Spring 2023 Newsletter

International Society for Occupational Ergonomics and Safety

Letter from the President

Dr. Marc Snell

ISOES President 2022-2023

Spring is here. The year 2023 brings new opportunities to come together and speak on issues related to safety and ergonomics. The waning of the COVID pandemic means the world is able to meet in person. To that end I am pleased that the 2023 ISOES conference can finally be held in person again. ISOES is pleased and proud to collaborate with SISE to bring you the 2023 conference Munich, Germany. The conference will be fully hybrid, meaning your can attend and/ or present in person or digitally. From October 9-10th the ISOES/SISE conference will be held at the Freising Campus of the Technical University of Munich. All the relevant details can be found here: https://isoes.info/conference_home.html. Abstracts can already be submitted using the our EasyChair system, and are due by April 30th. Authors will be notified of acceptance by May 15th, 2023. Full papers or extended abstracts and conference registration will be due by June 30th, 2023. As in previous years, there is a student award with up to $500 available for up to 2 student papers. Be sure to read all about the requirements and the award here: https://isoes.info/conference_student.html

Other upcoming events in the ISOES community include our booth at the ASSP conference in San Antonio, Texas from June 5-7th. ISOES is extremely thankful to ASSP for providing us a booth free of charge. At this booth we are able to showcase ISOES and the benefits it provides. If you are interested in volunteering at the booth, please get in contact with our past president, Steve Fleming (steve@pageengineering.net). Volunteers receive full access to the conference for free and the exhibitor floor. Even if you do not have time to volunteer, we encourage members to both stop by to speak with our fantastic volunteers.

Finally, I would like to remind all our members to pay your membership dues. These dues enable us to provide you with fantastic services, such as our newsletter, our website, and our annual conference. ISOES is proud to request membership dues on the honor system. If you need to renew your membership, please take a moment to do so; 1-year and 2-year renewals are available. See the website for details: http://www.isoes.info/membership.html. For questions about your membership status or for any other questions or comments, please send us a note at ISOESinfo@gmail.com.

Manual Material Handling Tasks for Loading and Unloading Materials in West African Countries

Udemba Chiemezie Anthony

International Member at Large

Manual material handlings tasks, such as loading and unloading materials, are an integral part of logistics and supply chain management in West African countries. From the years 1996 to 2022, workers in some West African countries, including Burkina Faso, Cabo Verde, Cote d'Ivoire, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Sierra Leone, and Togo, were affected by injury-leading to musculoskeletal disorders (MSD). These handling tasks are often physically demanding and can lead to workplace injuries and disabilities, especially in countries where health and safety regulations are lacking.

The purpose of this study is to provide an overview of the current manual material handling practices in West African countries and identify opportunities for improvement. This study also evaluates the body of literature on various material handling tasks, identifies the biomechanical and performance evidence supporting their use, and discusses the variables that might influence how they are used during loading and unloading tasks.

Because there is no effective prevention and, currently, little potential for change, approximately 95% of injured workers die in this region of the world. The above-mentioned West African countries rely heavily on manual labor for loading and unloading materials in various industries, such as agriculture, mining, construction, and transportation. This manual work is often performed by unskilled workers and can result in musculoskeletal disorders, back injuries, and other health problems. Using ergonomic interventions such as the manipulator and position can be introduced to reduce the influence of injury which will enhance worker productivity in such under-developed nations.

Studies have demonstrated that prolonged exposure to these work conditions may cause handler fatigue. If this fatigue persists and is not managed or treated, the risk of musculoskeletal injury to the handler rises.

Current manual material handling practices in West African countries are often characterized by using manual labor and a lack of equipment or technologies to assist with the tasks. Manual load handling is hazardous and increases the risk of injury due to several risk factors. These can be divided into five primary areas: the load, the task, the environment, organizational and psychosocial variables, as well as individual and lifestyle factors. Research has also provided evidence that ergonomics awareness training adoptions and lack of ergonomics guidance as one of the reasons. Workers often lift heavy loads without proper training or equipment, such as gloves, back braces, or mechanical aids. Additionally, workers may be required to perform tasks in awkward postures, such as bending or twisting, which can increase the risk of injury.

There are several opportunities for improv-

A systemic illustration of manual material handling tasks for loading and unloading materials in west African countries is shown above (Source: *job man work in Nigeria does offloading container - Bing images* and *job man work in Nigeria does offloading container - Bing images*) cited on 2/1/2023.

ing manual material handling practices in West African countries, including:

1.   Implementing ergonomic intervention by providing workers with equipment to assist with lifting and reducing the weight of loads.

2.   Improvement of training regarding safe lifting techniques and the use of equipment can help to reduce the risk of injury and increase efficiency.

3.   Developing health and safety regulations to address manual material handling tasks can help to ensure that workers are protected from injury.

4.   Investing in equipment and technology such as conveyor systems, forklifts, and cranes can help to reduce reliance on manual labor and improve efficiency.

This study concludes that manual material handling tasks are an important aspect of a productive work environment and improving these practices can help to reduce the risk of injury and increase efficiency, which can have a positive impact on the health and well-being of workers and the overall economy in West Africa. The investigation of MSD benefits greatly from mathematical modeling since it aids in the comprehension of injuries and offers workers relevant data for decision-making. It is also believed that acknowledging individual preferences for change will increase the acceptance of these workplace interventions. Companies must evaluate the health risks at work and take action to reduce them by adopting ergonomics and primary prevention (i.e., the work must fit human capabilities).

What's Your First Call to Obtain Assistance with Your Safety and Health Program?

Safety Managers often struggle with too many things to do with too little time to get them all done. A lot of organizations I work with struggle balancing workload and time in the safety department. Data, especially Workers' Compensation, but also including General Liability and Property may not be readily available at the local level. Claim data is available, but it may be housed with the Risk Manager or Chief Financial Officer (CFO), who may or may not share it with local Safety Managers for their location. But they should share it with any Corporate Safety Director if your organization has one. Each company is a little different.

Having a good working relationship with your companies Corporate Safety Director is a good first step. If you have a corporate level safety director, they will have access to injury data for your location. Corporate Safety will also have access to the insurance company and broker, that generally provide safety assistance services as a part of the insurance package. These services are planned out as a part of the insurance package and will be valid for the length of the policy period. But this type of information doesn't always get communicated to those that really need it at the local plant level.

For example, I worked with a very large company a few years back. The Risk Manager included a package of services designed to help the company's divisions combat safety risks. One of the division safety heads knew about the budget, others didn't know or didn't ask. The result was this safety manager planned to use the money for a number of risk-control project designed to lower his injury rate. Other divisions of the company could have shared in the budget if they asked. But they didn't ask or forgot about it.

The point here is to be aware of assistance from your insurance provider, as they have specialists in a number of safety areas, including data analysis, fleet, industrial hygiene, ergonomics, property, industrial safety audits, training programs, etc. If you have holes to fill in your safety management system, these types of services may be available from your insurance carrier or broker. All you have to do is ask.

Dr. Richard Wyatt

ISOES President Elect 2022-2023

Leveraging AI and Machine Learning for Ergonomics and Safety

Dr. Jaejin Hwang

International Member at Large

According to the Bureau of Labor Statistics, there were approximately 2.6 million nonfatal workplace injuries and illnesses reported by private industry employers in 2021 (BLS, 2022). Many of these injuries could have been prevented with the help of advanced technologies like artificial intelligence (AI) and machine learning. Here are some ways in which machine learning can assist in ergonomics and safety.

Predictive analytics: Machine learning algorithms can analyze data related to workers' behavior, such as movement patterns, muscle activity, and postures, to predict potential ergonomic hazards. By identifying risks, employers can take proactive measures to prevent workplace injuries and promote safety. For example, this practice has already been well applied to BMW's SERA (Safety & Ergonomics Risk Assessment). Our lab (WE-LAB) also recently published an

article about how a deep learning-based method could predict grip strength (Hwang et al. 2021).

Real-time monitoring: Wearable technology, such as sensors and smartwatches, can be used to monitor workers' vital signs and alert supervisors to potential health issues or hazardous situations in real-time.

Virtual ergonomics assessments: Machine learning algorithms can be used to create digital models of workers' movements and postures to simulate potential ergonomic hazards. This can help employers identify and address potential ergonomic risks before they become real problems.

Injury prediction: By analyzing historical data on workplace injuries, machine learning algorithms can identify patterns that can help predict future injuries. Em-

ployers can then take steps to prevent these injuries from occurring in the first place.

Training and education: Machine learning algorithms can be used to create customized training programs for workers based on their individual needs and learning styles. This can help improve worker safety by providing tailored instruction on proper lifting techniques, postures, and other ergonomic considerations.

AI and machine learning technology may have the potential to revolutionize workplace safety and ergonomics. By providing data-driven insights into potential hazards, enabling proactive prevention measures, and supporting more effective training and education programs for workers, these technologies can help create safer and healthier workplaces.
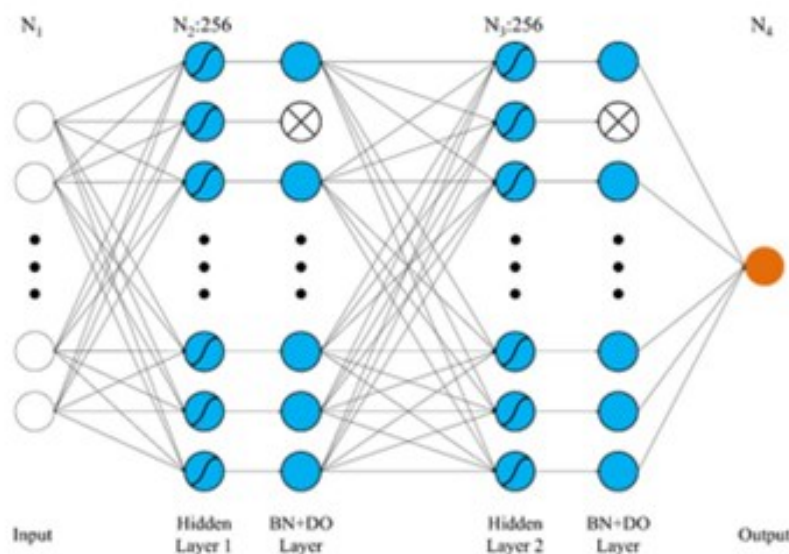
The neural network architecture for predicting a grip strength (Hwang et al. 2021)

References

Bureau of Labor Statistics. (2022, November 9). Employer-Reported Workplace Injuries and Illnesses – 2019. Retrieved from https://www.bls.gov/news.release/pdf/osh.pdf

Hwang, Jaejin, Jinwon Lee, and Kyung-Sun Lee. "A deep learning-based method for grip strength prediction: Comparison of multi-layer perceptron and polynomial regression approaches." *Plos one* 16.2 (2021): e0246870.

Adjusting a Railroad Freight Car Drawbar—Hand Force Measurement

Railroad freight cars are connected by coupler drawbars with coupler knuckles at the end of each drawbar. The drawbars can move laterally to accommodate train movements around curves. Drawbars can also move longitudinally to accommodate the transitions of stopping and starting more smoothly.

Occasionally, the coupler drawbar must be adjusted by hand, typically in a railroad yard or industry siding during freight car switching activities.

One of the common methods used to adjust a coupler drawbar by hand is to back into the drawbar with one's rear end and slightly lift the drawbar with your hands at the same time—the "back into" method. To assess this task biomechanically, it is necessary to measure the hand forces need to make this movement and to measure the push force of one's rear end—pushing with the legs. Up until now, the measurement of the forces exerted by each hand has not been assessed.

The author and his team have used Tekscan™ hand pressure mapping to measure the forces needed to perform a variety of railroad tasks. In this instance, the Tekscan™ approach was used to measure the left and right hand forces exerted to perform this task.

Measurement of the push force of the rear end is a subject for another article.

Figure 1, below shows the task being performed. It also shows the pressure mapping for each hand and the associated hand force for each hand. The pressure mapping was calibrated to hand force using a Jamar™ dynamometer before and after the task was performed.

This hand force data can then be used to assess the task of adjusting a coupler drawbar using the University of Michigan's Three Dimensional Static Strength Prediction Program™.

George Page
MSE, CPE

ISOES
Member at Large

Drawbar adjustment using the "back into" method; pressure mapping for each hand and associated hand forces (28.8 lbs.—right hand; 8.4 lbs.—left hand) .

Double Prejudice: The Challenges Faced by Immigrant Women in the Workplace

Dr. Gabriel Ibarra-Mejia

Member at Large

A person's immigration status might create barriers to opportunities for advancement and safety on the job, success in school and the ability to earn a degree, and overall well-being. Unfortunately, despite the devastating repercussions, government officials and some scientific community members have generally overlooked the effects of occupational danger and pollution on the health of Latino immigrants. In addition, neither the federal nor state governments keep track of the necessary information.

There is a correlation between the high rates of poor health outcomes, injuries, and deaths in the workplace and the high rates of immigrant workers. Women immigrants, in particular, may confront unique challenges in accessing necessary medical care once they arrive at their final destinations. After that, immigrants will work in dangerous occupations where they face uncertain conditions exacerbated by their lack of legal protections in the workplace. For instance, temporary visitors to the United States who are not permitted to work are subject to fewer or no protections afforded by U.S. labor laws.

This scenario defines and restricts the types of work and lifestyle options available to these populations.

Physical effort demands, repetitive motion, manual handling, high heights, tools and equipment, and outside environmental conditions are only some of the physical risks immigrants frequently face on the job. In 2018, 56.6% of immigrant women were employed in the United States (American Immigration Council, 2020). These women worked in a variety of fields, including management, business, science and arts, service, sales, and office, as well as production and transportation. They are also involved in agriculture, food processing, sales, child care, and housekeeping. In addition, most of the jobs available to them will be low-paying or dangerous. Because of their dual roles as immigrants and women, migrant women may experience double prejudice in the job. For example, verbally abused workers are more inclined to put in extra hours or work in dangerous conditions, earn less money, and are more likely to experience physical aggressiveness. In addition, there is evidence that immigrant female

workers have been subjected to physical, emotional, and sexual abuse in some workplaces.

More has to be done to protect workers, especially immigrant women who may lack the knowledge, skills, and resources to keep themselves safe. Thanks to an award by the Programa de Inmihgracion y Salud (PIMSA) from the University of Californa-Berkeley, we are conducting research at the University of Texas at El Paso to determine and assess the need for worker protection and safety, particularly among immigrant women who may lack access to information, training, and other safeguards. We aim to influence a policy change that will provide awareness and knowledge of health status, aid in cultural adjustment, and better equip them to protect themselves on the job.

CALL FOR PAPERS

XXXVth Annual International Conference
International Society for Occupational Ergonomics & Safety
Munich (Freising), Germany
October 9-10, 2023

This joint conference is being held in cooperation with SISE

Registration Cost
(includes admission to the joint ISOES and SISE conference)
More information

Type	Early (by April 30)	Regular (after April 30)
Full (in person)	500€ (~$525)	600€ (~$630)
Online (attending and/or presenting)	300€ (~$315)	400€ (~$420)
Student	200€ (~$210)	250€ (~$262)
Group Discount (≥3)	450€ (~$473)	500€ (~$525)

Submission Requirements & Deadlines
More information

Abstract Submission (350 words): April 30, 2023
Abstract Acceptance Notification: May 15, 2023
Final Abstract/Paper Submission* Jun 30, 2023

The following types of contributions from students, academic researchers, and practitioners are welcome: original research, pilot and ongoing studies, case studies, thematic literature reviews, dissemination articles, and research protocols. These contributions will be subject to peer review before acceptance.

- All submissions are to be made via EasyChair: ISOES Submission Portal
- Final Submissions: Max 6 Pages for Full Papers OR 2 Pages for Extended Abstracts

All details can be found at: https://isoes.info/conference_home.html

Industry

Aerospace
Agriculture
Automotive
Construction
Defense
Electronics
Fishing
Forestry
Health Care
Info Technology
Manufacturing Marine
Mining
Oil and Gas
Office
Retail
Transportation
and Others

Topics

Ergonomics & Human Factors
- Physical
- Cognitive
  - Perception/Processing/Memory
  - Distraction/Inattention/Boredom
- Organizational
- Psychosocial

Safety & Health
- Systems/Behavioral
- Home
- Risk Assessment/Management
- Artificial Intelligence
- Automated Vehicles/Equipment
- Robotics/Exoskeletons/Wearables
- Prevention through Design
- Virtual/Augmented Reality
- User Experience/Usability

Workplace Exposure Examples
- Aging Workforce
- Health & Wellness
- Stress & Fatigue
- Remote Working
- Sit vs Stand
- Vibration Exposure
  - Whole-body & Segmental
- Slips, Trips, and Falls
- Repetitive Motion
- Work Rest Cycles
- Musculoskeletal Injuries/Disorders
- Environmental
  - Temperature, Air Quality, Lighting, Noise, Electromagnetic Radiation
- COVID-19 Related Issues
- Other Emerging Topics

ISOES 2023 Conference Proceedings will receive a unique DOI (Digital Object Identifier)
Abstracts/Papers will be published in the ISOES Conference Proceedings.

Student Excellence Awards
More information

- ISOES will select up to two student full papers, with the student listed as the first author, to receive a monetary award not to exceed a combined sum of $500.
- In addition to the monetary award, award recipient(s) will receive an official certificate of recognition and a free two-year membership to ISOES.
- Student candidates must be currently enrolled in an accredited university pursuing an undergraduate or graduate degree with an ergonomics or safety focus.
- Award recipient(s) will be expected to register and present his/her research at the October 2023 annual conference.

Conference Organization Committee

Marc Snell (Chair), Anand Iyer, Steve Fleming, Richard Wyatt, Anoop Desai, Gabriel Ibarra-Mejia, George Page, Jaejin Hwang, Anthony Udemba, & James G. Borchardt.
For more information visit https://isoes.info. For questions contact isoesinfo@gmail.com.