ABSTRACT
Puerto Rico has not participated in the evaluation of the World Forum Competitive Index (WFCI) since 2015; consequently, the Puerto Rico Manufacturers Association (PRMA) created an index to measure productivity on a project level, known as the National Operational Excellence Index (OEI). As part of the evaluation, three out of the twelve pillars of competitiveness were covered: Innovation, Technological Readiness and Labor Market Efficiency. This study measured the impact of the implementation of the OEI in 2017 versus the actual 2018 performance. Each evaluation criteria was compared to identify the project development that needs attendance: Results and Culture categories. It was found that, overall, Biomedical had the higher scores for 2017 (but did not improve for 2018) and Pharmaceutical for 2018. It was also found that the variation decrease could suggest higher competitiveness over the years. This index can attract other industries to participate in the evaluation in order to be part of a competitive environment that promotes a collaborative business as part of a continuous improvement mentality, and not just an annual evaluation with no continuity.

INTRODUCTION
Since 2015, Puerto Rico has not participated in the World Economic Forum (WEF) evaluation of the WFCI, as seen in Figure 1; subsequently, the productivity of the island has not been properly measured. The PRMA has created an index that may be used to measure productivity on a project level, known as the National OEI (Desueza, 2018). With comparative statistical analysis tools between the years 2017 and 2018, the OEI of the industries’ projects can be studied to create feedback reports that would support the importance of the use of operational excellence practices in many industries, including benchmarking practices. Figure 2 shows part of Puerto Rico’s last WFCI evaluation results in 2015, pointing only the areas that the investigation will cover, which are: Innovation, Technological Readiness and Labor Market Efficiency. With the use of the OEI, this study contributes to competitiveness initiatives as an innovative value added assessment for the participating industries over the years.

OBJECTIVES AND SCOPE
- OEI evaluation to promote benchmarking practices and continuous improvement mentality.
- OEI evaluation for participating industries through 2017 and 2018: Medical Devices, Pharmaceutical, Biomedical, Aerospace, Confectionary, Manufacturing, Service, and Agriculture.
- Analyze the data collected from the Quest rubrics (2017-2018), based on a Lean Six Sigma project structure:
  - Define, Measure, Analyze, Improve and Control (DMAIC)
  - Results section
  - Culture section
- Develop conclusions and recommendations.

The 2017-2018 Evaluation of the National Operational Excellence Index in Puerto Rico
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METHODOLOGY
Evaluate Qualitative and Quantitative Data from Quest 2017 and Quest 2018
Evaluate Statistical Results by Industry Type, Company and Year
Conduct Hypothesis Testing to Measure Improvement and Consistency
Provide Conclusions and Recommendations
Generate Executive Summaries by Company
Illustrate Significant Results

OEI COMPONENTS
Results
Savings = Savings
Department’s Budget
Improvement = KPI after KPI before T

Culture
Ideas
# Implemented Ideas
# Employees in the area
Training = # Certified Employees
# Employees in the area

OEI Structure
2017
2018
DMAC 40% 70%
Results 40%
Culture 20% 15%
OEI TOTAL: 10 points (100%)

DATA

QUEST 2017

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<tr>
<th>TYPE</th>
<th>QUANTITY</th>
<th>MEAN</th>
<th>STD. DEV.</th>
<th>COEF. VAR</th>
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<tbody>
<tr>
<td>MEDICAL DEVICE</td>
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<td>5.05</td>
<td>1.43</td>
<td>28%</td>
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<tr>
<td>PHARMACEUTICAL</td>
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<td>5.84</td>
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<td>BIOMEDICAL</td>
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<td>8.63</td>
<td>0.78</td>
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<tr>
<td>AEROSPACE</td>
<td>6</td>
<td>7.25</td>
<td>1.21</td>
<td>17%</td>
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<tr>
<td>CONFECTIONARY</td>
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<td>1.14</td>
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<td>7.10</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Table 3: OEI results from Quest 2017 by Industry Type

QUEST 2018

<table>
<thead>
<tr>
<th>TYPE</th>
<th>QUANTITY</th>
<th>MEAN</th>
<th>STD. DEV.</th>
<th>COEF. VAR</th>
</tr>
</thead>
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<tr>
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<tr>
<td>PHARMACEUTICAL</td>
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<td>9%</td>
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<tr>
<td>BIOMEDICAL</td>
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<td>7.09</td>
<td>0.66</td>
<td>9%</td>
</tr>
<tr>
<td>AEROSPACE</td>
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<td>6.82</td>
<td>0.40</td>
<td>6%</td>
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<tr>
<td>MANUFACTURING</td>
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<td>11%</td>
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<tr>
<td>AGRICULTURE</td>
<td>1</td>
<td>6.50</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Table 2: OEI results from Quest 2018 by Industry Type

ANALYSIS AND RESULTS

- Mean results for 2018 show more consistency (std. dev.)
- Overall, the Biomedical industry had the highest index scores for 2017 (except in Culture). The Pharmaceutical industry had the highest index scores for 2018 (except in Measure, Analyze, Results and Culture).
- For 2017 at least one mean is statistically different, but for 2018 all means might be statistically equal.
- An improvement was observed for each DMAIC phase over the years, except for the Biomedical industry in every category, Agriculture in Define, and Aerospace in Improve.
- For Results, only Medical Devices improved. For Culture, only Pharmaceutical improved.

CONCLUSIONS AND RECOMMENDATIONS

- Although the industries improved in most of the categories, the Results and Culture categories need to be assessed to boost scores and promote competitiveness.
- The improvement in overall consistency suggests more competitiveness along industries.
- Offer support to those with a lower performance, in scores deficiency and consistency.
- Promote participation to those with inconsistent presence in the competition, or complete absence.
- Continue study to monitor and evaluate industries’ performance over the years. A Culture Index will be implemented in the next Quest competition.

REFERENCES

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