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ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)  
ORGANISATION OF ISLAMIC COOPERATION (OIC)

DEPARTMENT OF BUSINESS AND TECHNOLOGY MANAGEMENT

Mid-Semester Examination

Summer Semester, A. Y. 2022-2023

Course No. : BTM 4869

Time : 1.5 hours

Course Title : Decision Support Systems

Full Marks : 75

Answer **all 3 (Three)** questions. All questions carry equal marks. Marks of each question and corresponding CO and PO are written in the right margin with brackets.

1. Consider a manager in a fast-paced corporate environment who needs to select a vendor for a critical project. Due to time constraints and an overwhelming amount of information, the manager may not be able to thoroughly analyze every potential vendor. Instead, they might rely on previous experiences, recommendations, or a quick review of a few key criteria to choose a vendor that meets the minimum requirements within the given time frame. This decision-making process reflects bounded rationality in the face of limited cognitive resources and time.
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| a) Explain optimization and contrast it with suboptimization.   | 05 | (CO1)<br>(PO1) |
| b) Compare the normative and descriptive approaches to decision making.                                   | 07 | (CO3)<br>(PO3) |
| c) Define rational decision making. What does it really mean to be a rational decision maker? Explain it. | 13 | (CO4)<br>(PO4) |
2. The Industrial and Commercial Bank of China (ICBC) has more than 16,000 branches and serves over 230 million individual customers and 3.6 million corporate clients. Its daily financial transactions total about \$180 million. It is also the largest publicly traded bank in the world in terms of market capitalization, deposit volume, and profitability. To stay competitive and increase profitability, ICBC was faced with the challenge to quickly adapt to the fast-paced economic growth, urbanization, and increase in personal wealth of the Chinese. Changes had to be implemented in over 300 cities with high variability in customer behavior and financial status. Obviously, the nature of the challenges in such a huge economy meant that a large-scale optimization solution had to be developed to locate branches in the right places, with the right services, to serve the right customers.

With their existing method, ICBC used to decide where to open new branches through a scoring model in which different variables with varying weight were used as inputs. Some of the variables were customer flow, number of residential households, and number of competitors in the intended geographic region. This method was deficient in determining the customer distribution of a geographic area. The existing method was also unable to optimize the distribution of bank branches in the branch network.

With support from IBM, a branch reconfiguration (BR) tool was developed. Inputs for the BR systems are in three parts:

- a) Geographic data with 83 different categories
- b) Demographic and economic data with 22 different categories
- c) Branch transactions and performance data that consisted of more than 60 million transaction records each day.

These three inputs helped generate accurate customer distribution for each area and, hence, helped the bank optimize its branch network. The BR system consisted of a market potential calculation model, a branch network optimization model, and a branch site evaluation model. In the market potential model, the customer volume and value are measured based on input data and expert knowledge. For instance, expert knowledge would help determine if personal income should be weighted more than gross domestic product (GDP). The geographic areas are also demarcated into cells, and the preference of one cell over the other is determined. In the branch network optimization model, mixed integer programming is used to locate branches in candidate cells so that they cover the largest market potential areas. In the branch site evaluation model, the value for establishing bank branches at specific locations is determined.

Since 2006, the development of the BR has been improved through an iterative process. ICBC's branch reconfiguration tool has increased deposits by \$21.2 billion since its inception. This increase in deposit is because the bank can now reach more customers with the right services by using its optimization tool. In a specific example, when BR was implemented in Suzhou in 2010, deposits increased to \$13.67 billion from an initial level of \$7.56 billion in 2007. Hence, the BR tool assisted in an increase of deposits to the tune of \$6.11 billion between 2007 and 2010. This project was selected as a finalist in the Edelman Competition 2011, which is run by INFORMS to promote actual applications of management science/operations research models.

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| a) Can you explain how analytical techniques help organizations to retain competitive advantage? | 07 | (CO1)<br>(PO1) |
| b) Analyze how descriptive and predictive analytics can help in pursuing prescriptive analytics? | 13 | (CO2)<br>(PO2) |
| c) Are the prescriptive models once built good forever? Justify your opinion.                    | 05 | (CO3)<br>(PO3) |

Mobile service providers (i.e., Telecommunication Companies, or TELCOs in short) that helped trigger the explosive growth of the industry in the mid- to late-1990s have long reaped the benefits of being first to market. But to stay competitive, these companies must continuously refine everything from customer service to plan pricing. In fact, veteran carriers face many of the same challenges that up-and-coming carriers do retaining customers, decreasing costs, fine-tuning pricing models, improving customer satisfaction, acquiring new customers and understanding the role of social media in customer loyalty. Highly targeted data analytics play an ever more critical role in helping carriers secure or improve their standing in an increasingly competitive marketplace. Here's how some of the world's leading providers are creating a strong future based on solid business and customer intelligence.

**Customer Retention**

It's no secret that the speed and success with which a provider handles service requests directly affects customer satisfaction and, in turn, the propensity to churn. But getting down to which factors have the greatest impact is a challenge. "If we could trace the steps involved with each process, we could understand points of failure and acceleration," notes Roxanne Garcia, manager of the Commercial Operations Center for Telefónica de Argentina. "We could measure workflows both within and across functions, anticipate rather than react to performance indicators, and improve the overall satisfaction with onboarding new customers." The company's solution was its traceability project, which began with 10 dashboards in 2009. It has since realized US\$2.4 million in annualized revenues and cost savings, shortened customer provisioning times and reduced customer defections by 30%.

**Cost Reduction**

Staying ahead of the game in any industry depends, in large part, on keeping costs in line. For France's Bouygues Telecom, cost reduction came in the form of automation. Aladin, the company's Teradata-based marketing operations management system, automates marketing/communications collateral production. It delivered more than US\$1 million in savings in a single year while tripling email campaigns and content production. "The goal is to be more productive and responsive, to simplify teamwork, [and] to standardize and protect our expertise," notes Catherine Corrado, the company's project lead and retail communications manager. "[Aladin lets] team members focus on value added work by reducing low-value tasks. The end result is more quality and more creative [output]." An unintended but very welcome benefit of Aladin is that other departments have been inspired to begin deploying similar projects for everything from call center support to product/offer launch processes.

**Customer Acquisition**

With market penetration near or above 100% in many countries, thanks to consumers who own multiple devices, the issue of new customer acquisition is no small challenge. Pakistan's largest carrier, Mobilink, also faces the difficulty of operating in a market where 98% of users have a pre-paid plan that requires regular purchases of additional minutes. "Topping up, in particular, keeps the revenues strong and is critical to our company's growth," says Umer Afzal, senior manager, BI. "Previously we lacked the

ability to enhance this aspect of incremental growth. Our sales information model gave us that ability because it helped the distribution team plan sales tactics based on smarter data-driven strategies that keep our suppliers [of SIM cards, scratch cards and electronic top-up capability] fully stocked." As a result, Mobilink has not only grown subscriber recharges by 2% but also expanded new customer acquisition by 4% and improved the profitability of those sales by 4%.

#### **Social Networking**

The expanding use of social networks is changing how many organizations approach everything from customer service to sales and marketing. More carriers are turning their attention to social networks to better understand and influence customer behavior. Mobilink has initiated a social network analysis project that will enable the company to explore the concept of viral marketing and identify key influencers who can act as brand ambassadors to cross-sell products. Velcom is looking for similar key influencers as well as low-value customers whose social value can be leveraged to improve existing relationships. Meanwhile, Swisscom is looking to combine the social network aspect of customer behavior with the rest of its analysis over the next several months.

#### **Rise to the Challenge**

While each market presents its own unique challenges, most mobile carriers spend a great deal of time and resources creating, deploying, and refining plans to address each of the challenges outlined here. The good news is that just as the industry and mobile technology have expanded and improved over the years, so also have the data analytics solutions that have been created to meet these challenges head on. Sound data analysis uses existing customer, business, and market intelligence to predict and influence future behaviors and outcomes. The end result is a smarter, more agile and more successful approach to gaining market share and improving profitability.

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| a) Explain the main challenges for TELCOs?   | 05 | (CO1)<br>(PO1) |
| b) Analyze how data warehousing and data analytics can help TELCOs in overcoming their challenges. | 13 | (CO2)<br>(PO2) |
| c) Why do you think TELCOs are well suited to take full advantage of data analytics? Justify it.   | 07 | (CO3)<br>(PO3) |