

Lead-Time Estimation Approach using the Process Capability Index

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Abstract— This research proposes a methodology to estimate the customer order lead-time in supply chain based on the process capability index in manufacturing and service applications. The cases when the process output is normally distributed and when it is not are considered. The proposed method is used to examine the current process capability to deliver the orders before the promised lead-time. If the process was found to be incapable, the method can be used to revise the current lead-time to a proper value according to a desired service reliability level selected by the management. A Case study is presented to evaluate the capability index for the delivery processes in a multinational company in Egypt. The case presented estimates for the capability indices when delivering products belonging to G_1 , G_2 , and G_3 classes. Computation results reveal that the indices are 0.22, -0.257, and 1.01 respectively. Therefore, the process is incapable of delivering the G_1 and G_2 products before their promised due-date. The delivery process, however, does better job when delivering products belonging to class G_3 . The proposed estimation methodology was employed to revise the lead-time for the incapable cases. The relationships between the system capability indices in both service and manufacturing applications, delivery system reliabilities and the percentages of orders delivered after their promised due-dates are presented.

Keywords— Lead-time Estimation, Process Capability Index, Delivery System Reliability, Statistical Analysis, Service Achievement Index, Service Quality