



DR. BIMAL NEPAL

Associate Professor

Engineering Technology & Industrial Distribution
Texas A&M University

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Multistate Belief Probabilities-Based Prioritization Framework for Customer Satisfaction Attributes in Product Development

Abstract: The traditional approach to prioritization of customer satisfaction (CS) attributes includes methods such as analytic hierarchical process (AHP) that do not consider the correlation among CS attributes. This paper presents an analytic network process based framework that allows decision makers to prioritize the CS attributes by considering not only the correlation among the attributes themselves, but also the cross correlation among attributes and factors. Furthermore, the proposed framework employs Bayesian Belief Network methodology to deal with uncertainty in prioritization process due to subjectivity of the information during the early stages of product development. The belief probabilities are expressed in terms of conditional probabilities that reflect the contribution of an attribute toward a given prioritization criterion. In addition, we propose a novel approach to estimate the belief probabilities by considering different states of an attribute such as strong, average, and null. This approach improves the precision of the belief probabilities that are usually estimated through expert interviews. The framework is illustrated with an automotive industry case study with results presented for two disparate vehicle types.

Biography: Dr. Bimal Nepal is a Philipps'66 First Year Engineering Faculty Fellow and Associate Professor of Industrial Distribution in the Department of Engineering Technology and Industrial Distribution at Texas A&M University (TAMU). His research interests include: manufacturing and supply chain systems optimization, engineering decision and risk analysis, transportation optimization, quality and reliability, and new product development. He has authored over 80 refereed papers in leading journals and peer reviewed conference proceedings. His research has been funded by both government and private sectors. He is also a recipient of numerous teaching awards at TAMU both at the departmental and college levels. Dr. Nepal received Best Presenter Award at the Global Business, Economics and Finance Research Conference in UK in 2011. He has won the Best Paper Award in 2008 for Engineering Management Journal. In 2013, he was presented with Outstanding Alumnus Award by ISE Department at Wayne State University. He is a member of American Society for Engineering Education, American Society for Engineering Management, and a senior member of IISE. He is an Associate Editor for Supply Chain Management track of Engineering Management Journal.