Developments in Construction Workers’ Compensation Insurance with the Use of Biometrics

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Abstract

Construction insurance, especially that of workers’ compensation, is vital for the protection of general contractors, but it comes at a high cost and limits their control over contract terms. Biometric devices, such as heart rate monitors and motion capture, have the potential to revolutionize the industry by reducing construction insurance premiums. Heart rate monitors can provide real-time data on workers’ physical activity and health, while motion capture analyzes movements to identify unsafe movement patterns performed by workers. By monitoring workers’ biometrics, construction companies can ensure their safety, prevent hazards, and implement targeted training programs. This personalized data can lead to a decrease in accidents and injuries, resulting in reduced insurance claims and lower premiums. However, the use of biometrics in construction insurance is a novel concept with minimal research and some problems may arise with its implementation. Workers’ compensation insurance, a significant cost for construction companies, relies on past claims and experience modification ratings and doesn’t account for recent trends. Biometric technology can provide more accurate assessments of current working practices, leading to fairer premium calculations and a reduction in fraud. The implementation of biometric devices could create a safer workplace, minimize insurance costs, and enhance profitability for construction companies.

Keywords: Workers’ Compensation Insurance, Biometrics, Biometric Measurements, Heart Rate Monitor, Motion Capture

Introduction

Construction is widely acknowledged as an extremely hazardous industry that encompasses various risks, especially relating to financial and safety concerns. Because of this, there are significant financial commitments that general contractors must make to secure both their projects and the company. To accomplish this security, general contractors will obtain construction insurance that will provide means for risk mitigation by transferring a portion of their liability to the insurance company which acts as a separate entity. Many types of construction insurance will typically cover general liability, worker’s compensation, builder’s risk, professional liability, and many other related coverage areas as seen necessary. Although offering necessary protection, construction insurance comes at a substantial expense, as the general contractor will pay an average of 3% of their total
project costs in insurance premiums. On top of this, the general contractor has little to no say in the contract terms as the insurance entity writes up the terms. This allows for the insurance entity to act in a self-preserving manner when insurance is needed, yet it can restrict the rights and considerations of the general contractor. With such slow changing industry, construction insurance hasn’t had much change over the last few decades. Still, there might be some benefit to the industry if both insurance entities and construction companies as a whole can adopt new tools that could lead to a change in how insurance premiums are calculated.

Biometric measurements are quickly becoming the pioneer in various industries to improve worker performance, safety, and efficiency in many ways. Even with many biometric devices that can be used to obtain helpful results, heart rate monitors and motion capture could be the two most important devices to change how insurance premiums are calculated. Through the use of heart rate monitors, real-time information on an individual worker’s heart rate can be monitored to better understand physical activity levels, recovery time, and assess overall health and fitness. On the other hand, motion capture allows for the analysis of worker movements, which can help identify unsafe patterns and characteristics of movement, such as a lifting posture. Biometric technologies are the future of construction as they can improve safety, enhance security, reduce costs, and optimize operations throughout the entire construction process.

**Purpose**

Integrating heart rate monitors and motion capture devices in construction sites can lead to a decrease in construction insurance premiums. Analyzing biometrics would allow for instantaneous monitoring of workers’ health and safety, which could then lead to the immediate mitigation of any potential hazards to anyone on-site. Through the live monitoring of heart rates and movements, construction companies can ensure that their workers are not overexerted, are taking adequate breaks, and are following safe working practices throughout their shifts. Using the data collected from these biometric devices can help to identify patterns and trends in worker behavior and potential safety risks. This personalized data can then be used to implement targeted safety training and risk management strategies for any workers, reducing the likelihood of accidents and injuries on the construction site. An implementation of both heart rate monitors and motion capture could potentially lead to safer working practices causing a reduction in workplace accidents. This increase in safe practices from biometric monitoring on construction sites can lead to a reduction in insurance claims and, therefore, a decrease in construction insurance premiums. Insurance providers may be willing to offer lower premiums to construction companies that have implemented biometric monitoring as it represents a reduced risk of accidents and injuries.

**Goal**

During the past few years, the construction industry has seen a serious increase in the technological advancements that are being implemented to help reduce construction costs on a project. From BIM modeling to drone surveying, there has been an influx of helpful technology, yet nothing to help with insurance rates has emerged in this technological advancement. With the advances in constructability technology, there has been a lack of focus on finding ways to minimize overhead costs that are influential in all construction projects, including insurance premiums. Although biometrics might be more focused on lowering workers’ compensation insurance policies, it would be highly beneficial as workers are the biggest asset to the industry. According to California Contractors Insurance Services, workers’ compensation insurance premiums can be up to 25% of a company's total payroll amount.
which can show the importance of finding a reliable way to reduce premiums costs with the use of biometrics. Without a current solution to these outlandishly high insurance rates, it seems that biometrics could be the innovative solution to help reduce these costs. With the reliability that monitoring heart rates and movement patterns could provide, it could be imperative to implement these biometric technologies to progress the savings and profits for construction companies.

**Literature Review**

There is minimal to no research on the use of biometrics in the construction industry, especially for the specific service to reduce insurance premiums. As this is the case, the main focus of this literature review will be looking at biometric use in other industries as well as analyzing workers' compensation insurance. With the lack of research on the exact topic of this paper, thorough research on the two aspects of the paper had to be done to allow help create a baseline of knowledge to build a conclusion.

**Workers’ Compensation**

With workers’ being the largest asset of a construction company, it is crucial for their protection which is where the origin of workers’ compensation stems from. This type of insurance was one of the first large-scale social insurance administered in the United States (Cabral 2022). With workers' compensation being unique to each of the 50 states, the way this market functions could be very unique when implementing a new set of technology into its premium calculation. This type of insurance is seen to be a balanced act for both workers and employers as the workers receive reliable no-fault compensation for on-the-job accidents while the employers receive protection from tort liability or legal responsibility for harm or injury caused to another person or their property due to a breach of legal duty (Cabral 2022). There is an extremely interesting dilemma when pricing out insurance premiums as it is all based on future losses, expenses, and incomes that are unknown at the time of the insurance sale. As a result of this, it becomes crucial that the method of calculating workers’ compensation insurance premiums is a balance between a high enough cost for future claims, and yet low enough to remain competitive in the market (Cabral 2022). One of the most common ways for insurers to estimate workers’ compensation premiums for construction purposes is by using the help of the company's past claims by taking into account the company's Experience Modification Rating, or EMR (Al-Kasasbeh 2021). The standard form of calculating the standard premium for workers’ compensation comes from multiplying a manual rate, payroll units, and experience modification rating together (Al-Kasasbeh 2021). Diving deeper into this formula, manual rates are set by the insurers, based on the fact the type of work being done has a predictable loss frequency. EMR can be complicated in its calculation as each state has a slightly unique way of calculating it. Even with this variation, Al-Kasabeh states that EMR has a general calculation that uses the National Council on Compensation Insurance or NCCI. This formula takes into account the contractor’s actual losses and the contractor’s expected losses, adjusting for company size and the severity of the incidents. It can be seen how this form of calculating workers’ compensation can be inaccurate as it takes into account the company's entire history rather than its current safety, as well as favoring bigger companies that can manage more work hours as incidents will have less of an effect on the overall outcome. This form of insurance calculation should implement change by allowing for additional technology to help decipher a more accurate representation of the current working practices to help lower insurance premiums (Al-Kasasbeh 2021).

**Biometric Devices**
This section of the literature review will analyze the feasibility and accuracy of two biometric devices, live-feed heart rate monitors, and motion capture. With the help of this technology, there is a potential of creating a safer workplace in construction, allowing for accurate tracking and logs to minimize insurance premiums.

**Heart Rate Monitors**

With the help of biometric technology, tracking the heart rate of people or workers who are taking on physical loads could account for a safer working environment with proactive measures to prevent risks to those working. There is evidence that wearable devices that can monitor a user's real-time biometric information, can allow quantitative management of the user allowing for a quick-acting safety plan when any problems arise (Hashimoto 2022). Looking deeper into heart rate readings, there is a correlation between an increase in construction accidents and increased heart rates, especially in hotter environments (Kazar and Comu 2022). From looking at the results of using heart rate monitors there seems to be a correlation between adding a noninvasive monitor to workers for a safety benefit, minimizing accidents. It can be seen that regular monitoring of biometric information, such as heart rate allows for a quantitative result for the understanding of physical loads that would allow for the maintenance of sustainable working relationships in harsher working environments such as construction (Kageyama 2022).

![Simultaneous Heart rate Measurement with the Wearable Device (Hashimoto 2022)](image)

**Motion Capture**

Motion capture or analysis is an even newer development in the biometric realm that hasn't been fully taken advantage of at this point. Motion analysis has been a leading factor in the advances of safety in sports sciences, yet there is a lack of overlap of the technology in everyday human analysis (Wu 2016). Motion capture needs a few vital kinetic variables to allow for an accurate analysis of body movement. According to a study, velocity, acceleration, and angular rotation are key elements for understanding how injury or atrophy may occur within someone (Ammann 2020). With the advancements in motion analysis or motion capture allowing for advancements in wearable sensors, the widespread use of the technology may be used in more industries to help with understanding safer biometric movements to prevent accidents (Ammann 2020).
Methodology

The methodology for this research paper was informal interviews with insurance professionals, interviewing those on the insurance agency side and the construction side. The informal interviews allowed for the discussion of the topic to flow smoothly and freely as each person's understanding of biometric devices varied. The selection process of individuals interviewed was narrow as they needed to have an understanding of the insurance side of construction, as well as enough experience within the insurance world to understand insurance premium calculations as they are today. By looking at both the insurance carrier's viewpoint as well as the construction company's viewpoint, it allowed for a better understanding of how both sides view the implementation of this technology in the future of construction.

The process of finding the appropriate individuals to interview required research and resulted in contacting both general contractor insurance specialists and insurance carriers. Once selected, a basic email was sent to gauge their interest and understanding of the project. After interests and qualifications were apparent, a call was scheduled along with an email with the baseline questions to allow for a more accurate and trackable approach to documenting the responses.

Interview Structure

The questions sent were prepared informally to ensure free-flowing and easy conversations ensue throughout the interview. The questions started with a few points to gauge their understanding of biometric devices, especially heart rate monitors and motion capture. If the interviewee had more of an understanding of this type of technology, they would swiftly be moved to the next set of questions. If the interviewee was less knowledgeable about biometric devices, the interview would continue with a deeper background of the technology to ensure clarity of the following questions.

The following set of questions consisted of understanding the carrier or general contractor's viewpoints on the use of biometrics in the insurance side of construction. The questions aimed to gauge the interviewee’s thoughts about all aspects of biometric use in construction insurance. Throughout the entire interview, clarification on ways biometrics might be a help in different categories was presented to ensure full comprehension of each question and scenario.
Most individuals contacted were intrigued by the topic as they were targeted insurance professionals, and it was a unique set outlook on insurance calculations. Gaining knowledge from both the general contractor's outlook and insurance carriers was a very important distinction in the interviews as they had many disagreements in their responses based on how the biometric technology would help or hinder their companies. Yet many of the interviewees had agreements on the technologies implementation as well as an understanding of the common goal that biometric technology could bring to construction insurance.

There was also a group of both construction individuals and insurance carriers that were unwilling to interview as their lack of knowledge of biometrics hindered their understanding of the topic.

Results and Analysis

To allow for the ease of understanding of the similarities and disagreements between the general contractor insurance specialists' and insurance carriers' thoughts, this section will be broken into three parts: General Contractors, Insurance Carriers, and Agreeance. With this separation, it will allow for a better understanding of how both interviewed parties thought biometrics would benefit or hinder their respective companies, yet finish with the ideas they thought biometrics could benefit the industry as a whole.

General Contractor Insurance Specialists

Individuals on the construction side of things seemed to be persistent in the fact that the implementation of these biometrics measurements would allow for a better log of improvement in their insurance claim calculations. In an interview with Joey Strauss, the insurance specialist with Skyline Construction, he talked about one of the biggest revelations that this technology could bring to the industry is in the prevention side of biometric implementation. Knowing the most prominent places and tasks where injury or accidents occur on a job site could potentially reduce the laboring effects of the industry. Strauss emphasized the most common workers' compensation claims he has seen in construction are lower back and shoulder pain that hinder workers from doing their jobs. Strauss stated that using specifically the motion capture technology to analyze workers lifting techniques and shoulder movements could allow for a more extreme safety and prevention plan to reduce these wear and tear claims that are so prevalent.

Another insurance professional and project manager, John Dunsing, had similar thoughts about the use of biometrics within the construction industry. Dunsing reinforced the possibility for the technology to allow for a fairer and more accurate analysis of the company’s overall workers' compensation calculation. An example of this would be going back to the accurate logging that these devices could provide which could help prove a claim as legitimate rather than a worker trying to take advantage of the insurance policy being in place. The technology of heart rate monitors and motion capture could be used to cross-reference the worker's claims before they are investigated by the adjusters. This would in turn lower the total number of claims companies would receive and could lead to the lowering of workers' compensation premiums.

It was also mentioned that as workers' compensation is currently calculated, larger companies are favored as they will have more working hours to take into account in their premium calculation. The effects that biometrics could have on smaller companies and minimizing their insurance claims could
allow for smaller companies to prosper rather than struggle at the face of claims ruining their experience modification rating.

Insurance Carrier Specialists

On the other side of insurance claims are the insurance carriers, who had their own unique opinions on the state of implementing biometrics into the construction industry. While the insurance specialists working under general contractors thought that biometrics could allow for fairer premium calculations for workers’ compensation, Greg Martin, the CEO of High Ground Insurance Services, had other thoughts. In his opinion, the current system has many ways to reward the contractors with good loss avoidance and penalize the others. He states that although biometrics could help contractors minimize their injury claims to workers’ compensation, the current calculations have worked in the past and are plenty fair to contractors of all sizes. He admitted to the fact that his views were more conservative on implementing new technology into an already thriving system, but he didn’t see the need to add another form of reward or penalization calculation. Nevertheless, Martin did state that if there was an implementation of this technology were to go through, the data that it could provide could allow for the insurance carrier to give a credit to the contractor which would act as a premium reduction.

In a second interview with Kevin Weiser, a broker and Insurance expert with Newfront Insurance Corporation, talked more about the advancements in this biometrics technology in the insurance industry as a whole. Weiser noted that he has seen many presentations on biometric tools, including motion capture and heart rate monitors, yet there has yet to be physical implementation into the construction industry. Weiser stated that he has seen biometric technology start to be implemented in other industries such as transportation services, where truck drivers’ biometrics are watched to try to prevent accidents. He stated that there could be a parallel between this and heavy machine operators, providing a safety net and reducing some of the most common accidents on the job. Yet Weiser emphasized that he had talked to a loss control manager of a construction insurer and they have not had any experience with the technology as of yet, but could see it trend that way into the future.

Agreement

Although there were many disagreements in views between the contractor's and insurance carriers' views on biometric technology integration into insurance calculations, many of the interviewees had an agreement on biometrics use for fraudulent claims or unjust rulings on the claim. For the insurance carriers, they focused on the fraudulent claim side of things. Each interviewee had the insight of using the tracked and logged biometric information to physically show the traumatic reading on the biometric devices to confirm that it had happened. The most common example that was given throughout the interviews was that of a strained back while lifting something heavy. In this scenario, the biometric data could prove an increase in heart rate and logging of the lifting movement, yet it could also show that no lifting was done. This is where the accuracy of being able to see the change in someone's biometrics could come in handy when determining the truthfulness of the claim.

In addition to the reduction in fraudulent claims, they agreed that the biometric technology would allow for a quicker settlement of the insurance claim. When an injury occurs, the company or injured employees will have out-of-pocket expenses until the claim is verified and settled. This was acknowledged as a problem from both sides as it could lead to problems for cash flow depending on the severity of the injury. Being able to justly and swiftly payout the claim proves to be an extreme benefit of the new biometric technology integration into the construction industry.
The final point that the different groups agreed upon was the potential drawback of biometric information being classified as healthcare information which could slow its implementation into the industry. They believed that this could cause problems with gaining access to these biometric measurements of all employees as special sign-offs might be necessary. They believed that this is only a hurdle until the technology initially breaks into this conservative industry that doesn’t do well with change. Once this is figured out, most people agreed that the eventual benefit of biometrics can be major in reducing the premium costs that construction companies pay and increasing profit for the companies.

**Conclusion and Future Research**

After extensive research on the implementation of biometric measurements to help reduce construction insurance costs, especially that of workers' compensation, it seems to be that there is little room for the immediate execution of the technology. Although many see a long-term benefit of the use of biometrics in the construction industry, its use has many hiccups that need to be figured out before the technology can make a full launch into the old-fashioned and labor-intensive industry. However, there is room for the technology to advance in other industries and have an eventual cross-over into the construction industry.

Although many can see the long-term benefits that biometric measurements could bring when calculating insurance premiums, such as the reduction in injury frequency, the decrease in fraudulent claims, and the ability for quicker claim settlements, there are a lot of details that need to be figured out first. The main concern is the classification of the biometric measurements as most believed it could be considered healthcare information. The privacy concerns for the employees that would be having their bodies measured for biometric purposes could propose a problem of getting a sign-off agreement from each employee. If this drawback was resolved, most see a benefit for the construction companies who choose to implement this newer technology.

Future research on this topic, there would need to include an analysis of how these kinds of biometrics are classified in terms of employee privacy rights. There can also be an in-depth analysis of biometric implementation in other industries to try to draw comparisons between its use in that industry compared to the construction industry. This might also allow for one to look into how biometrics might help more types of insurance rather than that of workers' compensation that is focused on in this paper. To complete this, it would require a more in-depth conversation with a specialist on biometric tools so those in the insurance world can gain a deeper understanding of the power that the technology can bring to this dangerous industry.


