

instrument could aid in assessing perception. It is critical to look at the costs associated with perception in the workplace and the value attained by determining factors that influence it [7]. It was also crucial to determine what value current perception instruments add and recognize what they do or do not measure that could be critical to an organization's success.

Organizations have recognized various factors that impact the bottom line. Still, there is little research to demonstrate that they have focused on the value of understanding the impact of perception. An employee's perception can lead to miscommunication and poor collaboration, leading to lost productivity for organizations [2]. To improve the bottom line, assessments that focus on cultural-understanding and personality assessment have become popular in the workplace. Meinart [7] found that organizations spend more than \$500 million on personality testing. Therefore, it is critical to consider the research regarding perception to determine if organizations have the proper instruments to develop employees.

Perception is a broad term that can include measuring everything from bias to visual recognition differences. It is critical to consider how perception can impact relationships and decision-making. Glaeser, et al. [8] researched variables that predict behavior. One critical reason prediction of factors that influence behavior continues to receive attention is because of the cost of low engagement. Gallup [9] estimated that "actively disengaged employees cost the U.S. \$450 billion to \$550 billion in lost productivity per year." Suppose organizations can determine factors that impact the perception process. In that case, the issues with miscommunication, intolerance, lack of inclusion, and other social problems that lead to low engagement, could be critical to help reduce these corporate losses.

Ripley [10] took this foundational research and incorporated that into a methodology for determining employee perceptions. Ripley found variables such as communication, design of work, characteristics of the work setting, personal fit of employees, and workgroup influenced perception. However, Ripley's work did not focus on the process of perception and the variables that could impact that process.

Rossi and Berglund [11] continued exploring to determine characteristics that impact human perception and interpretation. Attempting to quantify perception has been referred to as "measuring the impossible" in a European call for research projects by the European Commission [12] due to the challenge of measuring and estimation of sensory events. Rossi and Berglund noted that there were challenges with the

measurement of perception, including the impact of language, logic, and modeling.

This literature review focused on the available assessments to determine if a new assessment could provide additional insight into the factors that impact perception. Although the available assessments add value to the research, there are few available for review and they are limited in scope. As organizations focus on issues like culture, generational and gender differences, it is an opportune time to recognize the impact of taking a holistic view of influences that can be categorized under the term perception. Just as emotional intelligence encompassed factors that included interpersonal and intrapersonal relationships, perception can include influences from intellect, emotion, culture, and personality influences such as curiosity [13]. The current research sought to determine if these influences could be quantified to create an instrument for organizations to determine a perception quotient (PQ).

3. DESIGN

The following research was performed to determine factors that impact perception.

4. METHODS

Having met IRB and CITI certification requirements, a test pilot was conducted. To validate a survey instrument, the following order of processes was important: Establish face validity, pilot test, clean dataset, principal component analysis, Cronbach's Alpha, and revise and repeat as needed.

4.1 Analysis

To determine potential factors that could impact perception, data were collected from two groups. The first sample consisted of business leaders (75 women and 92 men) from a virtual leadership group. The second sample consisted of business professionals (120 women and 110 men) from a social media group. This assessment was not intended for children. All participants were over 18 years of age. Many of the perception instruments have been tested on children or focused on music or other elements not related to the business setting [14]. However, this assessment was intended for use in working adults; therefore, the sample was obtained from business professionals. An exploratory factor analysis was used to examine the data.

Participants were asked to list the factors that they believed played a part in their perception process. This was an open-ended question that led to a variety of responses. The data were analyzed for patterns. Responses were grouped together,

which led to the determination that, at face value, there could be four factors that impacted perception.

To create questions that could measure these actors, a psychometric statistician was consulting. Past research was used to determine the process other researchers in the field have used to validate their behavioral instruments, including [13, 15-17].

Questions were based on the four areas that were determined from the data obtained from the two groups. Evaluation included questions about recognition of intent, response to cues, and intrapersonal skills; Prediction included questions about recognition of others' vantage points, concern for how a message comes across, and interpersonal skills; Interpretation included questions about the meaning of language, reaction to cultural norms, and validating experience; Correlation included questions about making conclusions while considering logic, openness to experience, and negotiation skills. Questions created used a 5-point Likert scale (1=strongly agree, 2=agree, 3=neither agree nor disagree, 4=disagree, 5=strongly disagree).

There were two rounds of questions (n=1009, n=1114). In each round, respondents were instructed as follows: "The following is a survey to determine things that might impact your perception process at work. Please be sure to respond to all questions." The first survey included 32 questions, with reverse questions to check for honesty. However, the results did not support four factors and had a low Cronbach α . Some questions did not come out high on the factor analysis and were removed. Thirty-two questions were rewritten with the inclusion of reverse questions again to check for honesty. The second attempt was created to include questions that aligned more specifically to the issues addressed. Final factor analysis came in with alignment with four factors with a Varimax Rotation that indicated a Cronbach α of 0.89 for evaluation, 0.87 for prediction, 0.81 for interpretation, and 0.75 for correlation.

4.2 Example Questions

Evaluation – Demonstrating impulse control could potentially be interpreted as unfeeling by other people.

Prediction – It is important to pick up cues from watching people interact before making decisions about them.

Interpretation – I do not make conclusions without learning about all variables in a decision-making process.

Correlation – I believe others should not have to conform to my ethical beliefs.

5. RESULTS AND DISCUSSION

This study's primary goal was to determine if there were factors that could be attributed to the perception process. A pool of 32 items was used in the final instrument, with factor loadings collected for 1114 participants (Table 1). Eight of those items were used as reverse questions to determine honesty in responses. The demographics for the final group (n=1114) include 54% male and 46% female. Ages included: 21% were between the ages of 18-29; 23% were between the ages of 30-44; 31% were between the ages of 45-60, and 25% were over 60.

Question	Evaluation (E)	Prediction (P)	Interpretation (I)	Correlation (C)
1	-	-	0.594	-
2	-	-	-	0.651
3	-	-	0.747	-
4	-	-	-	0.599
5	-	-	0.862	-
6	-	0.645	-	-
7	0.677	-	-	-
8	-	0.748	-	-
9	-	-	-	0.581
10	0.720	-	-	-
11	-	0.776	-	-
12	0.651	-	-	-

Table 1: A sample of factor loadings for 12 of the questions (n=1114).

Throughout the two survey attempts, the questions that did not load well were rejected. The final assessment included 32 questions that included questions for each of the four areas that impacted the perception process. The Cronbach alpha was higher for evaluation and prediction (0.89 and 0.87), lower for interpretation (0.81) and lowest for correlation (0.75) (Table 2). Future research will need to be completed to determine if there is enough overlapping to re-evaluate factors. However, it was anticipated that it would be challenging to have factors that did not have some overlap.

Factor/Example Question	M (SD)	Cronbach's alpha
Evaluation		
Self-Assess	3.20/1.019	0.89
Prediction		
Assess Others'	3.01/1.125	0.87
Interpretation		
Critical Thinking	2.89/1.114	0.81
Correlation		
Cultural Influence	3.42/1.052	0.75

Table 2: Cronbach alpha for the four factors

The following is an example of factor analysis to demonstrate their alignment into four separate factors, which include evaluation, prediction, interpretation, and correlation. These questions that determined these factors demonstrated that perception is a process that leads conclusions that have been influenced by intellect, emotions, gender, and environmental issues such as culture and family.

6. CONCLUSION

The research effectively determined that the factors that impact perception could be quantified. The Perception Power Index (PPI) determined that perception is an EPIC process which includes evaluation, prediction, interpretation, and correlation to reach a conclusion. Employers can utilize this tool to create training that establishes a corporate culture that embraces the impact of perception on communication, innovation, engagement, and a host of factors that lead to improved productivity.

The PPI will be used as part of continuing research into the area of perception and the factors that impact it. It could be essential to research correlations between the process of perception and how it impacts performance, including engagement, productivity, and innovation.

A limitation of this study is that the data was obtained through SurveyMonkey, limiting the generalizability of the results. Although it is possible to know that the respondents were all over 18 years of age, it is impossible to determine if the respondents were working adults. In the future, it is vital to study employees in organizations to assess the factors that are most problematic in the real-world setting.

REFERENCES

- [1] Su, W. L., & Lin, X. Q. (2018). Influence of supervisor developmental feedback on employees' innovative behavior: The effect of core self-evaluation on work engagement [In Chinese]. *Science and Technology Progress and Policy*, 4(35), 101–107.
- [2] Haaskjold, H., Anderson, B., Laedre, O. & Aarseth, W., (2019). Factors affecting transaction costs and collaboration in projects. *International Journal of Managing Projects in Business*, (6).
- [3] Woods, S. A., Mustafa, M. J., Anderson, N., & Sayer, B. (2018). Innovative work behavior and personality traits: Examining the moderating effects of organizational tenure. *Journal of Managerial Psychology*, 33(1), 2942.

- [4] Gilbert, T. F. (1996), *Human Competence: Engineering Worthy Performance*, Amherst, MA; HRD Press, Washington, DC: The International Society for Performance Improvement.
- [5] Hackman, J.R. & Oldham, G. (1980). *Work Redesign*, Reading, MA; Addison-Wesley.
- [6] Lewin, K. (1997). Defining the field at a given time in D. Cartwright (ed.) *Field Theory in Social Science*, Washington, DC: American Psychological Association, pp. 200-11.
- [7] Meinert, D. (2015). What do personality tests really reveal? *The Society for Human Resources (SHRM)*.
- [8] Glaeser, E., Laibson, D, Scheinkman, J, & Soutter, C. (2000). Measuring trust. *The Quarterly Journal of Economics*, pp. 811-13.
- [9] Gallup Business Journal (2013). How to tackle U.S. employees' stagnating engagement.
- [10] Ripley, D. (2003). Methodology for determining employee perceptions of factors in the work environment that impact on employee development and performance. *Human Resource Development International*, 6(1), pp. 85-100.
- [11] Rossi, G. & Berglund, B. (2009). Measurement related to human perception and interpretation – state of the art and challenges. XIX IMEKO World Congress Fundamental and Applied Metrology, Lisbon, Portugal.
- [12] European Commission (2007). *Measuring the Impossible*, EUR 22424, European Communities.
- [13] Hamilton, D. (2018). Developing and testing inhibitors of curiosity in the workplace with the Curiosity Code Index (CCI). *Helyon*, 5(1).
- [14] Larrouy-Maestri, P., Harrison, P. & Mullensiefen, D. (2019). The mistuning perception test: A new measurement instrument. *Behavioral Research Methods*, (51), pp. 663-675.
- [15] Andrews, M. & Gatersleben, B. C. M. (2010). Variations in perceptions of danger, fear, and preference in a simulated natural environment. *Journal of Environmental Psychology*, 30, 473-481.
- [16] Collins, R. P., Litman, J. A. & Spielberger, C. D. (2004). The measurement of perceptual curiosity. *Personality and Individual Differences*, 36, 1127-1141.
- [17] Kashdan, T. B. (2009). *Curious? Discover the missing ingredients to a fulfilling life*. New York, NY: William Morrow.



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