opportunities, flex-time, remote capabilities, more employee engagement and employee-oriented activities, making leadership more accessible, and providing new growth opportunities and challenges. Most expressed that they were starting to provide ownership and allow democratic leadership styles for their tech workforces. Regarding recruitment practices, the most common practice was the establishment of partnerships with local educational institutions (e.g. career fairs) and community outreach. Some of the noted short-term hiring strategies evolved from ineffective hiring practices. Historically, some of the respondent's companies had rigid office attendance policies, where the tech employees were required to arrive to work and follow an 8-5 schedule. In addition, leftover work had to be completed within the company's facility, resulting in longer work hours. Presently, these companies are using a clever strategy, where they allow their employees to work from home as needed. They are much more flexible in regards to their office attendance policy. Other respondents mentioned that they used to hire tech talent for new skills before they switched to providing retraining programs to their tech workforce, resulting in a lower attrition rate. Furthermore, many resorted to competitive salaries and benefits for the new tech hires. An analysis on how these short-term hiring strategies attribute to the company's long-term tech strategy will be provided in a later section where the long-term strategies of these companies are discussed.

Attrition Rate

Analyzing the attrition rate of a company related to its tech workforce is important for various reasons. This data point can be used to objectively assess the level of retention that a

company holds in their tech workforce. In addition and as noted previously, the attrition rate can provide further insight into the company's level of hiring-related spending. This type of spending does not only concern traditional costs of hiring, such as recruitment costs and training, but also indirect costs such as overtime costs for employees that are doing the work that would otherwise be handled by the absent employee(s). The attrition rate can also assist with assessing any decreased work productivity and employee morale, as well as employee burnout. This figure may also be insightful when gauging the frequency and level of project delays due to any shortage of tech talent. Lastly, the attrition rate can help assess the extent to which companies that are utilizing tech talent nationally or globally are benefitting from this hiring strategy compared to companies that are solely recruiting locally.

The attrition rates of the respondents ranged from one percent to 25 percent. There were two notable clusters in the data points as seen in Table 4. Respondents that maintained IT recruiting and operations at various international or national locations expressed that their attrition rates were significantly low. In contrast, those respondents that maintained IT recruiting and operations locally expressed an average of 20% in attrition rate related to their

Table 4. Tech Talent Attrition Rates of Respondents

	Respondents with IT offices internationally and/or outside of the Midwest	**Respondents with IT offices locally**
Attrition Rates (average)	Less than 1%	20%

tech workforce. This may be due to the fact that talent is universal, but opportunity is not. Tech talent is abundant internationally especially in developing nations where tech-related

opportunities are scarce. Various respondents expressed that they have expanded their global

presence with the strategic goal of leveraging the global tech talent pool that exists today.

Furthermore, the respondents that hired only locally expressed a greater level of employee

burnout and longer project delays, resulting in high overtime costs and significant decreases in

productivity.

Hiring Tech Talent from Coding Boot Camps

Coding boot camps have recently come to surface to serve as a quick remedy in

alleviating the shortage of tech talent nationwide. These "boot camps" serve as technical

training programs that teach on-demand programming skills (Wilson, 2017). Boot camps are an

alternate path to the university degree route, attracting individuals that would otherwise not

pursue a university degree in computer science and related fields. This newly developed

workforce has proven to fill the shortage of tech talent to some extent. Coding boot camps

focus on providing career development and teaching enrollees the skills that meet current

industry standards (Wilson, 2017). On the other hand, these schools have been criticized for not

teaching complex, computer science topics, such as algorithms and data structures, resulting in

the claim that these schools are mainly teaching enrollees to pass recruiting tests at the large

firms, rather than teaching enrollees to think like computer scientists. Additionally, a

correlation between graduates from these boot camps and subsequent high attrition rates has

been established (Wilson, 2017). Analyzing the extent to which companies are using tech talent

originating from coding boot camps is important for various reasons. First, recruiting

nontraditional tech talent may indicate a company's openness to uncommon avenues to fulfill

their tech talent needs. A broad-mindedness in recruiting various types of talent can be an

indicator of a company's role in the shortage that it may be experiencing. For example, in Vancouver, Canada, a region that has historically experienced a shortage of tech talent, companies' preferences have been a driver of the shortage. These companies tend to hire only experienced tech workers, secluding graduates with no experience (Keating, 2015). In other words, companies' own biases may be diminishing the tech talent pool that may be available to the companies when the talent is needed. For the companies that are utilizing tech talent from coding boot camps, it is equally important to assess the extent in which this newfound talent pool is addressing their tech needs. Hiring unqualified tech talent can lead to a greater level of pain than the firm may already be experiencing in the light of a shortage in their tech workforce, ranging from unnecessary recruiting and training costs to longer project delays deriving from not having the adequate tech workforce.

The majority of the respondents confirmed that they would consider a candidate with a certification from a coding boot camp, with the condition that the candidate would need to hold a college degree of some sort, resulting in the expansion of the tech pool in Omaha in the short-term. Nonetheless, the respondents expressed concerns about quality of coding academy graduates and their effectiveness in the long-run. Most viewed a four-year college degree as strong evidence of growth, commitment and expertise – something that could not be obtained through a 3-month boot camp. Code academies seem to be a temporary solution to a much bigger tech talent shortage problem. When asked how comparable code school graduates were in their technical ability, they all agreed that differences were insignificant in the short term. A common explanation was that the type of technical needs that they had were not dependent on complex computer science frameworks, such as algorithms, currently being taught in a

traditional computer science undergraduate degree. They expressed that most of their IT needs could be solved by an employee with a baseline level of technical skill that is being taught at the Interface Web School, the local coding boot camp in Omaha. The one respondent who had not hired talent from a coding boot camp stated that their company had not resorted to this talent pool because they did not develop code at their location. He further expressed that they had recently decided to build a DevOps/Automation team and that this option may come into play in the future.

Long-Term Strategy to Attract and Retain Tech Talent

Understanding a firm's strategy to attract and retain tech talent in the long run is important for various reasons. First, the complexity of a firm's long-term tech strategy may reflect the severity of the tech shortage they are experiencing. Understanding the long-term strategy to retain and attract tech talent may help understand any short-term hiring strategy that a company may have. For example, building a sophisticated education system internally with the intent to gain greater control of the knowledge levels within a workforce may prove to be a strategic, long-term plan. It is critical that a long-term tech strategy is aligned with corporate goals and encompasses a comprehensive list of factors that affect or may affect the hiring environment in the long-run. With a predicted, rapid rate of technological advancements occurring in the near future, it is critical that a firm formulates initiatives and builds an infrastructure within the company that will assist with the retention of a tech workforce. This may range from providing extensive, continuous training and education opportunities to installing leadership initiatives that urge the tech talent to build on personal development, such as interpersonal skills.

The most common, 5 year, tech strategy among the respondents was a focus on automation of basic IT processes, with the intent of freeing employee's time to focus on more value-add initiatives. Many of the respondents had stated that they were currently pushing their tech workforce to engage in leadership roles and build a greater level of interpersonal skills. From this, we can conclude that this short-term strategy is interconnected with the long-term strategy to automate basic IT processes in order to allow IT professionals to contribute greater value through leadership positions. Other respondents expressed plans to leverage artificial intelligence (AI) to enhance the company's user experience and profitability. This may explain why companies that are currently hiring from coding boot camps expressed that they do not find this hiring strategy viable in the long-term. One specifically emphasized a focus on predictive analytics, consulting/strategy, and information security solutions. They all agreed that IT is a support department; hence, all functions of this department needed to be tied to the overall company goals.

Consideration of Outsourcing and Off-Shoring Teams

According the McKinsey Global Institute (MGI), online talent platforms have the potential to boost global GDP by $2.7 trillion annually by 2025 (Manyika et al., 2015). Millions of educated individuals worldwide currently cannot find work, even those in the tech field, and have to cope with unemployment, underemployment, sluggish wages and despair. Many developing countries have not built the economic infrastructure to allow for companies to technologically advance. It is estimated that over 500 million individuals could benefit from online talent platforms (Manyika et al., 2015). This has sparked the rise of companies that specialize in outsourcing tech needs of companies, as well as establishing reliable, crafted off-
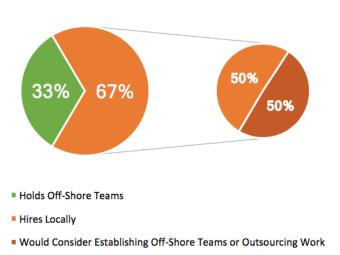
shore teams for various companies. Andela, a company that specializes in upskilling tech talent in Africa and sustaining off-shore teams for companies in the United States, leads the movement that has notably bridged some of the gap between the prevalent shortage of tech talent in the United States and the need for job opportunities worldwide (Nash, 2016). Outsourcing work and/or establishing off-shore teams have become a popular practice among companies of all sizes across the west and east coast of the country ("Outsourcing Accelerates," 2016). Understanding the level of consideration that companies in the Midwest are having in nontraditional talent pools, such as off-shore teams, may reflect a company's openness to resorting to uncommon avenues to fulfill their tech talent needs. Additionally, a broad-mindedness in recruiting various types of talent can be an indicator of a company's role in the shortage of tech talent that it may be experiencing.

One third of the respondents expressed that they held off-shore teams in various parts of the world at the time of the interview. These respondents used offshore teams to support development since they said that language in common with US locations among overseas locations tends to speed up delivery processes. Regarding outsourcing, they specified that their needs would have to be for a specific task or process area for this option to be considered. For example, they found no need to manage data networks inside of the company when the data networks are handled by carriers. Nonetheless, the majority expressed a preference in hiring local talent. Due to the nature of their businesses, many of their contracts required US-based talent.

Chart 1. The Respondent's Consideration of Off-Shore Teams

Consideration of Off-Shore Teams

- Holds Off-Shore Teams
- Hires Locally
- Would Consider Establishing Off-Shore Teams or Outsourcing Work

As seen in Graph 1, of the respondents that hired only locally, half of them expressed interest in collaborating with a company to establish an off-shore technical team or outsource portions of their technical needs. Many expressed beliefs that difficulty in finding qualified tech talent in the United States would intensify in the future and that resorting to these options will become necessary. Advantages mentioned ranged from obtaining top-tier skills at a lower cost to obtaining "follow-the-sun" availability of IT. Others pointed out the cultural advantages in leveraging this avenue, such as having access to a workforce that mostly speaks more than one language and resides in the same time zone as that of international customers. Most expressed the common concern that a third party, whether it be offshore or in the US, will not adhere to the same strict standards, service level agreement (SLA), and information security that their companies do. Others stated that they were concerned about the ability of managers to oversee the deliverable adequately since rework can be both time-consuming and costly. One respondent explained that data residency and data ownership policy has evolved, preventing

companies from storing, processing or transmitting data outside of the United States. This

creates a complex scenario in which mechanisms must be put into place to allow access to data.

There are solutions that enable this capability in limited engagements, but most companies

choose to not rely on off-shore teams for this function. Like the group that had off-shore teams,

most of the respondents explained that offshore teams would be a last resort as they placed an

emphasis on US-based resources.

Summary of Results

All of the respondents expressed an abnormal struggle in recruiting tech talent locally.

The shortage impacted the companies in similar ways as that of companies residing in other

regions of the United States: project delays, employee burnout, team tension, and greater

turnover rate. The respondents that had access to talent outside of their locality expressed a

lesser struggle in fulfilling their technical needs compared to the respondents that only hired

locally. There was not a notable shortage trend among the different industries in which the

respondents served. Most of the respondents confirmed that they provided a robust,

continuous training program that assisted with upskilling their workforce in a technologically

changing environment. As part of the current strategy for the recruitment of tech talent, most

of the respondents confirmed that they offered generous salary packages and work benefits to

their tech employees. The majority of the respondents demonstrated openness to considering

alternative solutions to the shortage, such as talent from coding boot camps and companies

that specialize in off-shore teams. Lastly, all respondents expressed the common long-term tech

strategy of automating as much of their IT processes as possible.

<p style="text-align:center;">**Recommendations**</p>

I reviewed various published literature and secondary reports related to initiatives that are being taken by companies all around the world. My goal was to provide recommendations for companies in the Midwest that will alleviate the shortage of tech talent. I provide two recommendations: a collaboration with companies that specialize in off-shore teams and the full application of the High-Performance Work System (HPWS). I recommend establishing off-shore teams based on the respondent's expressed interest on this option. I recommend applying HPWS based on the current management practices held by the respondents' companies. Although the respondents were utilizing talent from coding boot camps, I chose not to make any recommendations in this realm because the respondents had expressed that recruiting talent through this avenue would not be a viable hiring strategy for the respondents' long-term plans of implementing more advanced technology, such as artificial intelligence, that requires a greater degree of expertise that can only be obtained through a four-year college degree. Moreover, there is much debate regarding the effectiveness of coding boot camps and whether the talent from these boot camps add value. Evaluating the effectiveness of coding boot camps is a significant topic in itself, one that would require other in-depth research. Therefore, additional in-depth analysis on this topic is outside of the scope of this Thesis.

Collaboration with Companies that Specialize in Off-shore Teams

As described previously, companies like Andela are attempting to leverage an untapped, global tech talent pool to take care of the tech needs of various companies in the United States (Nash, 2016). In much the same way that Amazon Web Services has the value proposition of eliminating the need for companies to maintain servers internally, companies that specialize on

recruiting and upskilling off-shore teams for their clients are removing the need to have

expertise in recruiting and sustaining a strong tech workforce (Hammon, 2016). Most of the

respondents directly serve in an industry that is not tech-related. By utilizing these specialized

services, companies in the Midwest would allocate their resources more effectively by letting a

third-party that holds expertise in building off-shore teams take care of the companies' tech

needs (DeSogos, 2017). These talent companies specialize on training software engineers to

meet the specific needs of a client. In addition, based on their stringent recruiting standards,

these companies offer the best talent within the areas in which they recruit ("Outsourcing

Accelerates," 2016).

Although the respondents expressed interest in this option, they held two concerns that

hindered them from pursuing this alternative. Their largest concern regarded the adherence of

strict standards and information security. Today, reputable companies, such as Andela, are

building a track record, in addition to providing liability warranties, to engender trust among

their client pool and promote the benefits of remote work (Nash, 2016). Nonetheless,

companies similar to Andela are not prevalent in the Midwest, leading to the lack of awareness

and ultimately the inability for companies in the Midwest to fully capitalize on off-shore talent.

The second greatest concern among the respondents was related to the quality of remote

communications regarding product/service requirements. In order to address this concern,

these training companies commonly require the recruited software engineers to be proficient

in the language used by the client (Nash, 2016). In addition, they needed to provide an online

communications platform that features virtual calls, work supervision metrics, and time zone

coordination (DeSogos, 2017).

Utilizing the High-Performance Work System

In the light of a skills shortage, some companies have historically employed the High-Performance Work System, a set of management practices that fosters a work environment where an employee holds greater participation and leadership (Caldwell et al., 2014). The intent is to maximize an employee's knowledge base, traits, and skills at a time where there is a shortage of human capital to produce more value for a company. HPWS, which represents a combination of specializing recruitment, employee benefits and professional development, can provide a temporary cushion by allowing companies to bootstrap with limited human capital under a shortage (Malik et al., 2017). With existing internal talent shortages, an organization cannot afford to lose existing talent to competitors. Empowering employees to utilize their skills amplifies their motivation and commitment to the company.

Even though some of the respondents had already started implementing some aspects of the HPWS, they experienced employee burnout occasionally. This is because some of the practices prescribed by the HPWS model have a limited yield per employee (Caldwell et al., 2014). There is a "sweet spot" in the level of participation and responsibilities that is delegated to an employee. The HPWS model comprises of a multi-faceted set of management skills that altogether ejects optimum levels of productivity in employees.

Conclusion

Hiring practices of companies in the Midwest are adversely affected by the economic climate driven by a grand shortage of tech talent in the region. These companies are having to operate with understaffed and under-skilled tech talent to meet immediate needs, resulting in various operational deficiencies. To alleviate the shortage, these companies use a wide array of hiring tactics to recruit and retain an adequate tech workforce. Openness to various alternatives for tech talent is beginning to grow amongst companies in the Midwest. It is a matter of time until these companies choose to pursue untraditional avenues to fulfill any shortage that they may be experiencing.

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