NECA SAFETY PROFESSIONALS CONFERENCE

Task Demands: A New Perspective on Pre-Task Planning

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- MS and BS in Civil-Construction Engineering
- Research Interests:
  - Safety & Health
  - High-reliability work systems
  - Pre-task planning and performance improvement

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CPWR

- The Center for Construction Research and Training
- A nonprofit organization established by NABTU (North America's Building Trades Unions) in 1990
- Located in Silver Spring, MD
- Activity areas: research, training and service
- NIOSH's National Construction Center
- Dedicated to reducing occupational injuries, illnesses and fatalities in the construction industry

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JHA/PtP Preliminary Findings

- Mainly from a compliance perspective.
- Minimal opportunity for workers' input.
- Lack of task-specific content.
- Inconsistency between JHA/PtP content and task requirements.
- Lack of "buy-in."
- Lack of workers' engagement in site safety planning.

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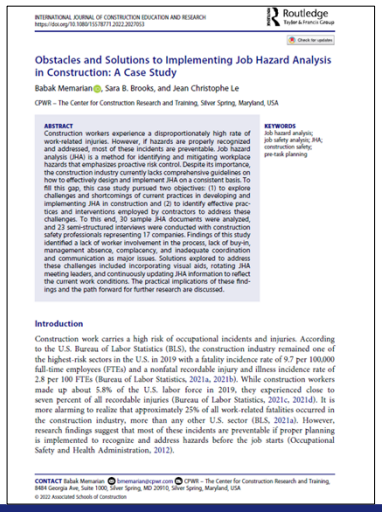
JHA/PtP Preliminary Findings (Cont.)



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Obstacles and Solutions to Implementing Job Hazard Analysis in Construction: A Case Study

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ABSTRACT

Construction workers experience a disproportionately high rate of work-related injuries. However, if hazards are properly recognized and addressed, most of these incidents are preventable. Job hazard analysis (JHA) is a method for identifying and mitigating workplace hazards that emphasizes proactive risk control. Despite its importance, the construction industry currently lacks comprehensive guidelines on how to effectively design and implement JHA on a consistent basis. To fill this gap, this case study pursued two objectives: (1) to explore challenges and shortcomings of current practices in developing and implementing JHA in construction and (2) to identify effective practices and interventions employed by contractors to address these challenges. To this end, 30 sample JHA documents were analyzed, and 23 semi-structured interviews were conducted with construction safety professionals representing 17 companies. Findings of this study identified a lack of worker involvement in the process, lack of buy-in, management absence, complacency, and inadequate coordination and communication as major issues. Solutions explored to address these challenges included incorporating visual aids, rotating JHA meeting leaders, and continuously updating JHA information to reflect the current work conditions. The practical implications of these findings and the path forward for further research are discussed.

KEYWORDS

Job hazard analysis; job safety analysis; JHA; construction safety; pre-task planning

Introduction

Construction work carries a high risk of occupational incidents and injuries. According to the U.S. Bureau of Labor Statistics (BLS), the construction industry remained one of the highest-risk sectors in the U.S. in 2019 with a fatality incidence rate of 9.7 per 100,000 full-time employees (FTEs) and a nonfatal recordable injury and illness incidence rate of 2.8 per 100 FTEs (Bureau of Labor Statistics, 2021a, 2021b). While construction workers made up about 5.8% of the U.S. labor force in 2019, they experienced close to seven percent of all recordable injuries (Bureau of Labor Statistics, 2021c, 2021d). It is more alarming to realize that approximately 25% of all work-related fatalities occurred in the construction industry, more than any other U.S. sector (BLS, 2021a). However, research findings suggest that most of these incidents are preventable if proper planning is implemented to recognize and address hazards before the job starts (Occupational Safety and Health Administration, 2012).

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What we propose

Let's think beyond just compliance!

"Learn and incorporate what workers say about the task."

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Problem Statement

- A lack of highly reliable work systems that ensure safety, health, and well-being.

- **What have other high-risk sectors done?**
  - Focused on **task design.**
  - Aviation (NASA) initiated **Task Demand Vs. Capability.**
  - Adopted by other high-risk sectors like healthcare and military.

- **How about the construction industry?**
  - Very limited.
  - Tested by Memarian and Mitropoulos in masonry, roofing, and concrete work.

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Task Demands

Task demands: knowledge, skills, and effort required for successful task performance

- **Physical demands:** energetic, biomechanical and environmental demands
- **Mental demands:** require cognitive inputs: concentration, memory, decision making and attention
- **Temporal demands:** time pressure experienced during task performance
- **Psycho-social demands …** How would you define them?

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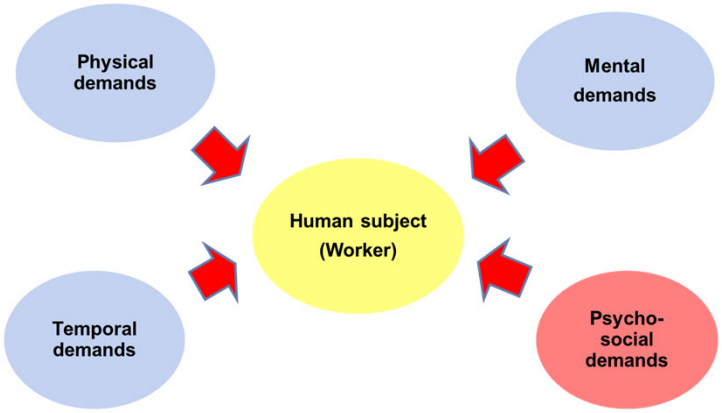
Task Demands



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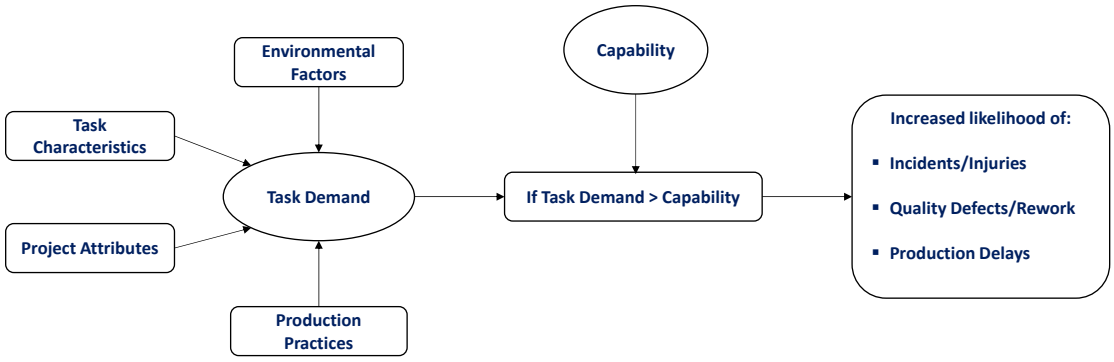
What it means!



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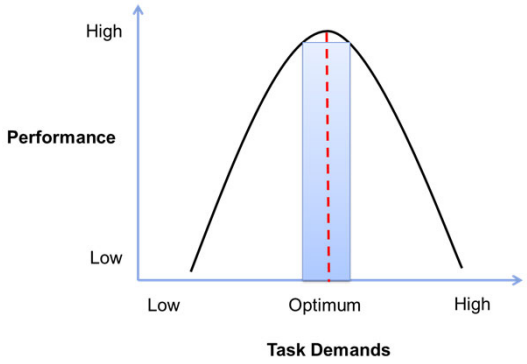
Task Demands & Performance

- Performance is affected when the task demand is too high or too low.

- **High workload (overloading)**
  - Increased response time
  - Increased stress
  - Fewer tasks performed
  - Increased likelihood of error

- **Sustained low workload (under-loading)**
  - Increased mental fatigue
  - Increased monotony
  - Reduced vigilance
  - Increased likelihood of error



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What we are doing

- Focus on Electrical Construction, one of the higher-risk trades.
- Explore task factors that increase task difficulty (demand) from workers' perspectives.
- Identify interventions to alter work processes to eliminate or mitigate such factors.

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Outputs

- Supplemental Task Analysis documents for **JHA** and **Pre-task Planning**:
  - Task factors and project attributes that increase task difficulty for electrical tasks
  - Effective work practices and interventions to eliminate or mitigate such factors
- A **Task Difficulty Assessment Tool** to enable contractors to establish continuous task improvement throughout the project lifecycle.

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Our Approach

- Formed an Industry Advisory Group.
- Identified electrical tasks to be studied.
- Interview workers to measure perception of task difficulty and identify contributing factors.
- Interview management to identify effective work practices and interventions.
- Observational analysis of field operations.

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Worker Interviews

- 15-20 minutes one-on-one, anonymous interviews
- Onsite during task performance
- We ask workers to:
  - **First;** measure physical, mental, temporal (time), and frustration (1= very low and 10=very high)
  - **Second;** identify contributing factors – what makes your task challenging
  - **Third;** what tips and tricks do you suggest to simplify the task?

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Task Analysis Documents

- Documents are organized based on Task and Project Type
- Each document contains:
  - A brief task description
  - Project type
  - Task-specific challenges raised by workers
  - An image demonstrating the situation
  - Recommendations to address challenges and hazards grouped based on the Hierarchy of Controls

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Benefits

- Applicable for JHA, Pre-Task Planning, and Training
- Will be publicly available free of charge
- Easy to download and use in PDF and MS Word format
- Customizable for specific project needs
- Living documents; improved as more data collected

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Next Steps

- Conduct more interviews on various tasks
- Work with the Industry Advisory Group to revise and finalize Task Analysis Documents
- Develop more documents
- Disseminate findings

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Thank You!

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Complete the Online Evaluation

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