Prodoscore’s Organization and Employee Collaboration Score

Research conducted and validated by third-party Data Science team, in partnership with the Prodoscore Research Council

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Network density and network transitivity are two of the most important factors in running a successful company - they allow the company to have better communication and coordination between employees, laying the groundwork for more efficient and effective operations.

**NETWORK DENSITY:**
The number of connections within a network

**NETWORK TRANSITIVITY:**
A measurement of the likelihood that two connected nodes will also be connected
Benefits of High Network Density and Transitivity

**Increased creativity and innovation**
- When people are closely connected, they are able to share ideas and build on each other's work more effectively.

**Greater knowledge sharing and learning**
- Closely connected networks allow for more effective knowledge sharing and learning, as people can easily access information and expertise from others.

**More effective communication and coordination**
- High network density and transitivity make communication and coordination more effective since there are more pathways for information to flow.

**Greater team effectiveness**
- Closely connected teams are able to work more effectively together, as they can easily coordinate and share information.

**Increased organizational efficiency**
- High network density and transitivity can lead to increased organizational efficiency because there are more pathways for information and resources to flow.

**Enhanced competitive advantage**
- Companies with high network density and transitivity have a competitive advantage and are better able to innovate and respond to market changes.
Network Density
Collaborative Quantity Metric

Low Density = Sparse Network

High Density = Dense Network

- Network density refers to the number of ties or connections in a network relative to the maximum number of possible connections in that network
- The more connections that exist among employees, the denser the network
Network Transitivity
Collaborative Quality Metric

Low Transitivity = Loose Network

High Transitivity = Tightly Knit Network or Community

- Network transitivity, also known as clustering coefficient, is a measure of the likelihood that two friends of a person are also friends with each other (i.e. Employee X communicates with Employee Y and Employee Z)
- This network characteristic implies that employees are operating as a clique; that is, everyone in the clique communicate with one another - a strong indicator of group collaboration
Comparing Network Density & Transitivity

**High Density and High Transitivity**
- Characterized by a high number of connections between employees and a high degree of communication and collaboration between employees
- This type of environment is often found in companies that are highly innovative and that place a high value on creativity and knowledge sharing

**High Density and Low Transitivity**
- Characterized by a high number of connections between employees but a low degree of communication and collaboration between employees
- This type of environment is often found in companies that are large and bureaucratic, where there is a lot of red tape and where employees are siloed
- Characterized by a low number of connections between employees but a high degree of communication and collaboration between employees
- This type of environment is often found in small companies or startups, where there is a close-knit team and where employees are highly engaged with each other

**Low Density and High Transitivity**
- Characterized by a low number of connections between employees and a low degree of communication and collaboration between employees
- This type of environment is often found in companies that are isolated or that have a very hierarchical structure
Days where communication networks are highly dense and highly transitive are highly collaborative.

These companies benefit from a large number of connections between employees, increasing productivity and efficiency, as employees are able to quickly and easily communicate with each other to solve problems more quickly and effectively than a company with a low degree of connectivity.
As the distributions of the two-network metrics are correlated, independent phenomenon that do not necessarily interact with one another, mimic a normal distribution, and the range from 0 – 1, an additive linear scoring model is ideal.

Organizational Collaboration = normalized \((\text{Network Density} + \text{Network Transitivity})\)

Normalization can be either a min-max normalization or we can divide all values by the maximum value, then take it to the power of a positive shape value that best satisfies our desired transformation.

All metric calculations are available as functions in the ‘igraph’ package using an adjacency matrix in python.
Collaboration Category Validation

To better sample the possible distributions of transitivity scores given a certain number of connections within the network, 10,000 randomized samples were simulated for each of the 154 days present within the dataset.

1,540,000 simulated observations were used as a comparison null group. Collaboration category are determined by the average standardized deviation from these observations deeming above average and below average scores significant.

The simulated expected scores for each category are as follows.

<table>
<thead>
<tr>
<th></th>
<th>Above Average</th>
<th>Average</th>
<th>Below Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transitivity</td>
<td>.58</td>
<td>.46</td>
<td>.31</td>
</tr>
<tr>
<td>Density</td>
<td>.59</td>
<td>.48</td>
<td>.33</td>
</tr>
</tbody>
</table>

The following network would be classified as having below average collaboration as very few connections emerge among employees.

Additionally, few employees speak with more than one other person, stifling the cross-pollination of ideas.
Based on the simulation results and results from the proposed scoring formula, we should expect organization-level collaboration scores to be:

- Average 73.4% of workdays
- Above Average 14.2% of workdays
- Below Average 12.3% of workdays
Highlights

1. Increased productivity through better communication and collaboration between employees
2. Increased efficiency as employees can quickly find and connect with the right people and resources
3. Improved innovation through exposure to a greater variety of ideas and perspectives
4. Greater employee engagement and satisfaction by feeling more connected to work and colleagues
5. Reduced costs as employees are able to share resources and knowledge more effectively
6. Increased competitiveness by quickly adapting and responding to changes in the market
7. Better decision making as employees are able to tap into the collective intelligence of the network
8. Greater resilience in the face of adversity as the network is able to quickly adapt and find new solutions