Company Report on International Business Machines Corporation (IBM)

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Global Networks and Innovation

Dataset: USPTO_2012_4

Company International Business Machines Corporation.

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1 Introduction

This report contain IBM's Internationalisation strategy and Innovation strategy. To do so author conduct a thorough analysis on company report, facts sheets and various literature and publications. In the data analytics part given data of Dataset: USPTO_2012_4 has been analysed to understand company's network, size, connectivity and contextual features. The whole analysis conducted by using Juypiter notebook.

2 Brief of the Company

International Business Machines Corporation (IBM) one of the most influential company within the Information Computer Technology (ICT) sector across the globe. It was incorporated in 1911, based in the United States of America (USA). These days IBM leading the way as one of the pioneer of hybrid cloud computing and Artificial Intelligence (AI). Company's segments include; Systems and Global Financing (GBS), Cloud & Cognitive Software and Global Business Services (GBS). Under Cloud & Cognitive Software Solutions- AI and cloud data being managed- which are classed as; cloud data platforms, cognitive applications and transaction processing platform. While GBS provides consulting, process of business and management of application in the enterprise. To date, company has annual revenue of 57.35bn dollars, net income 4.71bn dollars. Company has 307.60k employees worldwide (IBM Annual Report, 2021).

3 IBM's Internationalization Strategy

3.1 Approach of Post Multinational Firm

IBM's internationalization strategy stands on three aspects: cloud, data and engagement. Observing company's annual turnover, vast network of talented employees, company always stand as fierce competitor to others. Company's international strategy formulation on the basis of three pillars, signify global development and market entry strategy. Company consider themselves as post-multinational global organization (Spry and Lukas, 2016; O'Reilly et al., 2009). This means company sees themselves beyond USA. The firm generates two-thirds of its entire income overseas. Firm's international business strategy protects them from recession as it relies on services and software rather than hardware. Compare to many other technological company the firm is less cyclical than many tech firms.

3.2 Intensive Strategies for Growth

Primary Strategy- Development of New Product: Company's major intense expansion strategies are product innovation. The strategic purpose to do so is to expand the company via innovative products and services to bring new services/items to the target market (Bartlett and Beamish, 2018). By using this intense approach, firm's able to sale of its new computer systems along with other goods. The generic approach of cost leadership able to promote brand new product development through efficiencies that allow the firm's to offer new products/services at competitive pricing (Goncalves and Perra, 2015).

Market Stimulation- The secondary intensive growth strategy adopted the company is market penetration. This strategy help the company to achieve strategic objectives to company's capital share in the market for each type of services and products (Merchant, 2014). That's why company

pursue direct international marketing strategy as their supplementary strategic plan. Since their presence has worldwide coverage, thus company purse market penetration as secondary approach of their international business strategy.

New Market Development: Developing new market considers as one of the intensive strategy adopted by IBM. The aim of this strategy is to create a new product in saturated market to rejuvenate the market. By doing so IBM creates new segments of products that able to penetrate new market (Cross and Parker, 2004). For example company has introduced driverless automobiles by using its digital technologies. Under this strategic approach company has pursued low cost leadership through cost efficiency approach. This creates more sales, thus gain competitive advantages.

Diversification of Market: Diversification of market is an effective technique for IBM's success in the IT business. Under this scenario, company's strategic goals are to diversification. IBM may develop by acquiring smaller companies in adjacent sectors. Diversification enhances the positive aspects of the cost leadership competitive approach (Bartlett and, Beamish, 2018). IBM's PESTEL/PESTLE research shows that the corporation may use this aggressive development approach to benefit from the tendency of integration of technology in diverse areas.

4 Analysis of the Data

4.1 Keypoints of data:

- number of nodes 638 and
- number of edges 533.
- number of degree : 21

4.2 Identification of industrial network

The USPTO_2012_4_proj dataset had 533 connections between 638 companies. Figure 1 shows the industrial network. And In the fig 2. Community detection algorithm was used. From the Figure 2 it can be seen there are two different group of entities one is red and another one is green. This detection of was identified using girvan_newman algorithm.

```
[ ]: #read all the csv files of edgelist
     colnames = ['first', 'second']
     project_dataframe = pd.read_excel('USPTO_2012_4_proj.xlsx',names=colnames)
     print('total shape of edgelist {}'.format(project_dataframe.shape))
```

```
total shape of edgelist (533, 2)
```
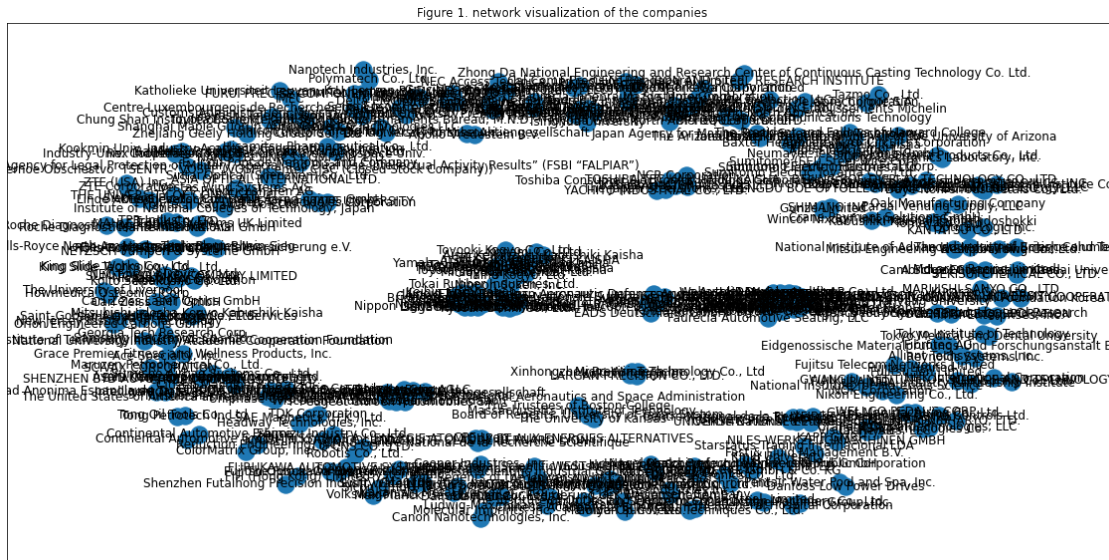
```
[ ]: def graph_information(graph):
         print("Number of nodes:", graph.number_of_nodes())
         print("Number of edges:", graph.number_of_edges())

     project_networks = nx.
      ↪from_pandas_edgelist(final_edgelist,source="first",target="second")
     graph_information(project_networks)
```
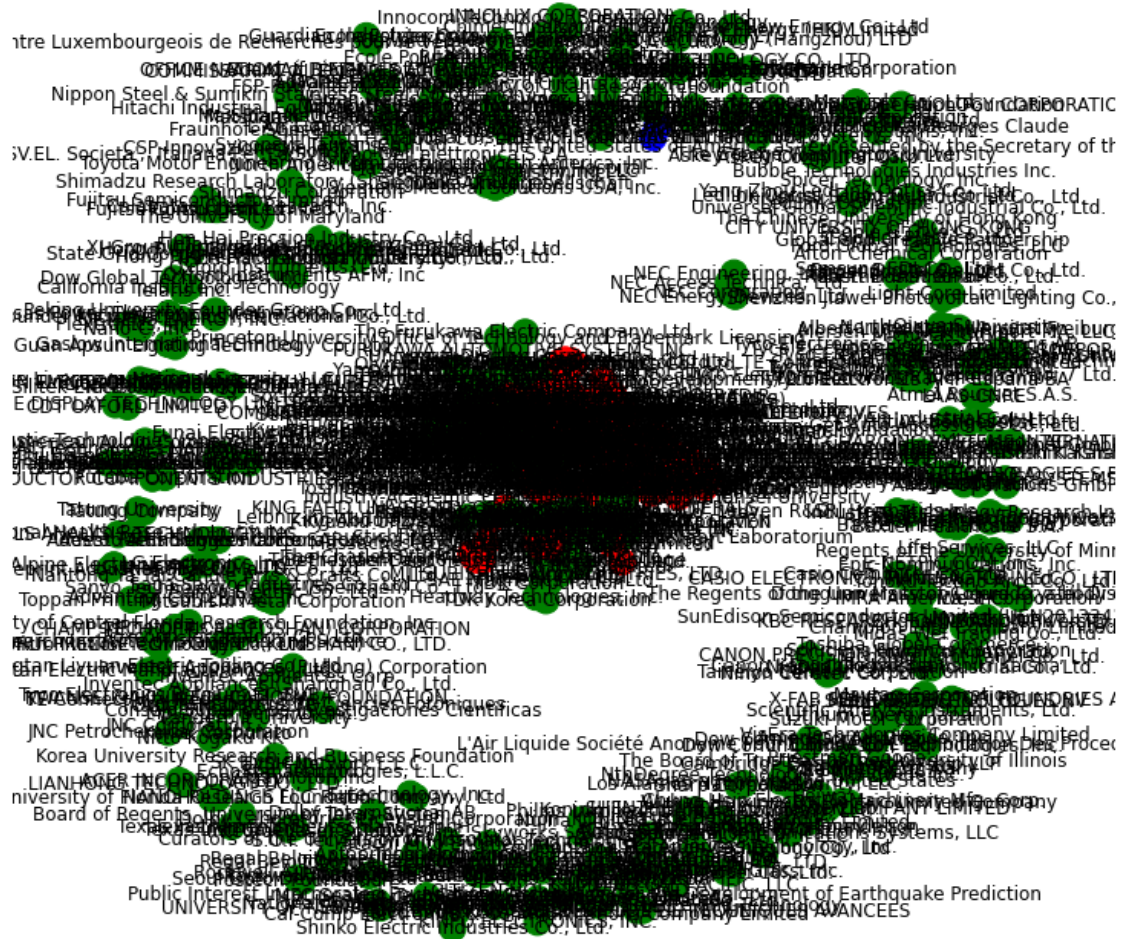
```
Number of nodes: 638
Number of edges: 533
```

[ ]: `nx.draw_networkx(project_networks)`

Figure 1. network visualization of the companies

[ ]: `## community detection using girvan_newman Algorithm`

Figure 2. girvan_newman community detection

5 Interpretation of the Meaning of the Data

5.1 Degree centrality :

Toyota Jidosha Kabushiki Kaisha (0.03924646781789639), Samsung Electronics Co. Ltd. (0.03924646781789639), International Business Machines Corporation (0.03296703296703297), and Samsung Electronics Co. Ltd. (0.03924646781789639). (0.02197802197802198). The degree centrality of Hitachi Displays, Ltd. (0.0015698587127158557), JAPAN DISPLAY INC. (0.0015698587127158557), and Henkel Corporation (0.0015698587127158557) is low in comparison to the other companies in this dataset, indicating that they have the fewest connections to one another in this dataset. When compared to the other companies, International Business Machines Corporation has the second highest number

of connections.

5.2 Eigenvector centrality:

The most important companies in the network, according to the eigenvector centrality, which was 0.45813003028955307 for IBM, 0.4318268014397 for Samsung, and 0.33389707201114694 for STMICROELECTRONICS S.R.L. This demonstrates that the ranking of companies based on Degree of centrality and eigenvector centrality are very similar. This is due to the fact that the most connected companies are also the ones that are more essential in the network. The eigenvector centrality of the network indicates that International Business Machines Corporation is the most important company in the system.

5.3 Betweenness Centrality:

When it comes to influencing the information flow in the network, the companies with the highest betweenness scores were Samsung Electronics Co. Ltd. (0.09045562104861295), IMEC (0.05288860585356546), and International Business Machines Corporation (0.04846897636655047). Taking them out of the network will have the greatest impact on other companies' ability to communicate with one another. The 3rd most influential company in the network is International Business Machines Corporation.

5.4 Closeness centrality:

Samsung Electronics Co. Ltd.(0.11556670253543498), IMEC(0.10819312151476919), and IBM (0.10100503325834695) were the top three closely centered businesses according to Closeness centrality. These companies who have high closeness centrality live right next to other businesses. In general, companies with such a higher closeness have quick routes to many other businesses, which can be good for quickly getting resources out there.

5.5 Shortest path

There are a number of ways in which SP can be used to analyze information spreading effectiveness and investigate the latent relationships in the weighted social network. Figure 3 shows the Shortest path from International Business Machines Corporation to their connections in the network.

```
[ ]: plt.figure(figsize=(15,10))
     plt.title('Figure 3. Shortest path from International Business Machines␣
      ↪Corporation to their connections ')
     nx.draw_networkx(nx.bfs_tree(project_networks,"International Business Machines␣
      ↪Corporation"))
```

Figure 3. Shortest path from International Business Machines Corporation to their connections

5.6 Other Attributes

As shown in figure 4 i can be seen that IBM had the highest number of employees comapared to other companies in the data.

```
sum_of_employees = df.groupby(['ID']).sum()['Employees_2012']
sum_of_employees.plot(kind="bar",figsize=(30, 5))
plt.ylabel('Number of employees')
plt.xlabel('Organization Names')
plt.xticks(keys, rotation='vertical', size=8)
plt.title('Figure 4. Number of employees for each comapany')
plt.show()
```

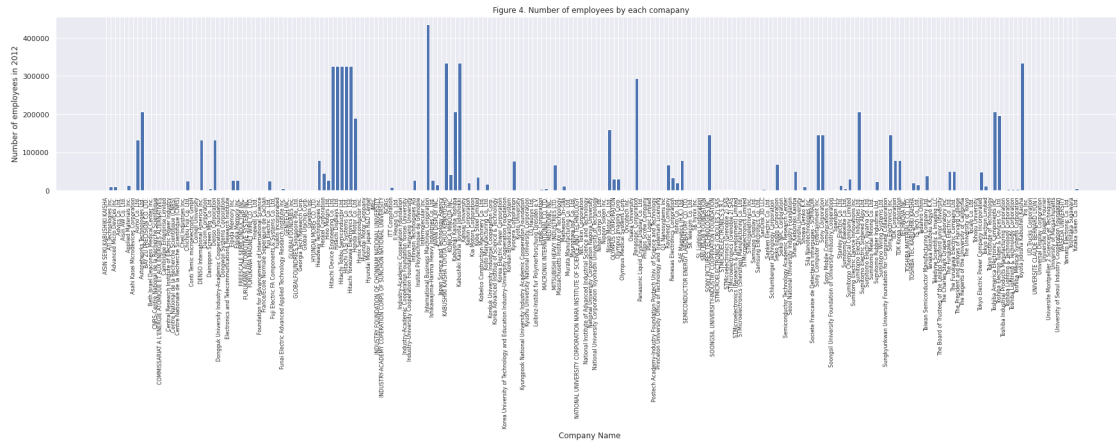Figure 4. Number of employees by each comapany

Figure 5 shows the linear regression fit between turnover and total asset. The positive linear line suggests increase in turnover would cause a increase in total asset.

```
[ ]: ax = sns.regplot(x=df['Turnover_2012'],y=df['Total_assets_2012'],color='c')

     #setup the title and the labels of the scatter plot.
     ax.set_title("Figure 5. turnover_2012 Vs Total_asset",fontsize=13)
     ax.set_xlabel("turnover_2012",fontsize=12)
     ax.set_ylabel("Total_asset",fontsize=12)

     #setup the figure size.
     sns.set(rc={'figure.figsize':(10,5)})
     sns.set_style("whitegrid")
```
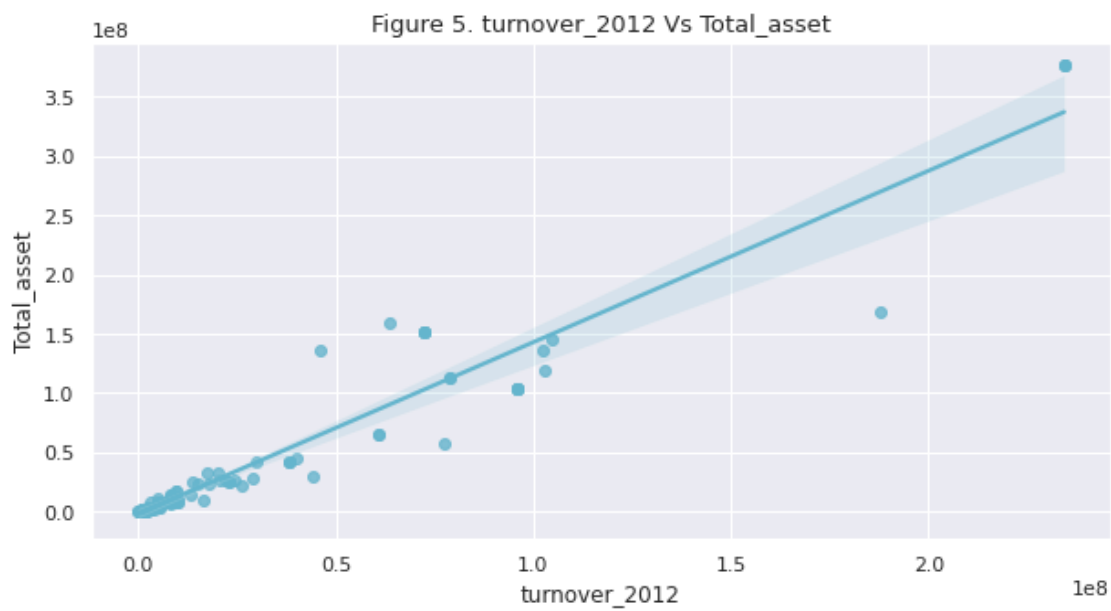

Figure 5. turnover_2012 Vs Total_asset

Figure 6 shows the turnover trend between turnover layer and turnover in 2012. The green barplots represent the total turnover by each company and the blue line is the their corresponding tunover layer.

```python
total_turover_lay = df.groupby('ID').sum()['Turnover_lay']
idx = [company for company, df in df.groupby(['ID'])]
sns.set(rc={'figure.figsize':(30,5)})
fig, ax1 = plt.subplots()

ax2 = ax1.twinx()
ax1.bar(idx,df.groupby(['ID']).sum()['Turnover_2012'], color='g')
ax2.plot(idx, total_turover_lay, color='b')

ax1.set_xlabel('Company Names')
ax1.set_ylabel('Turnover in 2012', color='g')
ax2.set_ylabel('turonver lay', color='b')
ax1.set_xticklabels(idx, rotation='vertical', size=8)
plt.title('Figure 6. Turnover and turnover layer trend for each companies\n')
```


Figure 6. Turnover and turnover layer trend for each companies
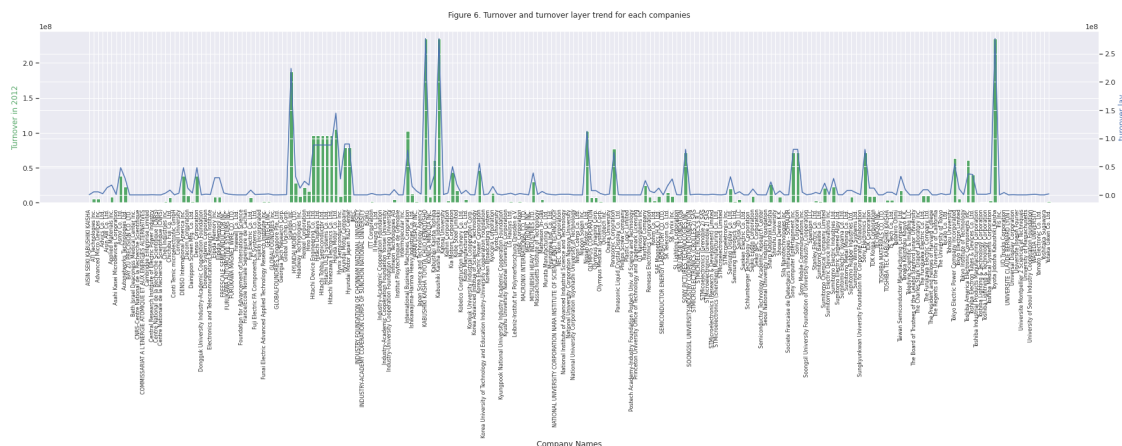
6 Firm's Innovation Strategy

Futuristic and Customised Approach: IBM futuristic approach and readiness for the demand always provide a competitive edge for the company. In the recent days, firm has developed a digital transformation plan, preparing to play a major role in the rapid change of the technological environment with hybrid cloud technology and AI. Company estimated hybrid cloud technology value at $1 trillion, while only less than 25% of workloads had shifted to public clouds. To implement better AI, company willing to adopt platform-centric services to exploit the potential market. Company has introduced Red Hat Open Shift product for hybrid cloud platform. Company developed specific technologies and cloud architecture that enable to construct industry-specific clouds. By doing so, company able to achieve worldwide coverage. Due to the contextual changes many employees

9

working from home, which has crated enormous challenge for various sectors like financial sector, service sectors and other industry. To tackle this, IBM has introduced hybrid cloud technology system, where client access the service from various IT environment.

Practical Solution and Agility (Workflow Intelligence) Company's practical work-based solution (Glazer, 1999; Spry and Lukas, 2016) is helping various business across financial services to healthcare to small and medium size enterprises (SMEs). Department of Global Business Services (GBS) has been helping such various companies to redefine work. IBM named it "Intelligent workflows" this can transform essential company processes like supply chains, recruiting, and bill processing. This process combine data from different systems and simplify procedures by providing actionable insights. For example; a blockchain-based trade finance platform named we.trade was created by 12 of Europe's top banks with IBM experts. We.trade has achieved up to 80% transaction processing savings, along with decreased risk and enhanced regulatory compliance. IBM also helped TSB Bank, UK to create a web-based platform named TSB Smart Agent by five days. This was due to Pandemic, many customers would not be able to pay their mortgage and loan repayment, this IBM found this solution for customer to repay their money through this dedicated online platform. During the first week of the operation, this platform helped 40,000 clients. Such agility and intelligent solutions provide a competitive edge over other company.

7   Conclusion

The analysis shows IBM is a futuristic and post-global company. It sees themselves as an international company. Company does not see international market as a new opportunity, they live in that market. In order to sustain their authority and competitiveness, currently company is pursuing management process to define new era of working space. Firm's believed in continuous development and innovation in their key strategy.

8   References

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