## The Competitive Situation of the **Cheminformatics Industry Based** on Porter's Model in Iran

SAGE Open October-December 2022: 1–21 © The Author(s) 2022 DOI: 10.1177/21582440221134604 journals.sagepub.com/home/sgo



Asefeh Asemi<sup>1</sup>, Adeleh Asemi<sup>2</sup>, and Andrea Ko<sup>1</sup>

### Abstract

The purpose of this study was to analyze the competitive situation of the cheminformatics industry using Porter's competitive model and to determine the priority and weight of each competitive force in this industry. In addition to qualitative analysis of data collected from library surveys and the Delphi method, multicriteria decision-making techniques (MCDM) were used to determine the rank and weight of forces (criteria). A preference judgment questionnaire was used to collect data. This researcher-made questionnaire was sent to cheminformatics specialists in Iran. Using the process of hierarchical analysis (AHP), Porter's competitive forces in this industry were investigated. The criteria, subcriteria, alternatives, and relation between them were drawn using the analytical decision tree model. Then, the priority and weight of each force were calculated. Then, the effect of each force on each other was investigated. The results showed that the decision-making priorities of cheminformatics industry managers in the competitive market concerning the management of competitive forces of the Porter model are as follows: (1) competitive rivalry condition between current competitors, (2) the threat of the entry of alternative products (the threat of substitutes), (3) the threat of new entrants (potential competitors), (4) the bargaining power of customers, and (5) the bargaining power of suppliers. We concluded that due to the prevailing economic conditions, companies active in the field of cheminformatics in the present study, to ensure profitability, should prioritize the competitive situation between competitors and consider this priority in strategic planning. Finally, we recommend that the present study be repeated in other countries and companies active in this industry.

### **Keywords**

Analysis Hierarchy Process (AHP), competitive, competitor, cheminformatics, Multi-Criteria Decision Making (MCDM), porter's model

### Introduction

Competition is one of the most important issues in sales and marketing. In any industry, safe competition is an important factor in improving the quality of products or services and reducing costs. Finally, competition increases customer value. Companies that do not participate in the competition cannot have enough information about their competitors. They do not know the strengths and weaknesses of their competitors, they cannot be successful in their business, and they are inevitably out of the field. Competition between companies is a kind of decision making behavior. The behavior that companies face in their competition can change the company's economic fate. The strategic plans of each company in business competition are an endogenous type of organizational behavior strategy.

Figure 1 shows the number of published papers in topic bioinformatics from 1997 to 2022 based on WoS's analysis tool (03 Jan 2020). These papers included different categories: 622 papers in Multidisciplinary Chemistry, 413 papers in Computer Science Interdisciplinary Applications, 337 papers in Medicinal Chemistry, 267 papers in Computer Science Information Systems, 234 papers in Biochemistry Molecular Biology, 176 papers in Pharmacology Pharmacy, 138 papers in Mathematical

#### **Corresponding Author:**

Andrea Ko, Corvinus University of Budapest, Budapest, Fővám tér 8, 1093 Hungary.

Email: andrea.ko@uni-corvinus.hu



the work without further permission provided the original work is attributed as specified on the SAGE and Open Access pages (https://us.sagepub.com/en-us/nam/open-access-at-sage).

<sup>&</sup>lt;sup>1</sup>Corvinus University of Budapest, Hungary <sup>2</sup>Universiti of Malaya, Kuala Lumpur, Malaysia



Figure 1. Published papers on bioinformatics topics from 1997 to 2022 based on different categories.

Computational Biology, 103 papers in Biochemical Research Methods, 62 papers in Biotechnology Applied Microbiology, and 58 papers in Multidisciplinary Sciences. This figure clearly shows that the number of studies on Cheminformatics in the Multidisciplinary Chemistry category is higher than that in other categories. Additionally, in Computer Science Interdisciplinary Applications and Chemistry categories, much research has been published on cheminformatics.

Figure 2 shows the number of published papers on the topic of bioinformatics from 1997 to 2021 (03 Jan 2022) based on publication year. This figure clearly shows that the number of published papers in this field is increasing daily, and researchers have given special attention to this issue.

Given the importance of the issue based on what has been said, our research sought to help strategists in this field by investigating "Porter's five competitive forces" in the cheminformatics industry using MCDM techniques to correctly plan for these forces to be profitable. These forces include competitive rivalry conditions between present competitors, the bargaining power of customers, potential competitors (the threat of new entrants), the bargaining power of suppliers, and the threat of the entry of alternative products (the threat of substitutes). The research questions are as follows:

RQ1: How is the hierarchy of decision trees in strategic competition in the cheminformatics industry?

RQ2: What is the priority of each Porter's competitive force in the cheminformatics industry?



**Figure 2.** Published papers in bioinformatics from 1997 to 2021 based on publication year.

RQ3: What is the weight of each force (criteria) and related subcriteria?

### **Porter Model**

Porter (1979, 2008) emphasized the organization's strategy, and he said that it should determine how organizational resources, skills, and competencies should be combined to create a competitive advantage (Mind Tools Content Team, 2018). Porter (2008) stated that awareness of the five forces could help a company understand the structure of its industry, stake out a more profitable position, and be less vulnerable to attack. In the conceptual definition of Porter's (1980) general strategies, there are three concepts: leadership cost,

differentiation strategy, and focus strategy. For leadership cost, the company committed to producing and supplying standard products. The cost of each unit reduces for the customer (who is sensitive to the price). The purpose of the differentiation strategy is to distinguish the product. This means that products and services claim to be unique products or services in the industry. These products can be offered to customers who are not very sensitive to the price. The focus strategy ensures that the focus on specific products and services meets the needs of small groups of consumers. Snowdon and Stonehouse (2006) mentioned that Porter believed "a nation's prosperity depends on its competitiveness". It can be said that competition is the result of the full productivity of products and services. Having macroeconomic, political, and legal policies is necessary to create a prosperous economy, but it is not enough. Paying attention to the infrastructure of the micro economy is also necessary for competitiveness. The situation of the competitive strategies depends on the quality of trade and the microeconomy of countries. Also, in the competitive policy of the national economy, it is necessary to understand the basics of the country's micro-economy (Porter, 2001). The Global Competitiveness Index is the most accepted and known competitiveness indicator in the world constructed by the World Economic Forum. Porter (2008) believed that "we should determine overall industry structure, and test the analysis for consistency: Why is the level of profitability what it is, and what is it? What are the controlling forces for profitability? Is the industry analysis consistent with actual long-run profitability? Are more profitable players better positioned concerning the five forces? He suggested analyzing recent and likely future changes in each force, both positive and negative. Many factors can affect industry profitability in the short run – including the weather and the business cycle - and industry structure, manifested in the competitive forces, sets industry profitability in the medium and long run. The strongest competitive force or forces determine the profitability of an industry and become the most important to strategy formulation." Currently, competition has intensified in all industries. Each company needs a proper analysis of the market and its competitors for successful entry into the market. Porter said that all companies are looking for profits, and the factor that determines the amount of profit is competition. If the intensity of the competition is clear, profitability is also evident. In this regard, the task of strategists is to look for a position in the industry in which companies can defend themselves against these forces or in their favor, and it affects them (Porter et al., 2015). Porter (2008) stated that five competitive forces shape strategy. In brief, these forces included competitors, customers, suppliers, potential entrants, and substitute products.

Finally, with evaluation, assessing these factors will help the organization meet its overall goals and objectives. Figure 3 shows how competition in the industry is shaped by Porter's five competitive forces.

In this regard, the economic foundations of strategy (Mahoney, 2005) show the essential basic tenets of strategy. It shows the interrelationships of five major theories of the firm: behavioral theory, transaction costs theory, property rights theory, agency theory, and dynamic resource-based theory.

## **Cheminformatic Industry**

Cheminformatics, also known as chemoinformatics, is primarily concerned with the application of new information technology and information science to solve broad interdisciplinary problems in chemistry, physics, biology, biochemistry, statistics, and mathematics. There is no clear information about the history of cheminformatics. It slowly evolved from several, often quite humble beginnings (Engel, 2006). Cheminformatics refers to solving chemical and synthetic problems effectively by using information tools in the vast space of the web (Thareja et al., 2021). Additionally, computer and informatics skills in analyzing chemical data are considered essential requisites (Kim et al., 2021). Figure 4 shows a knowledge map of eight primary concepts for cheminformatics (Yewno Discovery, 2021). Based on this figure, the sub concepts of cheminformatics are pharmacophore, virtual screening, docking (molecular), pesticide research, combinatorial chemistry, matched molecular pair analysis (MMPA), JOELIB, molecule mining, hit to lead, structure mining, and chemical similarity. This figure also shows important people like Yvonne Connolly Martin (1936-) in connection with the concept of cheminformatics. Gasteiger (2003) has stated that the scope of chemoinformatics has included molecular structures, informatics methods, and metabolism. "It was realized quite some decades ago that the amount of information accumulated by chemists can, in the long run, be made accessible to the scientific community only in electronic form; in other words, it must be stored in databases. This new field, which deals with the storage, manipulation, and processing of chemical information, emerged without a proper name" (Gasteiger & Engel, 2006). Some of the primary concepts of cheminformatics are included bioinformatics, molecular informatics, computational chemistry, materials informatics, and nanoinformatics. Bioinformatics is defined as follows: "bioinformatics is a hybrid science that links biological data with techniques for information storage, distribution, and analysis to support multiple areas of scientific research, including biomedicine" ("Bioinformatics | Science | Britannica"). Molecular Informatics finds relationships between



**Figure 3.** How competition in the industry is shaped by Porter's five competitive forces *Source*. Porter (2008).

molecules using informatics ideas and concepts (Bender & Glen, 2004). Computational chemistry is one of the sub-subjects of chemistry. This science examines the results of theoretical chemistry using appropriate computer programs. They use this science to calculate the structures and properties of molecules. It is also widely used to solve chemical problems.

Another concept concerning to cheminformatics is materials informatics. In this science, efforts are made to improve and increase the efficiency of material development by data analysis and using the technologies of informatics and information science. Nanoinformatics is concerned with acquiring information in the field of nanotechnology and developing tools for the efficient use of this information (Nanoinformatics 2020 Roadmap, 2011). Chemical and drug information has collaborated with cheminformatics over the past decades (Gasteiger, 2006; Varela et al., 2017). Cheminformatics tools and techniques help chemists better understand the complex structures of chemical compounds. This subject is a new interdisciplinary field that plays a vital role in collecting, storing, and analyzing chemical data (Begam & Kumar, 2012). The cheminformatics strategies help explore chemistry and its applications (Prieto-Martínez et al., 2019). Various cheminformatics approaches include data mining, representation of chemical compounds via

descriptors, similarity, substructure searching, and classification algorithms (Jamal & Grover, 2017). This concept of knowledge derivation was illustrated by Hann and Green (1999) and modified in Figure 5 by the researchers. This image shows that they consider a pyramid to depict the basic concepts of cheminformatics, which in one side includes knowledge, information, and data from top to bottom. At the other side of the pyramid are numbers as data, facts as information, and rules as knowledge. Mussa et al. (2015) believed that the pattern classification techniques are indispensable in cheminformatics.

Sometimes the treatment process requires extensive experimental effort. In this regard, computer techniques can increase the speed of action, and cheminformatics tools play an essential role in pharmaceutical research (Poorinmohammad & Mohabatkar, 2014). Cheminformatics addresses discovering drugs based on modern drug discovery techniques (Begam & Kumar, 2012). Additionally, cheminformatics analysis offers a new and promising approach to systematically understanding complex chemical reactions (Li et al., 2015). Figure 6 shows the knowledge map of published scientific resources in cheminformatics and the subconcepts. This report was prepared by using Yewno, a web application, on July 19, 2021. The active companies in the field of cheminformatics try to engage and equip



Figure 4. A knowledge map of eight primary concepts for cheminformatics.

researchers, students, and other companies with bioinformatics knowledge and services. The companies' employees are composed of professionals with research experience in chemistry, pharmacy, bioinformatics, software development, and specialists in genomic data analysis and molecular genetic analysis. These companies hold courses and workshops to develop drug design, cheminformatics, quantitative structure-activity relationship (QSAR), molecular dynamics, Python programming, next-gene sequencing (NGS), and many other computational skills in bioscience. They offer counseling services to many research centers, universities, and R&D departments to achieve their scientific and industrial goals. Additionally. the companies provide equipped computer-based labs and other computational services for consumers. One of the significant activities of compagenomic data analysis services. nies is These

bioinformatics services include NGS, proteomics, metabolomics, transcriptomics analysis, drug & vaccine design services, molecular dynamics, molecular docking, and many other computational services in biosciences.

The expectations of the cheminformatics industry which is a pre-formulated mental result from this industry could be that cheminformatic industry has so far had important applications in using technology to assist the sciences related to this industry, including chemical and molecular structures. As a new technological industry, it has played an important role in solving cheminformatics problems using various techniques of data collection, organizing and processing data, computational analysis, comprehension, and interpretation of data. On the other hand, it has greatly contributed to the development of new compounds, materials, and processes. The most used technique in cheminformatics is "in silico" which it



Figure 5. Concept of cheminformatics.

is virtually simulated through appropriate software on a computer. Thus, can predict some expectations for this industry as a goal for the future. For example, it can play an important role in the drug discovery process for a selected disease. Thus, by searching for potential compounds and molecules using software for calculating and visualizing structures, it can be an important factor in discovering new drugs and reducing the target disease. Martinez-Mayorga et al. (2020) believe that cheminformatics plays a key role in the discovery of drug and that it faces challenges in this regard.

### **Literature Review**

In relation to examining the competitive situation of different industries, research has been done using the Porter model in different countries. Sagheer (2007) has evaluated the national competitiveness of Indian and Thai shrimp industries using the Porter model. Bridwell and Kuo (2005) examined the computer industry in China and Taiwan using Porter's competitive advantage factors. Clancy et al. (2001) also examined industry clusters in three indigenous parts of Ireland. They also used the Porter model for this study. Based on previous research, it seems that similar work has not been done to examine the competitive situation of the cheminformatics industry in other countries. The studies reviewed in connection with this article were divided into three categories. The first category includes studies that examine the behavior of the organization/company in the field of competition. Here, we tried to present some articles from the oldest studies to emphasize the history of these studies and the importance of the subject. The second category includes studies based on Porter's five competing forces. The third category of studies is related to the cheminformatics industry and related topics in connection with the subject of the present study.

Regarding the first category, Barnard (1938) observed that the administrative process transcends the capacity of merely intellectual methods. In a safe and successful competition, behavioral and cognitive processes play an important role in competitive decision-making. Simon (1947) proposed a theory of human choice and decisionmaking. This theory aimed to accommodate the rational aspects of choice. His theory included the limitations of human decision-making mechanisms and attracted the attention of psychologists and practical decision-makers. March and Simon (1958) studied human behavior in organizations. They believed that organizations must consider the motivational, attitudinal, and rational aspects of human behavior. Cyert and March (1963) emphasized the actual process of making business decisions and provided detailed observations of how organizations make these decisions. Simon (1947) borrowed from economics and operations research, artificial intelligence, and cognitive psychology to build a theory of procedural rationality (i.e., a theory of the processes of decision-making) in complex, dynamic circumstances. Johnson et al. (2008), in "Exploring Corporate Strategy," believed that strategy determines the direction and scope of an organization over the long term. Additionally, they discussed determining the market needs and stakeholders. Garcia-Nunes and Antunes da Silva (2019) used web crawling, competitive forces, and PESTLE analysis to indicate threats and opportunities. Their case study showed that this approach could be used as a viable alternative to support surveillance of strategic discontinuities that permeate the organizational environment.

Regarding the second category. Slater and Olson (2002) present such an updated model, built on and expanding the basic premises underlying Porter's five competitive forces model. Manteghi and Zohrabi (2011) proposed a comprehensive framework to formulate strategy in organizations. Dulčić et al. (2012) introduced the dimension of time dynamics into the five forces format. They tried to give a clear insight into the existence and nature of the past, present, and future of the interaction between the firm and its industry environment. Z. Y. Zhao et al. (2016) used a five-force model to assess China's biomass power industry. This assessment highlighted the status, existing issues, and prospects of the biomass power industry. Similarly, it helps develop procurement strategies for the sustainable development of the industry. Chen et al. (2017) analyzed the competitiveness of the Health Club in Weifang based on Porter's



Figure 6. Knowledge map of cheminformatics and its relationship with the subconcepts. *Source*. Reported from: https://discover.yewno.com at 03 Jan 2022.

diamond model. They conducted this research to determine the current state of development of the club. The results of this study showed that the level of competition in this club is not high. They suggested that to increase the club's competitiveness, it was necessary to increase publicity in the field, increase government support, strengthen the industry norm, improve the personal system, and introduce high-level coaches. Marek (2018) analyzed the Polish marine container terminal market using Porter's model to explore profitability criteria. They first looked at industry competitors in the marine container terminal market, then analyzed the customers of these services, and finally the suppliers of resources and services in the industry. They concluded that the economic strength of this market is one of the most important factors in this regard. L. Zhao (2018) determined food industry competitiveness based on Porter's diamond model in China. The results of this study show that there are seven indicators to assess competitiveness in the food industry. These seven indicators are factors of production, demand conditions, supporting industries, company strategy, industry structure or competitive environment, government policies, and innovation. They identified innovation as a key factor influencing other indicators. Baxter (2019) used Porter's model to strategically analyze Cargolux airlines' international position in the global air cargo supply chain. This research showed that the company has developed successful strategies,

and in 2017, with the introduction of the "Cargolux 2025 Strategy," it began its journey of transformation. Ge and Li (2019) analyzed the competitive power of Chinese sports apparel brands based on Porter's model. They concluded that in developing local sportswear brands, a cost-leading strategy should be implemented in the core strategy. They also believe that growth strategies are considered the strengthening strategy and three aspects of market penetration, market development, and product development. Tsai et al. (2021) used Porter's diamond model to assess the competitiveness of the solar photovoltaic industry in Taiwan. In their study, they used six dimensions to identify indicators of vital development. The results of this study showed that these six dimensions should be promoted in order of priority: company strategy, structure and competition, demand conditions, chance or opportunity, operating conditions, and finally related or supporting industries. Lord et al. (2021), in addition to using resource dependency theory and Altman's Z score model, use Porter's competitive model and his five forces. Using these methods, they have examined the relationship between market factors and the financial distress of a nursing home. They concluded that the effect of foreign market forces on the financial problems of nursing homes is limited. However, organizational-level variables have a significant impact on these problems.

Regarding the third category, the Porter model has also penetrated the cheminformatics industry and is used to design business plans. Chu et al. (2015) used Porter's five forces model to analyze the impact of cheap drug modification on the pharmaceutical industry. They acknowledged the beneficial effects of this reform. They said the reform could lead to the healthy development and promotion of China's pharmaceutical industry. PRNewswire (2015a, 2015b, 2016) reported on the ink solvent market. PR Newswire in Chicago was a distributor of press releases. The report is focused on the market by type of chemistry, product type, process, application, and region. This study analyzes the entire ink solvent market based on Porter's model and his five competing forces. Value chain analysis concerning technology providers, solvent ink manufacturers, printing ink manufacturers, and end-user industries is presented. The impact of various market factors, such as incentives, constraints, and opportunities, is also reported. This report concludes that the economic downturn in Europe and the United States affected the economies of other developed countries as well. This report identifies the key companies, and it is concluded that these companies are constantly focusing on expanding their production capacity to achieve a competitive advantage and more effective customer service. The report also provides a competitive perspective that covers a variety of strategies and developments, such as mergers and acquisitions, investment and development, and new products. Rothaermel (2016) discusses the meaning of competitive advantage and how a company's strategy is defined, as managers' theory, of how the business operates and maintains competitive advantage. In his study, he describes the strategic group model in the pharmaceutical industry as an example. He believes that the opportunities and threats of a company based on this model are different according to the strategic group in which it is located. Finally, we examine the importance of strategy in technology-based industries and believe that sustainable competitive advantage can only be achieved through continuous innovation. Additionally, the Porter model was used in designing the LabiNet business plan for the management of the chemistry laboratory (Kao, 2018). Molloy and Johnson (2016) believe that the Porter model concerning the five competitive forces is a prominent strategic planning framework in previous research that has not received enough attention in biotechnology companies. They have studied the application of this model in a biotechnology company. They concluded that this technique, like other techniques in biotechnology companies, has failed. Despite the conclusion reached in the end, they are suggested that considering the forces that influence the success of biotechnology companies can provide a new basis for designing a successful strategic framework in the biotechnology business. Kumar et al. (2021) analyzed the transcatheter aortic valve replacement industry using the Porter model and its five competitive factors. The results show that transcatheter aortic valve replacement is more expensive than surgical aortic valve replacement. Transcatheter aortic valve replacement is a growing industry whose financial sustainability currently depends on operational efficiency.

A review of studies shows that competition is a topic that has a long history. The study of competition based on the Porter model has always been of interest to researchers and experts in various industries. Studies show that the issue of competition in many disciplines has been and is influenced differently by Porter's five forces. It has also been used extensively in the chemical & pharmaceutical industries and health care to study the relevant market. However, it seems that no research has been done specifically in the field of cheminformatics. This study specifically addresses Porter's competitive forces in this area based on the views of experts in the field in related companies using MCDM techniques.

### Methodology

The choice of research methodology depends on the purpose and nature of the subject. This method also depends on operational capabilities. This section discusses the

<ul> <li>Reserch method</li> <li>The combination method included the qualitative and quantitative methods</li> <li>Sumpling and collecting data</li> <li>Sumpling and collecting data</li> <li>Rever of the combinants' websites</li> <li>Rever of the combinance' website</li> <li>Rever of the comparise with the reverse comparise with bioinformatics founded in 2013</li> <li>Rever of Website</li> <li>Rever of the compary to the reverse comparise of the reverse comparise with the reverse comparise with the reverse comparise of the reverse comparise comparise of the reverse comparise comparise of the reverse comparise comparise of the reverse comparise of the reverse comparise comparise comparise comparise comparis reverse comparise comparis reverse comparise comparise compa</li></ul>	Reserve method         Evention           Research method         Evention           Research method         Evention           Range and collecting data         Evention           Range and collecting data         Evention           Range and collecting data         Evention           Research method         Evention           Range and collecting data         Evention           Research methods         Evention           Research methods         Research methods           Research methods         Researchon				
<ul> <li>Reaerch communy</li> <li>Sterring texts. Documents, and Comparise industry</li> <li>Simpling and collecting data</li> <li>Review of the comments induction industry</li> <li>Text and the implicit of the subject</li> <li>Review of the comments while sports</li> <li>Review of the comparise' while sports</li> <li>Review of the comparise of the informatic induction of the informatic inductin of the informatic induction of the informatic induction of th</li></ul>	<ul> <li>Reaerch communy</li> <li>Steinelli cext, Documents, and Companies industry</li> <li>Review of the comments industry</li> <li>Review of the method Unstructured interview white spectral</li> <li>Review of the method Commistion white spectral</li> <li>Review of the method Unstructured interview white spectral</li> <li>Review of the method start of the aduption of the method Unstructure study as Wood start of the method start of the spectral</li> <li>Restorther/Made Tampistion</li> <li>Restorther/Made Tampistion Oversionmetric study as Wood start of the method study of the method start of the method start of the start of the method start of the start</li></ul>	Research method	А	The combination method included the qualitative and quantitative methods	
<ul> <li>Rangers and coprets in the chamiormatics industry</li> <li>Rangers and coprets in the communic with experts</li> <li>Reverse of Increment methods Printed Comparison Outcomes, services, and their policy (mission and vision)</li> <li>Reverse of Increment method (Increment) methods</li> <li>Reverse of Increment methods</li> <li>Reverse of Reverse and tools to review the Interacture such as MoS and Scopus</li> <li>Scientific databases and tools to review the Interacture such as MoS and Scopus</li> <li>Terzy Approach to strangic evaluation</li> <li>Privary Approach to strangic evaluation by the MCDM techniques/Analytic Hierarchy Process (AHP) based on Porter's Model attain an interpret in an interpretion the Contransition and the Reverse of the indirection and vision the mission to set on evaluation the terrestortex. Statement and comparison the interactive framework with the mission to set on evaluation the mission to set on evaluation the mission to set on evaluation shorts comparison with strong statemes and to an informatics. Founded in 2013 with the mission to set on evaluation shorts in the field of charmiformatics induction the comparison shorts and the comparison shorts in the field of charmiformatics. Founded in 2013 with the mission to set on evaluation shorts in the field of the minformatics. Founded in 2013 with the mission to set on evaluation the evaluation the evaluation the evaluation the mission to set on evaluation states in the field of the mission to set on evaluation the evaluation the evaluation the mission to sevaluation the evaluation the evaluation the evaluation the min</li></ul>	<ul> <li>Ramping and collecting data</li> <li>Review of Interacture related on Bayles.</li> <li>Review of Interacture related on Bayles.</li> <li>Review of the companies: wobsite &amp; documents include productions, services, and their policy (mission and vision).</li> <li>Used methods and costs for version events on bayles.</li> <li>Reservice Phade Phined Companies: Notestite &amp; documents include productions, services, and their policy (mission and vision).</li> <li>Leef methods and costs for version events in the Reservice Phade Phined Companies on the interview of the companies of particle of transmiss in the Interview of the companies of particle of transmiss in the function of the companies of particle of transmission of the companies of the policy formatic setter of the companies of the companies of the companies of the policy formatic setter of the companies of the policy formatic setter of the companies of the policy formatic setter of the policy formatic setter of the policy for the policy of the policy of the policy of the policy of the policy o</li></ul>	Research community	А	Scientific texts, Documents, and Companies' websites	
<ul> <li>Sampling and collecting data</li> <li>Review of the comparison to the subject.</li> <li>Review of the comparison Questionmark expension</li> <li>Review of the comparison Questionmark expension</li> <li>Review of the comparison Questionmark expension</li> <li>Reservict-Index National Constructured Interview which Repeated</li> <li>Reservict-Index National Constructured Interview which Repeated</li> <li>Reservict-Index National Storemer and a NoS and Scope</li> <li>Array Approach to strategic evaluation</li> <li>A franzy Approach to strategic evaluation by the MCDM techniques/harbitic Hierarchy Process (AHP) based on Porter's Model</li> <li>A franzy Approach to strategic evaluation by the MCDM techniques/harbitic rist activation</li> <li>A franzy Approach to strategic evaluation by the MCDM techniques/harbitic rist activation</li> <li>A franzy Approach to strategic evaluation by the MCDM techniques/harbitic rist activation</li> <li>A franzy Approach to strategic evaluation by the MCDM techniques/harbitic rist activation</li> <li>A franzy Approach to strategic evaluation by the MCDM techniques/harbitic rist activation</li> <li>A franzy Approach to strategic evaluation by the MCDM techniques/harbitic rist and holinformatics. Journal of the company's tasm in the field of chaminformatics. Journal of the strate rist and the company tasm in the field of chaminformatics. Journal of the strate rist and protein technic rist. Journal of the strate rist and the strate rist and the strate rist and protein technic rist. Journal of the strate rist and the strate rist and the strate rist and the strate rist and holinformatics. Another and strate rist and the strate rist and holinformatics. Another and strate rist and protein rist and protein rist and the strate rist and the strate rist and holinformatics. Another and strate rist and protein rist and prist and protein rist</li></ul>	<ul> <li>Staroping and collecting data</li> <li>Review of the comparison include productions, services, and their policy (mission and vision).</li> <li>Review of the comparison include productions, services, and their policy (mission and vision).</li> <li>Restrict-Frade Printer Printer (Errente) (Interview with sea period).</li> <li>Restrict-Frade Printer (Errente) (Interview Mission Comparison (Appendix).</li> <li>Restrict-Frade Printer Printer (Errente) (Interview Mission Comparison (Appendix).</li> <li>Restrict-Frade Printer (Errente) (Interview Mission Comparison (Appendix).</li> <li>Arrentific databases and cools to review the literature such as WoS and Scopus.</li> <li>Arrentific databases and cools to review the literature such as WoS and Scopus.</li> <li>Arrentific databases and cools to review the literature such as WoS and Scopus.</li> <li>Arrentific databases and cools to review the literature such as WoS and Scopus.</li> <li>Arrentific databases and cools to review the literature such as WoS and Scopus.</li> <li>Arrentific databases and cools to review the literature such as WoS and Scopus.</li> <li>Arrentific databases and cools to review the literature such as WoS and Scopus.</li> <li>Cheminific sole of the literature companies of the mission to engage and equip research ensers. Arrentific and Pointer Companies of the mission to engage and equip research ensers. Arrentific and Pointer Applementation house companies of the mission to engage and equip research ensers. Arrentific and Pointer Applementation house companies of the strent companies of the mission to engage and evectual presearch ensers. Arrentific and Pointer Applementation house companies of the mission to engage and evectual presearch ensers. Arrentic and Pointer Applementation house companies of the mission to engage and evectual presearch ensers. Arrentic and Pointer Applementation house and volution of the compaperion of the enapplementation and the endinterview statementa</li></ul>		A	Managers and experts in the cheminformatics industry	
<ul> <li>Review of the comparies where a dociment include productions, services, and their policy (mission and vision).</li> <li>Delphi method (Unterreturned interview with species).</li> <li>Resturber/hulde filler Comparison (Destromative (Appendis)).</li> <li>Centralic databases and cosis to review the literature such as VoSs and Scopus tarates from the interature such as VoSs and Scopus to interview with species).</li> <li>A Fuzy Approach to strategic evaluation by the MCDM techniques/Ambride Hierarchy Process (AHP) based on Porter's Model in 2013 to internation induction analysis (for interaction and vision to engage and ever) restorates and evolution the company's team.</li> <li>Arrows Taller is not on the leading Middle Essent companies in the field of cheminformatics. Jourded in 2013 with the company's team and evolution analysis of evolopments in a divolution gale species. The company's team is a deviation by the company's team in a divolution gale species. The evolution and species in a general divolution and independent and induction gales. Additionally, the company's team in a general divolution and by the company's team and evolution analysis. Additionally, the company's to deviate analysis of evolution and induction gales. Additionally, the company's team and evolution analysis. Additionally, the company's team and evolution analysis. Additionally, the company's team and evolution and and evolution analysis. Additionally, the company's team analysis of general analysis of the produced and and evolution analysis. Additionally, the company's a</li></ul>	<ul> <li>Review of the comparist where ite &amp; document cludes productions, services, and their policy (mission and vision)</li> <li>Depin method (maturcurured interview with seperat)</li> <li>Determine the extended interview with seperation (action mate (Appendia)</li> <li>Sternife databases and cosis to review the literature such as VMSs and Scopus</li> <li>A Tuzy Approach to strategic evaluation by the MCDM techniques/Analytic Hierarchy Process (AHP) based on Porter's Model</li> <li>Theory approach to strategic evaluation by the MCDM techniques/Analytic Hierarchy Process (AHP) based on Porter's Model</li> <li>Theory approach to strategic evaluation by the MCDM techniques/Analytic Hierarchy Process (AHP) based on Porter's Model</li> <li>Theore and WoS Analysis (or comparise) in the Mission to strategic evaluation by the MCDM techniques/Analytic Hierarchy Process (AHP) based on Porter's Model</li> <li>Theore and WoS Analysis coli to review the interaure</li> <li>Companies</li> <li>Theore and WoS Analysis coli to review the interaure</li> <li>Companies</li> <li>Theore and WoS Analysis coli to review the interaure</li> <li>Companies</li> <li>Theore and WoS Analysis coli to review the interaure</li> <li>Companies</li> <li>Theore and the mission to extending and promise companies with bioinformatics. Founded in 2013 with the mission to a strategic analysis. Production of the comparison include promise and other companies with strong gases. Additionally Mission and WoS. and marked and contract and industria gases. Additionally Mission and Wash and and contract analysis and other comparison and work of comparison and work of comparison and work of programming galances. Domaling galances and work of programming galances and other comparison and work of programming galances. Domaling galances and molecular galances. Domaling galances and work of programming galances. Domaling galances. Domalega and and coptic comparison and work of programming. Mission</li></ul>	Sampling and collecting data	А	Review of literature related to the subject	
<ul> <li>Definition of the comparison clusterion with separity.</li> <li>Definition of the comparison clusterion is (Appendix)</li> <li>Stending cluster and dots to review the learance such as WGS and Scopas</li> <li>Fuzzy Approach to strategic evaluation the MCDM techniques/Analytic Hierarchy Process (AHP) based on Porter's Model:</li> <li>Terminomic and WGS Analysis of the model, weighting and prioritize criteria/subcriteria in competition the memory and weighting and prioritize criteria/subcriteria in competition the memory and WGS Analysis on and WGS Analysis of the memory and weighting and prioritize criteria/subcriteria in competition the memory strategic evaluation</li> <li>Terminomic made years on a decision-making scale on the model in 2013</li> <li>Terminomic made years and section-making scale on the comparison in the field of cheminformatics. Johnne measures, software the company's termits compassion of an english and stratements. Founded in 2013</li> <li>Terminomic made years and section-making scale scale and scale sca</li></ul>	<ul> <li>Depin method: Unstructured inserview with operation</li> <li>Depin method: Unstructured inserview with operation</li> <li>Exercited habes and cools to revek with iterature studia ar WoS and Scopa:</li> <li>A Fazy Approach to strategic evaluation by the MCDM techniques/habbit: Herrarity Process (AHP) based on Porter's Model:</li> <li>Themarchical analysis for</li> <li>Therarchical analysis for analysis and work analysis tool to revek the literature studia and WoS Amalos tool it or strategic evaluation by the MCDM techniques/habbit: Herrarity Process (AHP) based on Porter's Model:</li> <li>Therarchical analysis tool to revek the literature studia and WoS Amalos tool it or strategic evaluation by the MCDM techniques/habbit: Herrarity Process (AHP) based on Porter's Model:</li> <li>Therarchical analysis tool to revek the literature studia and WoS Amalos tool it or factor software and decinomatic and tool it or factor and wos Amalos tool it or factor and tool it or factor software and decinomatic static and tool it or factor and to the comparity much and and explored and and explored tool it or factor and to the comparity or factor and tool it or factor and to the comparity or factor and tool it or</li></ul>		A	Review of the companies' website & documents include productions, services, and their policy (mission and vision)	
<ul> <li>Beardrise/Place Priver Comparison Oceanion (Appendix)</li> <li>Beardrise/Place Priver Comparison Oceanion (Appendix)</li> <li>Fuzzy Approach to strategic evaluation by the MCDM techniques/Analytic Hierarchy Process (AHP) based on Forter's Model on Forter's Model analysis (for strategic evaluation)</li> <li>A Fuzzy Approach to strategic evaluation by the MCDM techniques/Analytic Hierarchy Process (AHP) based on Forter's Model on Forter's Model analysis (for strategic evaluation)</li> <li>A Fuzzy Approach to strategic evaluation by the MCDM techniques/Analytic Hierarchy Process (AHP) based on Forter's Model Techninofformatics induced analysis (for strategic evaluation)</li> <li>A Fuzzy Approach to strategic evaluation by the MCDM techniques/Analytic Hierarchy Process (AHP) based on Forter's Model Techninofformatics induced analysis (for the software development)</li> <li>Companies</li> <li>A Fuzzy Approach to strategic evaluation for the companies with bioinformatics. Founder 10.01 and the techninofformatics induced and and the techninofformatics. Software the rest stratement of the companies with bioinformatics founder in 2013 with strong research experision. The Rest MCG and many other companies with bioinformatics founder in 2013 with strong research experision. The ADA exclusion and the companies with bioinformatics founder in 2013 with strong research experision. The ADA exclusion and the companies with strong research exerts with onder companies and evolution and the ADA exclusion and the companies of an evolution and industrial gala. And for and the companies of an evolution and the companies of the company's and model company's to evolution and and and additional the companies to and evolution and the companies of the company's and model consenting and many other computational SMS. And analy other computational SMS. And additional t</li></ul>	<ul> <li>Beardine-Made Frierd Comparison Outeritomine (Appendix)</li> <li>Beardine-Made Frierd Comparison Outeritomine (Appendix)</li> <li>Fuzzy Approach to strategic evaluation by the MCDM techniques/Markit: Hierarchy Process (AHP) based on Porter's Model for Internative Induction analysis (four-level decision tree mode), weighting and prioritize criteria/subcriteria in competition the deminiformatics induction analysis (four-level decision tree mode), weighting and prioritize criteria/subcriteria in competition the forminformatics induction analysis (four-level decision tree mode), weighting and prioritize criteria/subcriteria in competition the deminiformatics induction analysis (four-level decision tree mode), weighting and prioritize criteria/subcriteria in competition the forminformatics induction of the company provides advances of pharmecutical companies to a device analysis. Production of the company provides advances of pharmecutical companies to a chieve their sciencific analysis. Production of the company provides advances of pharmecutical companies to a chieve their sciencific and induction gravits. Apolino programming NGS, and many other company provides advances of pharmecutical companies and oblinic matter specific analysis. Apolito programming NGS, and many other company provides advances of pharmecutical companies and oblinic matter specific analysis. Production of the comparison of provides advances of pharmecutical companies and oblinic matter specific and specific analysis. Apolito programming NGS, and many other company provides advances of pharmecutical company. Provides and objinic matter specific and specific and specific and specific matter specific and specific matter specific and specific opharmecutical companies. and objinic matter specific and speci</li></ul>		. А		
<ul> <li>Used methods and tools for review the literature auth a WoS and Scopus data analysis for data analysis for atta analysis for a transport of the evolution by the MCDM techniques/harbitict Hierarchy Process (AHP) based on Porter's Model: To Internet analysis for a market solution and structure and</li></ul>	<ul> <li>becardic databases and cools to review the Iterature subs a WoS and Scous</li> <li>Carentife databases and cools to review the Iterature subs and you weighting and prioritize criteria/subcriteria in competition the networks induction</li> <li>A Fuzzy Approach to strategic evaluation the MCDM etchiques/Analytic Hierarchy Process (AHP) based on Porter's Model: To Interarchical analysis (four-level decision three model), weighting and prioritize criteria/subcriteria in competition the terminormatic inductry.</li> <li>A Fuzzy Approach to strategic evaluation term codel), weighting and prioritize criteria/subcriteria in competition that analysis (four-level decision-muking scot).</li> <li>A Fuzzy Approach to strategic evaluation term codel), weighting and prioritize criteria/subcriteria in competition the terminormatic scole one of the fuely Model Earth companies in the field of cheminformatics. Software with the mission to engoge and equip freatments. Futures values: and hol companies with broinformatics. Software development and specific analysis and melcular genetic (SA). And many other computational stalls in Disconce company's team is composed of professionals with strong research experiments. Production of the company included holding development and specific and stan analysis and melcular genetic. Solar, molecular genetic, and analysis and hol company research experiments. Solar, molecular genetic, and analysis and hol company's sorvices to many research experiments. And hol company included holding decision compared solaris and protein genetic and equipped computer-based solaris and and evaluation and solaris and transcriptorist. Solar, molecular genetic and equipped computer-based solaris and protein and solaris and protein and solaris and and and and and and and and and and</li></ul>		. А	Besetcher-Made Paired Comparison Ouestionnaire (Appendix)	
<ul> <li>A Fuzy Approach to strategic evaluation by the MCDM techniques/han/ytic Hierarchy Process (AHP) based on Porter's Model: The meninformatics industry in the mistion material in the meninformatics industry.</li> <li>A Fuzy Approach to strategic evaluation by the MCDM techniques/han/ytic Hierarchy Process (AHP) based on Porter's Model: The meninformatics industry in the mistion one of the leading Middle Earth and the companies in the field of cheminformatics. Founded in 2013 Expert Choice software as a decision-making software.</li> <li>Ters Silico is one of the leading Middle Earth companies in the field of cheminformatics. Founded in 2013 Expert Choice software as a decision-making software.</li> <li>Ters Silico is not one of the above and model and the companies in the field of cheminformatics. Software evolves the internation one engge and equip researchers usueding and model and workchops to develop and an approximation. Software and workchops to develop and a develop</li></ul>	<ul> <li>dra analysis for strategic evaluation by the MCDM techniques/hanytic Hierarchy Process (AHP) based on Porter's Model: To interarchista industry in the method.</li> <li>a Fuzzy Approach to strategic evaluation by the MCDM techniques/hanytic Hierarchy Process (AHP) based on Porter's Model: To interarchista industry indu</li></ul>	Used methods and tools for	A	Scientific databases and tools to review the literature such as WoS and Sconus	
<ol> <li>A Fuzzy Approach to strategic evaluation by the MCDM techniques/Analytic Hierarchy Process (AHP) based on Porter's Model.         Texmon evolution and Wox 5 Analysis (our-level decision tree model), weighing and prioritize criteria/subcriteria in competition the enhiltormatics industry.     </li> <li>Yewn on Wox 5 Analysis tool to review the literature         Termon and Wox 5 Analysis tool to review the literature         Termon and Wox 5 Analysis tool to review the literature         Termon 2005         Termon 2006         Termon 2005         Termon 2005         Termon 2006         Termon 200</li></ol>	<ol> <li>A Fuzy Approach to strategic evaluation by the MCDM techniques/Analytic Hierarchy Process (AHP) based on Porrer's Model. To interarchical analysts (jourierachies) analysis (jourierachies) analysis (jourierachies) and services intermined multismust in the mission and WGS Analysis tool to review the literature.</li> <li>Yewen and WGS Approach to so for review the literature and the mission and WGS Analysis so too review the literature in the mission and WGS Analysis and so the companies in the field of cheminformatics. Founded in 2013 Pewen and WGS Approach to segge and equip researches, students, and other companies with bioinformatics. Founded in 2013 With the mission to engage and equip researches, students, and other companies with the mission so engage and equip researches, students, and other companies with bioinformatics. Approximates, acformate and and analysis and poly of the company provides approximation stalls in bioscience. Counses and works the company provides approximates, acformate and services in the company provides approximates. Approximates and with the mission to engage and equip researches, stratents, approximates, approxi</li></ol>	data analysis for	,		
<ul> <li>A ruzzy Approarto rateage evaluation by the PLOM techniques/Anyticr interactivity modes of protes rootent of the interactivity analysis (four-level decision tree model), weighting and prioritize criteria/subcriteria in competition the thermatic form and VoS Analysis root to reverve the title and the end of herminformatics and the analysis (four-level decision tree model), weighting and prioritize criteria/subcriteria in competition the thermistry in compared to the analysis (four-level decision tree model), weighting and prioritize criteria/subcriteria in competition the thermistry to angle so the analysis and the root present experiment of the minimormatics founded in 2013 with the mission to engage and excisonals with teoming software.</li> <li>The company's tran targe reaction that analysis and molecular genetic analysis. Production of the company included holding corres and workshops to development, and spatiantic comparised of the minimormatics. GNAR, molecular dynamics, Phyton programming, NGS, and many other computational skills in bioscience. Consulting services to many reservices is genomic data analysis and molecular genetic analysis. Founded in 2013 the provident and roughting and many other computational skills in bioscience. The other computational services in bioscience, and workshops to develop decing and many other computational services in the services in decision of molecular dynamics. Allocation of the bioscience and workshops to develop and evolution and services and workshops to develop decing and prost computational services in the services of and workshops to develop decing and bioscience. The other computational services in the services of and workshops to develop decing and bioscience. The other computational services in the services of and workshops to develop decing and woreshold and 2013. All many other computational services of an</li></ul>	<ul> <li>7. A TAYA Approvent to strategic evaluation by the POLY techniquestaryative treaterial/subcriteria in competition the interarchical analysis (jour-lead edicsion-making software).</li> <li>7. Wenno and WGS Analysis tool: neviewnell edication to reviewnell the field of cheminformatics in compaction to engage and services.</li> <li>7. Wenno and WGS Analysis tool: neviewnell the field of cheminformatics in comparition to engage and services.</li> <li>7. Wenno and WGS Analysis tool: neviewnell the field of cheminformatics in comparity to the maximum on engage and services.</li> <li>7. Wenno and WGS Analysis tool: neviewnell the field of cheminformatics in chemitary tool services and which field the maximum of the prostistion and other comparities and holding correst and expension and other comparities and molecular genetic analysis. Finduction of the compary is the maximum and specialist in provides statem comparities and molecular genetic analysis. Applicationally, NGS and may other comparational stills in bioscience. Constraints strated is and molecular genetic analysis and bioding evolution and strates and base and other comparational strates and base and other comparation and strates and bases and base and other comparation and strates and bases and base and other comparation and strates and bases and bases. The compary is an evices to many research enters which include bases and other comparation and strates and bases and other comparation and bases. Analot and the actintic and the compary is and the compary is ana</li></ul>	su aregic evaluation	4		-
<ul> <li>Companies</li> <li>Companies</li> <li>Experi Choice software as a design vilidate Enstern companies in the field of cheminformatics and bioinformatics. Founded in 2013 with the mnsion or engage and englight in genomic data analysis and one companies with bioinformatics. Software the englight in a molecular general cash and soft of englight in a genomic data analysis and note-tompanies with storage research experience in chemistry. bioinformatics, software and ore companies of professionals with storage research experience in chemistry. Bioinformatics, software and yor shalps to develop mice and molecular general cash. Bioinformatics and bioinformatics. Software development, and specialits in genomic data analysis and note-tompanies of the company provides adoanced and general candina companies to a doance all in bioscience. Consoling services to an molecular general cash. Software and workshops to develop mice and industrial goals. Additionally, the company provides adoanced and equipped computer-based labs and other company services for consumers, holding courses and workshops to develop mice approximation of the major parts of the company services for consumers, holding courses and workshops to develop mice approximation and services for consumers, holding courses and workshops to develop mice approximation and services for consumers, holding courses and workshops to develop mice approximation and services for consumers, holding courses and workshops to develop mice approximation and services in the endine analysis and bioinformatics. Company provides adoanced and eegly, cheminformatics. QSAR, molecular dynamics, Phytopen and services in the restorant and services and</li></ul>	<ul> <li>Companies</li> <li>Term of WoS Analysis tool for review the literature</li> <li>Term of WoS Analysis tool for review the literature</li> <li>Term of WoS Analysis tool for review the literature</li> <li>Term Sillio is one of the leading Middle Eastern companies with bioinformatics founded in 2013 with storing team is composed on professionants with storog research experience in chemistry. Floinformatics, software the company is team is composed on professional with storog research experience in chemistry. Floinformatics, software the company is team is composed on professional with storog research experience in chemistry. Floinformatics, software the evolution of the analysis and molecular genetic analysis and molecular genetic analysis and molecular genetic analysis and many other companies with storog research expension. Software of professionance, Software devolption for the molecular genetic analysis and molecular genetic analysis and many other computer-based last and other company's services is genomic data analysis and bioinformatics, software devolption for the major storage of the major farma analysis and bioinformatics and transcription and three dimensional computer-based last and three dimensional company's services, molecular dynamics, molecular dynam</li></ul>		A	A Fuzzy Approach to strategic evaluation by the MCDM techniques/Analytic Hierarchy Process (AHP) based on Porter's Model: To hierarchical analysis (four-level decision tree model), weighting and prioritize criteria/subrriteria in competition the	<u></u>
<ul> <li>Expert Choice software as a decision-making software</li> <li>Expert Choice software as a decision-making software</li> <li>Pars Silico is one of the leading Middle Exstern companies in the field of cheminformatics and bioinformatics. Founded in 2013</li> <li>Pars Silico is one of the leading Widdle Exstern companies in the field of cheminformatics and bioinformatics. Software development, and specialist in genomic data analysis and onecular genetic analysis. Production of the company included holding evelopment, and specialist in genomic data analysis and molecular genetic analysis. Production of the company included holding many other computational skills in biostiments. QSAR, molecular and may research experiments. Software development, and specialist in genomic data analysis and molecular genetic analysis. Production of the company included holding many other computational skills in biostime. QSAR, molecular and maxines exactly extensing. NG3, and many other computational skills in biostimes. DSAR, Addinional of Adminiomatics, GSAR, molecular and naccine design. Addinional skills in biostience. Doint and naccine design and inductrial gas and calcular granterist of the company's evines for construmes, holding courses and workflops to develop drug design, cheminformatics. GSAR, molecular and proceeding and bioscience. Drompational sciences for onsurress, holding courses and workflops to develop drug design, denninotratics. GSAR, molecular provision of molecular dynamics. Protocon science. June 2013 has and onter company services in bioscience. The company's experise is pononic data analysis and bioscience. Source hutple, holding and cocking and many other companies, and three dimensional QSAR. Simulation of molecular dynamics. Todeking and many other company services in bioscience. The company's expertise is in Drug design. Vaccine design. Computed and analysis drug and accine design and many other computers, and holding and cocking and many other companys services in provision of pro</li></ul>	<ul> <li>Yewn and WSS Analysis col to review the literature.</li> <li>Expert Choice software as a decision-making software</li> <li>Expert Choice software as a decision-making software</li> <li>Pars Silto is one of the elading Mild Extern companies with strong research expensive with bioinformatics. Founded in 2013 with the mompany's team is compared with strong research expensive with bioinformatics. Molecular of matter sources and molecular greater analysis. Production of the company included holding cuerses and workshops to develop drug design, cheminformatics. Software are applied to pharmecular comparies with strong research experiments. Molecular of matter sources and workshops to develop drug design, cheminformatics. Software of pharmecular opharmics, Photon programming NGS. and experiments and specialism of many other computational services for consumers and workshops to develop drug design, cheminformatics. Software of pharmecular opharmics. Founded last and holding courses and workshops to develop drug expension of molecular greater analysis. And many other computational services for consumers to a hole workshops to develop matter opharmic should be accessed of a software and and and cuerce optication of the compary's tervices is genomic data analysis and holinformatics. Software design services. More cuputational Chemistry, Two-dimmissional and transcriptional chemistrican analysis. And anary other computational chemistry and transcription analysis. And many other computational chemistry. Two-dimmissional and transcriptional chemistrican analysis and holinformatics software design services. More cuerse and workshops to develop drug exists. More and and and and and analysis and holinformatics services which include bioscretes. The compary is experimelys and workshops to develop drug exists. More analysis and holinformatics. More and and exists and holinformatics are and workshops to develop drug exists. Two-dimmissional and minter and process and honinformatics. More and and analysis a</li></ul>			to menu analysis (our reversion area model), wegaing and promise of the manual and the competition are cheminformatics industry	
<ul> <li>Expert Choice software as a design existen companies in the field of cheminformatics. Founded in 2013 with the mission to engage and equip research surfactures. And experisions in the intensity bioinformatics fromwedge and exvices. The company is that and psecialist in genomic data analysis and molecular genetic analysis. Production of the company included holding courses and workshops to develop drug design, cheminformatics. OSAR, molecular of many chemic romputational sites in score consulting stage. Additionally, the company included holding courses and workshops to develop drug design. Cheminformatics. CARA, molecular of many chemic romputational sites in bioinformatics. SAR, molecular of many chemic romputational sites in the entities and inductionally, the company provides advanced and equipped computer-based lass and other compating and provision and syste and holding courses and workshops to develop drug disayris. Foundaria of many chemic computational services for any and many other computational services in genomic data analysis and holding curves and workshops to develop drug holding constrained and equipped computer-based lass and other compational services in genomic data analysis and bioinformatics active setvices which include NGS, proteomics, and transcriptomics and ysters and many other computational services in genomic data analysis and bioinformatics active setvices which include NGS, proteomics, and transcriptomics and two consumers, holding curves and workshops to develop drug bioscience. One of the major parts of the company's services is genomic data analysis and bioinformatics services which include the comparies and the comparies and the comparies of the production of the comparies. And bioinformatics active setvices which include NGS, proteomics, and transcriptomics and text mining QSAR, Simulation of molecular of program. One of the analysis and program of program and set and present in the outs and set and medicial databases. Source thypolegeny and evolution analyses, An</li></ul>	<ul> <li>Companies</li> <li>Pars Silico is sone of the leading Middle Eastern companies in the field of cheminformatics. Founded in 2013 with the mission to engrga and equip resarchers, and other companies with bioinformatics, software are development, and operating tin growning resarchers and experisions with strong resarchers. Software development, and operating funding and many other companies with bioinformatics, software are development, and operating funding and many other companies to the mission to engrga and equip resarchers. Software development, and operating tin growning search can any other comparison of the company provides advanced and any other computerional silis in bioscience. Counseling services to many research creaters, universites, and ABC departments of pharmaceutical companies to athread table start of the company provides advanced and edsign, cheminformatics, OSAR, molecular dynamics, Python programming, NGS, and may other computerional silis in bioscience. Counseling services to many research creaters, universites, and ABC departments of pharmaceutical companies to athread pharmaceutical companies and the company services to many percention analysis, and many other computational services for analysis and bioinformatics. Software advanced and bioscience. Conce of the miniformatics, OSAR, molecular dynamics, Python programming, NGS, and many other computational services to many presarch development, and transcriptomics analysis, and and science spin services in the field of the production of the company provides advanced and bioscience. Conce of the miniformatics, OSAR, molecular dynamics, Pothon programming, NGS, and many other computational services of proceeding and many other computational services in the informatics and proceeding and proceeding and transcriptomics analysis, durg and varice design of the provide advanced and proceeding and many other computational services in the informatics and proceeding and medical databases. Soft Huttractorel and proceeding and three-dim</li></ul>		А	Yewno and WoS Analysis tool to review the literature	
<ul> <li>Pars Silice is one of the leading Middle Easterin companies in the field of cheminformatics and bioinformatics. Founded in 2013 with the mission to engage and equip researchers, students, and other companies with bioinformatics, software development, and specialist in genomic data analysis and molecular genetic analysis. Provide programming, NGS, and many other computational skills in biostead of professionals with strong research experience. The company's team is compared with the mission to engage and equip researchers, students, QSAR, molecular dynamics, Python programming, NGS, and many other computational skills in biostering again charstring agas. Additionally, the company provides advanced and equipped companies to achieve their scientific and industring agas. Additionally, the company provides advanced and equipped computer based biothermatics. QSAR, molecular dynamics, Python programming, NGS, and many other computational skills in biosteries. The company's tearing and and other provises and workshops to develop drug design, cheminformatics. QSAR, molecular dynamics, Python programming, NGS, and many other computational skills in biosteries. The company biodise advanced and and escilla statistic analysis: strong and variable and other dynamics. Modeling and bioinformatics services to construction of a strong advanced and and services to a scillate the production of the analysis and the advanced and and services and bioinformatics services which include biological structures design. Computational Chemistry, Two-dimensional, and three-dimensional SAR, simulation of molecular dynamics. Modeling and production of the company in the company and collegical structures and bioinformatics and services in tructure dynamics. Modeling and production of the company and evolution analysis. Arg and variable advanced and and services and protein exploration of analysis of genomics and protein analysis. Arg and variable advanced and and services and servician and protein arginer tructure protein analysis.</li></ul>	<ul> <li>Pars Silico is one of the leading Middle Easterin companies in the field of cheminformatics and bioinformatics. Rounded in 2013. The company's team is compared switchers, and other companies with the mission one engge and equip researchers, students, and other companies with the mission to engge and equip researchers, students, and other companies with the mission to engge and evolveshors to develop drug design. Atominicantal statica in the mission provides to many other computational skills in bioscated. Some analysis and molecular genetic analysis. Production of the company into the company statica, GSAR, molecular dynamics, Python programming, NGS, and many other computational skills in bioscate. Consumers, tolding course and workshops to develop drug design, cheminformatics, GSAR, molecular dynamics, Python programming, NGS, and many other computational skills in bioscate. The company's services for consumers, holding course and workshops to develop drug design, cheminformatic, Stata analysis and holding many search centers, universities, and RBD departments of design, cheminformatic, Python programming, NGS, and many other computational services in biosciences. The company's services for consumers, holding course and workshops to develop drug design, cheminformatic, Stata analysis and bioinformatics services which include bioscience. Due detain physics and san other computational services in biosciences. The company's services in biosciences. The company's services in biosciences. The company's services in biosciences. The company services in biosciences. The company's services in biosciences. The company services in biosciences. The company services in biosciences. The company's services in biosciences. The company's services in biosciences. The company services is provinde the highest quality products and serv</li></ul>		A	Expert Choice software as a decision-making software	
<ul> <li>with the mission to engage and equip researchers, students, and other companies with bioinformatics fortwares The company's team is composational with strong research experience in chemistry, bioinformatics, offware development, and specialist in genomic data analysis and molecular genetic analysis. Production of the company included holding courses and workshops to develop drug design, cheminformatics, CSAR, molecular genetic analysis. Production of the company included holding courses and workshops to develop drug design, cheminformatics, CSAR, molecular genetic analysis. Production of the company included holding courses and workshops to develop drug design, cheminformatics, CSAR, molecular goals. Additionally, the company browides advanced and many other computerized computerises cachine their scientific and industrial goals. Additionally, the company provides advanced and equipped computerizes (DSAR, molecular dynamics, python programming, NGS, and many other computational prostein engineering, many other computational services in locating experises in Drug design, descrite design domany other computerized and descrite and proceeding and prostein engineering. Molecular physens, and transcriptonics analysis. Simulation of molecular ytem, Bioekanol Chemistry, Wo-dimensional OSAR, Simulation of molecular system. Bioekanol analysis. Data mining and text mining of biological and medical data, and Sark's simulation of the prostein engineering. Molecular physens and evolution analyses. Analysis of genomics and pervices in healoging and prostein engineering. Molecular physens and evolution and physens and evolution and services in the field, in pursuit of its social mission and with its core knowledge of the production of biotechnology products and the complete provision of genomics and provised the highest quality products and the complete provision of genomics and provised the highest quality products and the complete provision of genomics and provide the phynelony and evolution analysis.</li> <li>Topaz</li></ul>	<ul> <li>with the mission or engage and equip researchers, students, and other companies with strong research experience in themistry bioinformatics, software development, and specialitin genotic data analysis and molecular grenetic analysis. Production of the company included holding course and workshops to develop drug design, cheminformatics, QSAR, molecular ymanis, Pytohon programming, NGS, and many other computational skills in bioscience. Counsults and other computational skills in bioscience. Counsults and other computational skills in bioscience. Computational statistic and industrial goals. Additionally, the company provides advanced and elsign, cheminformatics, SARA, molecular ydmanics, Apdino programmers, holding courses and workshops to develop drug design, cheminformatics, SARA, molecular ydmanics, fund and variato bear design, cheminformatics, and many other computational skills in biosciences. The company's services is genomic data analysis and bioinformatics services which include design, cheminformatics, and many other computational services in biosciences. The company's services is genomic data analysis and bioinformatics services which include posicines. The analysis and pointerial and mice dimensional services in biosciences. The company provides advanced and design, cheminformatics, that dranscriptoring analysis and bioinformatics, mackatoning, and transcriptoring analysis and bioinformatics are vices which include posicines. To and many other computational services is periodic analysis and bioinformatics and transcriptoring or bioinformatics and transcriptoring analysis. Fund and variance and advanced and design, cheminformatics, that dranscriptoring analysis and bioinformatics. Mackath and and advanced and design, cheminformatics. That and posiciences. The archite esign and molecular and and analysis and bioinformatics. Mackath and bioinformatics and variance and bioinformatics and variance and bioinformatics data analysis and bioinformatics data analysis and bioinformatics and variance a</li></ul>	Companies	А	Pars Silico is one of the leading Middle Eastern companies in the field of cheminformatics and bioinformatics. Founded in 2013	
<ul> <li>The company's team is composed of professionals with strong research experience in chemistry, bioinformatics, software development, and specialist in ground cata analysis and molecular of ynamics, python programming, NGS, and many other companies to analyse services to many research centers, universities, and R&amp;D departments of pharmacutical companies to achieve their scientific and industrial goals. Additionally, the company provides advanced and equipped computer-based last and other constructional skills in bioscience. Counseling services to many research centers, universities, and R&amp;D departments of pharmacutical companies to achieve their scientific and industrial goals. Additionally, the company provides advanced and equipped computer-based last and other computational services for consumers, holding courses and workshops to develop drug design, cheminformatics, QSAR, molecular dynamics, Python programming, NGS, and many other computational services for consumers, holding courses and workshops to develop drug design, cheminformatics, GSAR, molecular dynamics, molecular dynam</li></ul>	<ul> <li>The company's team is composed of professionals with strong research experience in chemistry bioinformatics, software development, and rescalitst in genome data analysis and molecular of rate company include holding cuerses and workshops to develop rith design, cheminformatics, GSAR, molecular of rate company includes holding cuerses and workshops to develop rith design, cheminformatics, GSAR, molecular of rate analysis and built company isotated and equipped computer-based last and observices to many research comparational skills in bioscience. Counseling services for consumers, holding courses and workshops to develop drug design, cheminformatics, GSAR, molecular dynamics, PGAR, molecular dynamics, Moleing and equipped computer-based last and evolutional starvices view and version and services is genomic data analysis and bioinformatics services which include NGS, proteomics, and transriptions, and transriptions, and varacine design services which include NGS, proteomics, metebolomics, and transription services is genomic data, and varacine design. Varanics, Modeling and protein engineering, Molecular phylogeny and evolution of the company is ervices in biosciences. Convelling and the company is ervices is genomic data, and bioinformatics services which include holding and medical databases. Source: http://enpanicg.tot.gand anay other comparational services in biosciences. The company's experites in biosciences. The company is a differentiated metal analysis is compared and metal data, and evolution of the protein engineering. Molecular phylogeny and evolution and evolution and services in biosciences. The company is a differentiated metal analysis. For the molecular of the evolution of the evolution of the company is a directed metal analysis. Moleling and evolution and evolution and verses. Analysis of genomics and proteenics data. The biological system compared and medical databases. Source: http:</li></ul>			with the mission to engage and equip researchers, students, and other companies with bioinformatics knowledge and services.	
<ul> <li>development, and specialist in genomic data analysis and molecular genetic analysis. Production of the company included holding curses and workshops to develop drug design, cheminformatics. PANn molecular symmets, PMCIN programmics, NGL departments, NGL genetics, and many other computerbased tabs and other computational services to many research centers, universities, and R&amp;D departments of pharmaceutical companies to achieve their scientific and industrial goals. Additionally, the company provides advanced and equipped computerbased tabs and other computational services for consumers, holding courses and workshops to develop drug design, cheminformatics, QSAR, molecular advanatics, Toolecular Advanatics, molecular Advanatics, advanaticar advanatic advanaticar avaitar advanaticar advanaticar advanaticar advanaticar avaitar advanati</li></ul>	<ul> <li>development, and specialist in genomic data analysis and molecular genetic analysis. Production of the company included holding courses and workshops to develop drug design, cheminformatics. QAR, molecular dynamics, Pychon programmings. NGS, and many other computational services to many research centers, universities, and R&amp;D departments of pharmaceutical companies to achieve their scientific and industrial goals. Additionally, the company provides advanced and gesign, cheminformatics. QSR, molecular dynamics, Pychon programmings. NGS, and many other computational services in genomic data analysis and bioinformatics services which include NGS, proceeding represents, and transcriptormics analysis, drug and vaccine design services. Which include NGS, proceeding represents, Molecular dynamics, Pychon programming, NGS, and many other computational services in biosicience domany services halves in biosicience of the NGS, proceeding represents, Molecular dynamics, Molecular dynamics, Molecular dynamics, Contrast analysis and bioinformatics services which include NGS, protein regineering, Molecular and three-dimensional QSR, Simulation of molecular dynamics, molecul</li></ul>			The company's team is composed of professionals with strong research experience in chemistry, bioinformatics, software	
<ul> <li>courses and workshops to develop drug design, cheminformatics, QSAR, molecular dynamics, Python programming, NGS, and my other comparational selvice their science. Counseling services to many research enterners, universites, and RAB of departments of pharmaceutical companies to achieve their science. Counseling services to many research enterners, universites, and RAB of departments equipped computer -based labs and other computational services for consumers, holding courses and workshops to develop drug design, cheminformatics. QSAR, molecular dynamics, Python programming, NGS, and may other computational services in prostemines. Note: the major parts of the company's services in bioscience. One of the major parts of the company's services in bioscience design, services molecular dynamics, molecular dynam</li></ul>	<ul> <li>courses and workshops to develop drug design, cheminformatics, QSAR, molecular dynamics, Python programming, NGS, and many other comparational skulls in bioscience. Counseling services to many research centers, universities, and RAB Departments of pharmaceutical companies to a chine when its citentific and industrial goals. Additionally, the company provides advanced and equipped computer-based labs and other computational services for consumers, holding courses and workshops to develop drug design, cheminformatics, SAR, molecular dynamics, python programming, NGS, and many other computational services is genomic data analysis and bioinformatics services which include NGS, proteomics, metabolomics, and transcriptomics analysis, drug and vaccine design services which include NGS, proteomics, metabolomics, and three-dimensional. The comparation of molecular dynamics, molecular dynamics,</li></ul>			development, and specialist in genomic data analysis and molecular genetic analysis. Production of the company included holding	ğ
<ul> <li>many other computational skills in bioscience. Counseling services to many research centers, universities, and R&amp;D departments of parametucida companies to achieve their scientific and industrial para company provides advanced and equipped computer computational services for consumers, holding courses and workshops to develop drug design, cheminformatics. OSAR, molecular dynamics, pulson programming, NGS, and many other computational skills in bioscience. One of the major parts of the company's services is genomic data analysis and bioinformatics services which include NGS, proteomics, and transcriptomics analysis, drug and vaccine design services. Molecular dynamics, molecular docking, and many other computational analysis. No-dimensional, and transcriptomica analysis of genomic data analysis and bioinformatics services which include NGS, proteomics, and transcriptomica analysis of genomic data analysis and bioinformatics services which include NGS, proteomics, and transcriptomica, and transcriptomica analysis of genomic data analysis and bioinformatics services which include NGS, group and evolution analyses. Molecular phylogeny and evolution analyses, Snullation of molecular dynamics, Molecular group is of molecular dynamics. Molefing and protein engineering. Molecular phylogeny and evolution analyses. Source: http://en.parasili.co.com/</li> <li>Topaz Gene Exploration (setablished in 2012) has been able to provide the highest quality products and services in the field, in pursuit of its social mission and whit its core knowledge of the production of biotecthology products and the complete provision of genomics and evolution and services contented and evolution of sententies and microbiology products and the complete provision of genomics and protection of biotecthology products and services utilizing the topazene companies. and first-level medical genetic laboratories even in the most sophisticated research products and the complete provargemencom</li> <li>Piopaz Gene Exploration (setablished in 201</li></ul>	<ul> <li>many other computational skills in bioscience. Counseling services to many research centers, universities, and R&amp;D departments equipped computer-based labs and other computational services for consumers, holding courses and workshops to develop drug design, cheminformatics, QSAR, molecular dynamics, Python programming, NGS, and many other computational skills in bioscience. One of the major parts of the company is services in bioscience. The company is nevices which include bioscience. One of the major parts of the company is services in bioscience. The computational skills in bioscience. The computational services in biosciences. The computational services which include bioscience many other computational services in biosciences. The company is services, molecular dynamics, molecular dynamics, molecular pytosping and many other computational services in biosciences. The company is services, molecular dynamics, molecular dynamics, molecular pytosping and many other computational services in biosciences. The company is services, molecular dynamics, molecular dynamics, molecular pytosping and evolution of services truther computational services truth include services, molecular dynamics, molecular dynamics, molecular dynamics, molecular gytosmic, molecular dynamics, molecular genetic, molecular dynamics, molecular dynamics, molecular dynamics, molecular dynamics, molecular dynamics, molecular dynamics, and medical databases. Source: http://entarssilico.co</li></ul>			courses and workshops to develop drug design, cheminformatics, QSAR, molecular dynamics, Python programming, NGS, and	)
<ul> <li>of pharmaceutical companies to achieve their scientific and industrial goals. Additionally, the company provides advanced and design, cheminformatics. OSAR, molecular dynamics, Python programming, NGS, and many other computational services for consumers, holding courses and workshops to develop dus biostience. One of the major parts of the company is services is genomic data analysis and bioinformatics. wolecular postences in the company is services is genomic data analysis and bioinformatics. The company is services is genomic data analysis and bioinformatics. Molecular dynamics, molecular phylogeny and evolution analysis, drug and vaccine design. Vaccine design. Vaccine design, and mergical datapases. Source: http://en.parssilico.com/</li> <li>Topaz Gene Exploration (stabilished in 2012) has been able to provide the highest quality products and services in this field, in pursuit of its social mission and with its core knowledge of the provide of biotechnology products and protection of biotechnol analysis. The goal of this provide the highest quality products and the complete provision of genomics and protecnics. Topaz Gene is supporting clients at universities, research projectics of the provision of biotechnology products and protection of biotechnology products and protectical genetic laboratories even in the most sophisticated research projectical company. The company offers duction of biotechnology products and protectical company company offer second.</li> <li>Pistgaman is a knowledge-based Bioinformatics company.</li></ul>	<ul> <li>of pharmaceutical companies to achieve their scientific and industrial goals. Additionally, the company provides advanced and equipped computerbased labs and other computational services for consumers. Holding curves and workshops to develop drug design, chemiformatics. SAR, molecular dynamics, Python programming, NGS, and many other computational skills in biosciences. The comparaty and sources and vorkshops to develop drug design, chemiformatics and ranscriptomics analysis, drug and vaccine design services which include NGS, proteomics, metabolomics, and transcriptomics analysis, drug and vaccine design services which include NGS, proteomics, metabolomics, and transcriptomics analysis, drug and vaccine design services which include protein engineering. Melcular phylogy and evolution analysis, and proteomics and protecular dynamics, molecular dynamics, molecular dynamics, molecular dynamics, molecular dynamics, and protein engineering. Melcular phylogy and evolution analysis, and proteomics and protecular dynamics, molecular dynamics, molecular dynamics, and fractine design, action and metical data and services in biosciences. The compary and evolution analysis, and more design and proteomics and proteomics data. The biological and medical databases. Source: http://mpaneas.source.http://mp</li></ul>			many other computational skills in bioscience. Counseling services to many research centers, universities, and R&D department.	nts
<ul> <li>equipped computer-based labs and other computational services for consumers, holding courses and workshops to develop drug design, cheminformatics, SQAR, molecular dynamics, Python programming. NGS, and many other comparational slub is in bioscience. One of the major parts of the company's services is genomic data analysis and bioinformatics services which include NGS, proteomics, metabolomics, and transcriptomics and transcriptomes analysis is and bioinformatics services which include NGS, proteomics, metabolomics, and transcriptomes analysis is genomic data analysis and bioinformatics services which include NGS, proteomics, metabolomics, and transcriptomes analysis is dramary other computational chemistry. Two-dimensional, and three-dimensional QSAR, Simulation of molecular dynamics, molecular dynamics,</li></ul>	<ul> <li>equipped computer-based labs and other computational services for consumers, holding courses and workshops to develop drug design, cheminformatics, OSAR, molecular dynamics, Python programming, NGS, and mary other computers and services in biosciences. The company's services is genomic data analysis and bioinformatics services which include NGS, proteomics, metabolomics, and transcriptomics analysis, drug and vaccine design services, molecular dynamics, molecular dynamics,</li></ul>			of pharmaceutical companies to achieve their scientific and industrial goals. Additionally, the company provides advanced and	
<ul> <li>design, cheminformatics, QSAR, molecular dynamics, Python programming, NGS, and many other computational skills in bioscience. One of the major parts of the company's services is genomic data analysis and bioinformatics arrives which include NGS, proteomics, and many other computational services in biosciences. The company's expertise is in Drug design, Vaccine design, docking, and many other computational services in biosciences. The company's expertise is in Drug design, Vaccine design, computational computational services in biosciences. The company's expertise is in Drug design, Vaccine design, computational computational services in biosciences. The company's expertise is in Drug design, Vaccine design, computational companies, Molecular phylogeny and evolution analyses, Analysis of genomics and proteomics data, The biological system, Bioethanol analysis, Data mining and text mining of biological and medical data, and Design and implementation of bio and medical datas. The biological system, Bioethanol analysis, Data mining and text mining of biological and medical data, and Design and implementation of bio and medical datas. The biological system, Bioethanol analysis, Data mining and text mining of biological and medical data, and Design and implementation of bio and medical datas. The biological system, Bioethanol analysis, Data mining and text mining of biological and medical data, and Seaw. Vaccine design, vaccine design, and first-level medical genetic laboratories even in the most sophisticated research complete provision of genomics and proteomics. Topaz Gene is suporting clients at universities, research services http:// topazgene.com/</li> <li>Parsuit of first-level medical genetic laboratories even in the most sophisticated research services utilizing the provision of genomics and proteomics. Topaz Gene is suporting clients at universities, research services utilizing the provision of genomics and proteomics. Topaz Gene is upporting clients at universities, research corters, topaz compar</li></ul>	<ul> <li>design, cheminformatics, QSAR, molecular dynamics, Python programming, NGS, and many other computational skills in biosciences. One of the analor parts of the company's services is genomic data analysis and bioinformatics services which include NGS, proteomics, and transcriptomics analysis, drug and vaccine design services, molecular dynamics, molecular docking, and many other computational services in biosciences. The company's expertise is in Drug design. Vaccine design, of computational Chemistry, Two-dimensional, and three-dimensional QSAR, Simulation of molecular dynamics, molecular phylogeny and evolution analyses, Analysis of genomics and proteomics data. The biological system, Biotenatical adaptases. Source: http://en.parstilico.com</li> <li>Topaz Gene Exploration (established in 2012) has been able to provide the highest quality products and the complete provision of genomics and proteomics and proteomics and proteomics and proteomics and proteomics and the complete provision of genomics and proteomics. Topaz Gene is supporting clients at universities, research centres, pharamaceutical companies, and first-level medical genetic laboratories even in the most sophisticated research projects. Source: http://</li> <li>Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research services and knowledge and experience of specialists in molecular genetic; alboratories, source: http://</li> <li>Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research services utilizing the knowledge and experience of specialists in molecular genetics, medicine, provide training courses for bioinformatics learning. Other services source: http://</li> </ul>			equipped computer-based labs and other computational services for consumers, holding courses and workshops to develop dru	rug
<ul> <li>bioscience. One of the major parts of the company's services is genomic data analysis and bioinformatics services which include NGS, proteomics, metabolomics, and transcriptomics analysis, drug and vaccine design services, molecular dynamics, dynamics, molecular dynamics, molecular dynamics, molecular dynamics, molecular dynamics, molecular dynamics, molecular dynamics, dynamics, molecular dynamics, dyna</li></ul>	<ul> <li>bioscience. One of the major parts of the company's services is genomic data analysis and bioinformatics services which include NGS, proteomics, metabolomics, and transcriptomics analysis, drug and vaccine design services. molecular dynamics, nad frequentia, molecular dynamics, cand protein engineering, Wolecular phylogeny and evolution analyses of genomics and proteomics data, and devolution and medical data, and Diograf and medical data, and bioingraf and medical data, and forechnology products and services in this field, in provision of genomics and proteomics. Topaz Gene is supporting clients at universities, research centers, pharmacutical companies, and first-level medical genetic laboratories even in the most sophisticated research project. Source: http:// topazgene.com/</li> <li>Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research services with the woledge and experimence of specialists in molecular genetic, medical dentalor-made training courses for bioinformatics laboratories. Source: http://pishgam-bioir.</li> </ul>			design, cheminformatics, QSAR, molecular dynamics, Python programming, NGS, and many other computational skills in	)
<ul> <li>NGS, proteomics, metabolomics, and transcriptomics analysis, drug and vaccine design services, molecular dynamics, molecular docking, and many other computational services in biosciences. The company's expertise is in Drug design, Vaccine design, Computational Chemistry, Two-dimensional, and three-dimensional QSAR, Simulation of molecular dynamics, Modeling and protein engineering, Molecular phylogeny and evolution analyses, Analysis of genomics and protein engineering. Molecular phylogeny and evolution analyses, Analysis of genomics and protein engineering. Molecular phylogeny and evolution analyses, Analysis of genomics and proteomics data. The biological system, Bioethanol analysis, Data mining of biological and medical data, and Design and implementation of bio and medical databases. Source: http://marseilic.com/</li> <li>Popaz Gene Exploration (setablished in 2012) has been able to provide the highest quality products and services in this field, in pursuit of its social mission and with its core knowledge of the production of biotechnology products and first-level medical genetic laboratories even in the most sophisticated research projects. Source: http:// topazgene.on/</li> <li>Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research services utilizing the knowledge and experience of specialists in molecular genetics, medicine, biomedical and microbiology and knowledgeable in various fields of bioinformatics. Ibe goal of this group is to provide tailor-made training courses for bioinformatics learning. Other services of this group include equipping bioinformatics laboratories. Source: https://pishgam-bio.ir</li> </ul>	<ul> <li>NGS, proteomics, metabolomics, and transcriptomics analysis, drug and vaccine design services, molecular dynamics, dynamics, molecular dynamics, and first-level medical denta in 2012) has been able to provide the highest quality products and services in the pursities transing and the complete provision of genomics and proteomics. Topaz Gene is supporting clients at universities, research products in consonic analyses, and first-level medical dentatic ab</li></ul>			bioscience. One of the major parts of the company's services is genomic data analysis and bioinformatics services which include	e
<ul> <li>docking, and many other computational services in biosciences. The company's expertise is in Drug design, Vaccine design, Computational Chemistry, Two-dimensional, and three-dimensional QSAR, Simulation of molecular dynamics, Modeling and protein engineering, Molecular phylogeny and evolution analyses. Analysis of genomics and proteomics data, The biological system, Bioethanol analysis, Data mining and text mining of biological and medical data, and Design and implementation of bio and medical databases. Source: http://en.parssilico.com/</li> <li>Topaz Gene Exploration (established in 2012) has been able to provide the highest quality products and services in this field, in pursuit of its social mission and with its core knowledge of the production of biotechnology products and the complete provision of genomics and proteomics. Topaz Gene is supporting clients at universities, research projects. Source: http:// topazgene.com/</li> <li>Pishgama is a knowledge-based Bioinformatics company. The company offers educational and mecicilaria and molecular gene evolution is group is to provide tailor-made training courses for bioinformatics learning. Other services utilizing the involvedge and experience of specialists in molecular genetics, biomedical and microbiology and knowledgeable people in various fields of bioinformatics. The goal of this group is to provide tailor-made training courses for bioinformatics learning. Other services of this group include equipping bioinformatics laboratories. Source: https://pishgam-bioir</li> </ul>	<ul> <li>docking, and many other computational services in biosciences. The company's expertise is in Drug design, Vaccine design, Computational Chemistry, Two-dimensional, and three-dimensional QSAR, Simulation of molecular dynamics, Modeling and protein engineering, Molecular phylogeny and evolution analyses, Analysis of genomics and proteomics data. The biological system. Bioethanol analysis, Data mining and text mining of biological and medical data, and Design and implementation of bio and medical databases. Source: http://en.parsilico.com/</li> <li>Topaz Gene Exploration (established in 2012) has been able to provide the highest quality products and services in this field, in pursuit of its social mission and with its core knowledge of the production of biotechnology products and the complete provision of genomics and proteomics. Topaz Gene is supporting clients at universities, research projects. Source: http:// topazgene.com/</li> <li>Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research services utilizing the knowledge and experience of specialise in molecular genetic, medicine, biomedical and microbiology and knowledgeable people in various fields of bioinformatics laboratories. Source: https://pishgam-bio.ir</li> </ul>			NGS. proteomics. metabolomics. and transcriptomics analysis. drug and vaccine design services. molecular dynamics. molecular	Ļ.
<ul> <li>Computational Chemistry, Two-dimensional, and three-dimensional QSAR, Simulation of molecular dynamics, Modeling and protein engineering, Molecular phylogeny and evolution analyses, Analysis of genomics and proteomics data, The biological system, Bioethanol analysis, Data mining and text mining of biological and medical data, and Design and implementation of bio and medical databases. Source: http://en.parssilico.com/</li> <li>Topaz Gene Exploration (established in 2012) has been able to provide the highest quality products and services in this field, in pursuit of its social mission and with its core knowledge of the production of biotechnology products and the complete provision of genomics and proteomics. Topaz Gene is supporting clients at universities, research projects. Source: http://</li> <li>Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research services utilizing the knowledge and experience of specialists in molecular genetics, medicine, biomedical and microbiology, and knowledgeable people in various fields of bioinformatics. The goal of this group is to provide tailor-made training courses for bioinformatics learning. Other services of this group include equipping bioinformatics laboratories. Source: https://pishgam-bio.ir</li> </ul>	<ul> <li>Computational Chemistry, Two-dimensional, and three-dimensional QSAR, Simulation of molecular dynamics, Modeling and protein engineering. Molecular phylogeny and evolution analyses, Analysis of genomics and proteomics data, The biological system, Bioethanol analysis, Data mining and text mining of biological and medical data, and Design and implementation of bio and medical databases. Source: http://en.parssilico.com/</li> <li>Topaz Gene Exploration (established in 2012) has been able to provide the highest quality products and services in this field, in pursuit of its social mission and with its core knowledge of the production of biotechnology products and the complete provision of genomics and proteomics. Topaz Gene is supporting clients at universities, research centers, pharmaceutical companies, and first-level medical genetic laboratories even in the most sophisticated research projects. Source: http://</li> <li>Pishgama is a knowledge-based Bioinformatics company. The company offers educational and research services utilizing the knowledge of bioinformatics. Medicine, biomedical and microbiology, and knowledgeable people in various fields of bioinformatics. The goal of this group is to provide tailor-made training courses for bioinformatics learning. Other services of this group include equipping bioinformatics laboratories. Source: https://pishgam-bioir</li> </ul>			dockine, and many other computational services in biosciences. The company's experitise is in Drug design. Vaccine design.	
<ul> <li>protein engineering. Molecular phylogeny and evolution analyses, Analysis of genomics and proteomics data. The biological system, Bioethanol analysis, Data mining and text mining of biological and medical data, and Design and implementation of bio and medical databases. Source: http://en.parssilico.com/</li> <li>Topaz Gene Exploration (established in 2012) has been able to provide the highest quality products and services in this field, in pursuit of its social mission and with its core knowledge of the production of biotechnology products and the complete provision of genomics. Topaz Gene is supporting clients at universities, research centers, pharmaceutical companies, and first-level medical genetic laboratories even in the most sophisticated research projects. Source: http://</li> <li>Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research services utilizing the knowledge and experience of specialists in molecular genetics, medicine, biomedical and microbiology, and knowledgeable people in various fields of bioinformatics. The goal of this group is to provide tailor-made training courses for bioinformatics learning.</li> </ul>	<ul> <li>protein engineering. Molecular phylogeny and evolution analyses. Analysis of genomics and proteomics data, The biological system, Bioethanol analysis, Data mining and text mining of biological and medical data, and Design and implementation of bio and medical databases. Source: http://en.parssilico.com/</li> <li>Topaz Gene Exploration (established in 2012) has been able to provide the highest quality products and services in this field, in pursuit of its social mission and with its core knowledge of the production of biotechnology products and the complete provision of genomics and proteomics. Topaz Gene is supporting clients at universities, research centers, pharmaceutical companies, and first-level medical genetic laboratories even in the most sophisticated research projects. Source: http://</li> <li>Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research services utilizing the knowledge and experience of specialists in molecular genetics, medicine, biomedical and microbiology, and knowledgeable people in various fields of bioinformatics. The goal of this group is to provide tailor-made training courses for bioinformatics learning. Other services of this group include equipping bioinformatics laboratories. Source: https://pishgam-bio.ir</li> </ul>			Commissional Chemistry Two-dimensional and three-dimensional OSAR simulation of molecular dynamics. Modeline and	
<ul> <li>Protection of procession provided and text mining of biological and medical data, and Design and implementation of bio and medical databases. Source: http://en.parssilico.com/</li> <li>Topaz Gene Exploration (established in 2012) has been able to provide the highest quality products and the complete provision of genomics and proteomics. Topaz Gene is supporting clients at universities, research centers, pharmaceutical companies, and first-level medical genetic laboratories even in the most sophisticated research projects. Source: http:// Propazgene.com/</li> <li>Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research projects. Source: http:// topazgene.com/</li> <li>Pishgaman is a knowledge-based Bioinformatics company offers educational and microbiology, and knowledgeable people in various fields of bioinformatics. The goal of this group is to provide tailor-made training courses for bioinformatics learning.</li> </ul>	<ul> <li>ystem, Bioethanol analysis, Data mining and text mining of biological and medical data, and Design and implementation of bio and medical databases. Source: http://en.parssilico.com/</li> <li>Topaz Gene Exploration (established in 2012) has been able to provide the highest quality products and services in this field, in pursuit of its social mission and with its core knowledge of the production of biotechnology products and the complete provision of genomics and proteomics. Topaz Gene is supporting clients at universities, research centers, pharmaceutical companies, and first-level medical genetic laboratories even in the most sophisticated research projects. Source: http:// topazgene.com/</li> <li>Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research services utilizing the knowledge and experience of specialists in molecular genetics, medicine, biomedical and microbiology, and knowledgeable people in various fields of bioinformatics. The goal of this group is to provide tailor-made training courses for bioinformatics learning. Other services of this group include equipping bioinformatics laboratories. Source: https://pishgam-bio.ir</li> </ul>			componential and the second second and and train and uses. And and train and the second s	
<ul> <li>System, procuration analysis, Data mining and text mining or broughtar and medical databases. Source: http://en.parssilico.com/</li> <li>Topaz Gene Exploration (established in 2012) has been able to provide the highest quality products and services in this field, in pursuit of its social mission and with its core knowledge of the production of biotechnology products and services in this field, in pursuit of its social mission and with its core knowledge of the production of biotechnology products and the complete provision of genomics and proteomics. Topaz Gene is supporting clients at universities, research centers, pharmaceutical companies, and first-level medical genetic laboratories even in the most sophisticated research projects. Source: http:// Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research services utilizing the knowledge and experience of specialists in molecular genetics, medicine, biomedical and microbiology, and knowledgeable people in various fields of bioinformatics. The goal of this group is to provide trailor-made training courses for bioinformatics learning. Other services of this group include equipping bioinformatics laboratories. Source: https://pishgam-bio.ir</li> </ul>	<ul> <li>Avertin, procenting on databases. Source: http://en.parssilico.com/</li> <li>Topaz Gene Exploration (established in 2012) has been able to provide the highest quality products and services in this field, in pursuit of its social mission and with its core knowledge of the production of biotechnology products and the complete provision of genomics. Topaz Gene is supporting clients at universities, research centers, pharmaceutical comparises, and first-level medical genetic laboratories even in the most sophisticated research projects. Source: http://</li> <li>Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research services utilizing the knowledge and experience of specialists in molecular genetics, medicine, biomedical and microbiology, and knowledgeable people in various fields of bioinformatics. The goal of this group is to provide tailor-made training courses for bioinformatics learning. Other services of this group include equipping bioinformatics laboratories. Source: https://pishgam-bio.ir</li> </ul>			process regimenting i necessar privident auto evolucion analyzes, rutaryzes or genomes and processimes academic necessaria Branchen l'andreis Dan ministrand torre ministrand fuel and nord dand dang and Dorden and Interlanden	
<ul> <li>Topaz Gene Exploration (established in 2012) has been able to provide the highest quality products and services in this field, in pursuit of its social mission and with its core knowledge of the production of biotechnology products and the complete provision of genomics and proteomics. Topaz Gene is supporting clients at universities, research centers, pharmaceutical companies, and first-level medical genetic laboratories even in the most sophisticated research projects. Source: http:// ropazgene.com/</li> <li>Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research services utilizing the knowledge and experience of specialists in molecular genetics, medicine, biomedical and microbiology, and knowledgeable people in various fields of bioinformatics. The goal of this group is to provide trailor-made training courses for bioinformatics learning. Other services of this group include equipping bioinformatics laboratories. Source: https://pishgam-bio.ir</li> </ul>	<ul> <li>Topaz Gene Exploration (established in 2012) has been able to provide the highest quality products and services in this field, in pursuit of its social mission and with its core knowledge of the production of biotechnology products and the complete provision of genomics and proteomics. Topaz Gene is supporting clients at universities, research centers, pharmaceutical companies, and first-level medical genetic laboratories even in the most sophisticated research projects. Source: http:// ropazgene.com/</li> <li>Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research services utilizing the knowledge and experience of specialists in molecular genetics, medicine, biomedical and microbiology, and knowledgeable people in various fields of bioinformatics. The goal of this group is to provide tailor-made training courses for bioinformatics learning. Other services of this group is to provide tailor-made training courses for bioinformatics learning.</li> </ul>			system, proteinario analysis, Data mining and next mining or proposal and merical data, and Design and minipementation or pro and modified Astributors Control Control from the structure of the structure of the structure of the structure of	
<ul> <li>Iopaz Gene Exploration (established in 2012) has been able to provide the highest quality products and services in this field, in pursuit of its social mission and with its core knowledge of the production of biotechnology products and the complete provision of genomics and proteomics. Topaz Gene is supporting clients at universities, research centers, pharmaceutical companies, and first-level medical genetic laboratories even in the most sophisticated research projects. Source: http:// topazgene.com/</li> <li>Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research services utilizing the knowledge and experience of specialists in molecular genetics, medicine, biomedical and microbiology, and knowledgeable people in various fields of bioinformatics. The goal of this group is to provide trailor-made training courses for bioinformatics learning. Other services of this group is to provide tailor-made training courses for bioinformatics learning.</li> </ul>	<ul> <li>Iopaz Gene Exploration (established in 2012) has been able to provide the highest quality products and services in this field, in pursuit of its social mission and with its core knowledge of the production of biotechnology products and the complete provision of genomics and proteomics. Topaz Gene is supporting clients at universities, research centers, pharmaceutical companies, and first-level medical genetic laboratories even in the most sophisticated research projects. Source: http:// topazgene.com/</li> <li>Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research services utilizing the knowledge and experience of specialists in molecular genetics, medicine, biomedical and microbiology, and knowledgeable people in various fields of bioinformatics. The goal of this group is to provide trailor-made training courses for bioinformatics learning. Other services of this group include equipping bioinformatics laboratories. Source: https://pishgam-bio.ir</li> </ul>		4		
<ul> <li>pursuit of its social mission and with its core knowledge of the production of biotechnology products and the complete provision of genomics and proteomics. Topaz Gene is supporting clients at universities, research centers, pharmaceutical companies, and first-level medical genetic laboratories even in the most sophisticated research projects. Source: http:// topazgene.com/</li> <li>Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research services utilizing the knowledge and experience of specialists in molecular genetics, medicine, biomedical and microbiology, and knowledgeable people in various fields of bioinformatics. The goal of this group is to provide trailor-made training courses for bioinformatics learning. Other services of this group include equipping bioinformatics laboratories. Source: https://pishgam-bio.ir</li> </ul>	<ul> <li>pursuit of its social mission and with its core knowledge of the production of biotechnology products and the complete provision of genomics and proteomics. Topaz Gene is supporting clients at universities, research centers, pharmaceutical companies, and first-level medical genetic laboratories even in the most sophisticated research projects. Source: http:// topazgene.com/</li> <li>Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research services utilizing the knowledge and experience of specialists in molecular genetics, medicine, biomedical and microbiology, and knowledgeable people in various fields of bioinformatics. The goal of this group is to provide trailor-made training courses for bioinformatics learning. Other services of this group include equipping bioinformatics laboratories. Source: https://pishgam-bio.ir</li> </ul>		A	lopaz Gene Exploration (established in 2012) has been able to provide the highest quality products and services in this field, in	_
<ul> <li>provision of genomics and proteomics. Topaz Gene is supporting clients at universities, research centers, pharmaceutical companies, and first-level medical genetic laboratories even in the most sophisticated research projects. Source: http://topazgene.com/</li> <li>Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research services utilizing the knowledge and experience of specialists in molecular genetics, medicine, biomedical and microbiology, and knowledgeable people in various fields of bioinformatics. The goal of this group is to provide trailor-made training courses for bioinformatics learning. Other services of this group include equipping bioinformatics Iboratories. Source: https://pishgam-bio.ir</li> </ul>	<ul> <li>provision of genomics and proteomics. Topaz Gene is supporting clients at universities, research centers, pharmaceutical companies, and first-level medical genetic laboratories even in the most sophisticated research projects. Source: http://topazgene.com/</li> <li>Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research services utilizing the knowledge and experience of specialists in molecular genetics, medicine, biomedical and microbiology, and knowledgeable people in various fields of bioinformatics. The goal of this group is to provide tailor-made training courses for bioinformatics learning. Other services of this group informatics laboratories. Source: https://pishgam-bio.ir</li> </ul>			pursuit of its social mission and with its core knowledge of the production of biotechnology products and the complete	
companies, and first-level medical genetic laboratories even in the most sophisticated research projects. Source: http:// topazgene.com/ Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research services utilizing the knowledge and experience of specialists in molecular genetics, medicine, biomedical and microbiology, and knowledgeable people in various fields of bioinformatics. The goal of this group is to provide tailor-made training courses for bioinformatics learning. Other services of this group include equipping bioinformatics laboratories. Source: https://pishgam-bio.ir	companies, and first-level medical genetic laboratories even in the most sophisticated research projects. Source: http:// topazgene.com/ Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research services utilizing the knowledge and experience of specialists in molecular genetics, medicine, biomedical and microbiology, and knowledgeable people in various fields of bioinformatics. The goal of this group is to provide tailor-made training courses for bioinformatics learning. Other services of this group include equipping bioinformatics laboratories. Source: https://pishgam-bio.ir			provision of genomics and proteomics. Topaz Gene is supporting clients at universities, research centers, pharmaceutical	
topazgene.com/ Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research services utilizing the knowledge and experience of specialists in molecular genetics, medicine, biomedical and microbiology, and knowledgeable people in various fields of bioinformatics. The goal of this group is to provide tailor-made training courses for bioinformatics learning. Other services of this group include equipping bioinformatics laboratories. Source: https://pishgam-bio.ir	topazgene.com/ Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research services utilizing the knowledge and experience of specialists in molecular genetics, medicine, biomedical and microbiology, and knowledgeable people in various fields of bioinformatics. The goal of this group is to provide tailor-made training courses for bioinformatics learning. Other services of this group include equipping bioinformatics laboratories. Source: https://pishgam-bio.ir			companies, and first-level medical genetic laboratories even in the most sophisticated research projects. Source: http://	
Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research services utilizing the knowledge and experience of specialists in molecular genetics, medicine, biomedical and microbiology, and knowledgeable people in various fields of bioinformatics. The goal of this group is to provide tailor-made training courses for bioinformatics learning. Other services of this group include equipping bioinformatics laboratories. Source: https://pishgam-bio.ir	Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research services utilizing the knowledge and experience of specialists in molecular genetics, medicine, biomedical and microbiology, and knowledgeable people in various fields of bioinformatics. The goal of this group is to provide tailor-made training courses for bioinformatics learning. Other services of this group informatics laboratories. Source: https://pishgam-bio.ir			topazgene.com/	
knowledge and experience of specialists in molecular genetics, medicine, biomedical and microbiology, and knowledgeable people in various fields of bioinformatics. The goal of this group is to provide tailor-made training courses for bioinformatics learning. Other services of this group include equipping bioinformatics laboratories. Source: https://pishgam-bio.ir	knowledge and experience of specialists in molecular genetics, medicine, biomedical and microbiology, and knowledgeable people in various fields of bioinformatics. The goal of this group is to provide tailor-made training courses for bioinformatics learning. Other services of this group include equipping bioinformatics laboratories. Source: https://pishgam-bio.ir		A	Pishgaman is a knowledge-based Bioinformatics company. The company offers educational and research services utilizing the	
in various fields of bioinformatics. The goal of this group is to provide tailor-made training courses for bioinformatics learning. Other services of this group include equipping bioinformatics laboratories. Source: https://pishgam-bio.ir	in various fields of bioinformatics. The goal of this group is to provide tailor-made training courses for bioinformatics learning. Other services of this group include equipping bioinformatics laboratories. Source: https://pishgam-bio.ir			knowledge and experience of specialists in molecular genetics, medicine, biomedical and microbiology, and knowledgeable peopl	ple
Other services of this group include equipping bioinformatics laboratories. Source: https://pishgam-bio.ir	Other services of this group include equipping bioinformatics laboratories. Source: https://pishgam-bio.ir			in various fields of bioinformatics. The goal of this group is to provide tailor-made training courses for bioinformatics learning.	
				Other services of this group include equipping bioinformatics laboratories. Source: https://pishgam-bio.ir	

type of research, the research community, data collection, and data analysis methods and tools (Table 1). This study is an "Applied Research," and according to the techniques of data collection, the research method is "Descriptive." Descriptive research is a set of methods aimed at describing the circumstances of the case study. The statistical community of the research is a community that the researcher chooses to determine the sample. In the present study, the research community included managers and experts in the cheminformatics industry in Iran. Data collection aimed to answer research questions. Various methods and tools were used to collect the required data: 1. The library studies method includes reviewing scientific texts and reviewing organizational documents, 2. browsing the websites of companies surveyed in the cheminformatics industry include productions, services, and their policies about mission and vision, 3. unstructured and open interviews with experts and activists in the related field, and 4. gathering the opinions of experts using the preferential judgment questionnaire (Appendix). One of the most suitable theories for assessing market competition is Porter's five forces theory. Using Porter's model can be useful in choosing the right policy to enter or develop in the market. In this model, we deal with five main competitive forces. Porter considers these five factors in industry analysis. These forces include competitive rivalry conditions between present competitors, the bargaining power of customers, potential competitors (the threat of new entrants), the bargaining power of suppliers, and the threat of the entry of alternative products (the threat of substitutes).

Porter's five competitive forces influence the nature and intensity of competition in the industry. This collective power of forces determines the capacity of a business's profits. Here, we used Porter's five forces analysis to help formulate a strategic plan for companies in the field of the cheminformatics industry. In this regard, the questionnaire was designed based on Porter's five main criteria and subcriteria per the main criteria and was completed by selected experts from three companies. To draw a decision tree model, the researchers reviewed the companies' websites, such as their productions, services, and policy, including mission and vision.

Researchers in recent decades have turned their attention to multicriteria models for measuring complex decisions. MCDM methods are divided into two categories: multiobjective decision-making (MODM) and multicriteria decision-making (MADM). The purpose of decision-making is to choose the best option or to weigh the decision factors. Each decision-making method has a specific task, such as ranking the criteria, weighting the criteria, or evaluating the criteria. Here, we explain the most widely used MCDM methods. Figure 7 presents a classification of multicriteria decision models. This figure also shows the MCDM method used in this research. The AHP method is one of the scoring methods under the compensatory methods of MCDM. In scoring methods, the preferred option has the highest score. In these methods, using different algorithms, the best option is to obtain the most points. This method is a powerful decision-making technique, introduced by Saaty (1980). The process of hierarchical analysis usually consists of four main stages. First, the decision is identified, and its options and criteria are identified. Paired comparisons are then performed fuzzy or nonfuzzy. In the next step, the weight of the importance of each set criterion is calculated. Finally, the utility of the best option is calculated. One of the advantages of this method is indicating the degree of compatibility and incompatibility of the decision. In this method, the problem is divided into different levels of objectives, criteria, subcriteria, and options so that the decision-maker can easily be careful in the smallest decision. As the name implies, this method is examined hierarchically or from top to bottom. In this study, the AHP method was used to determine Porter's competitive forces in the cheminformatics industry. To solve the problem of decision-making, all possible solutions, called alternatives, were first identified and the criteria by which the experts made judgments. The importance of the criteria was determined by experts using pairwise comparisons.

Compiling an AHP questionnaire includes two steps. The first step in this stage is to form a hierarchical model, that is, a model in which the criteria and subcriteria of the problem are well defined. In the second step, after defining the criteria, a questionnaire is prepared to determine the levels of importance of these criteria. Then, pairwise comparisons of the criteria should be formed, that is, the criteria should be compared in pairs. This comparison is based on fuzzy spectra. Here, the number of respondents to the AHP questionnaire, because its system is expert-oriented, is 21 people, and to select experts, criteria such as proficiency in the research topic, availability, and relevant work experience are used. The type of sampling was nonrandom and snowball sampling. The MCDM questionnaire does not have validity and reliability, but a rate called the incompatibility rate is used, which some consider equivalent to reliability. In any matrix, the result of dividing the incompatibility index by the random matrix index of its dimension is a suitable criterion for judging the incompatibility of the matrix, which is called the degree of incompatibility. If this



Figure 7. Multicriteria models for measuring complex decisions.

number is less than or equal to 0.1, the matrix is approximately consistent; otherwise, the judgments should be reconsidered.

### Steps to Conduct Research

A. To review the scientific literature including books, articles, dissertations, databases, and related websites, B. To identify effective and constructive criteria of each of Porter's competitive forces and its subcriteria with the help of experts in cheminformatics and using existing information resources. C. To draw a four-level hierarchy of decision tree for strategic competition in cheminformatics industry. D. To prioritize and determine the weight of the criteria and subcriteria based on the experts' opinion using a researcher-made questionnaire. E. Determining the weight each of Porter's forces as the criteria and subcriteria based on the experts' opinion. F. Discussion on the importance and impact of Porter's forces and the competition status of the cheminformatics industry using experts' opinion, the hierarchical analysis (four-level decision tree), and software. G. Finally, limitations and suggestions are presented to achieve this industry's effective strategy in competition (Figure 8).

## Findings

In this section, data collected from 21 managers and experts in the cheminformatics industry were analyzed using multicriteria MCDM decision-making methods. The methods are compatible with the type and purpose



Figure 8. Research map.

of the research and the types of variables. Ultimately, the hierarchy of decision trees drew in strategic competition in the cheminformatics industry.

## Porter's Five Factors in Cheminformatics Industry Analysis

In the theoretical foundations of this research and literature review, background information for the cheminformatics industry was provided. The following presents some information about the global cheminformatics market and the economic principles identified by each of Porter's five forces in the field.

Cheminformatics market. The global bioinformatics market is projected to reach USD 21.8 billion by 2026 from USD 10.7 billion in 2021, at a CAGR of 15.2% during the forecast period (Bioinformatics Market -Global Forecast to 2026 | MarketsandMarkets, Jan 2022). In recent years, various news items have been published regarding the bankruptcy of cheminformaticsrelated markets. Some of the headlines of this news are bankruptcy PET recyclers being sold off (Tullo, 2021), bankrupt pharmaceutical chemicals company Aceto to sell off businesses (McCoy, 2020), succinic acid maker BioAmber is bankrupt (McCoy, 2018), and bankrupt Orexigen to sell for \$75 million (Cross, 2018). Ahmadpour and Shahsavari (2016) investigated the quality earnings characteristic and earnings management type in bankrupt and distressed companies between 2007 and 2012. This study is related to companies listed on the Tehran Stock Exchange. This study shows that bankrupt firms tend to use opportunistic earnings management, and nonbankrupt firms choose efficient earnings management. They showed that both debtor and bankrupt companies tend to manage profits. They showed that efficient profit management is strong for solvent companies. Tbalvandani and Aghajan Nashtaei (2017) repeated this study for the same listed companies between 2012 and 2015. They concluded from their study that the quality of accruals and the portfolio rank of companies have a significant relationship with future profits in healthy companies, and they showed that cash flow has no role in this regard. This was while this relationship was very weak in bankrupt companies. Sales returns are currently due to successive economic crises, including economic sanctions, declining exports, declining imports, declining liquidity of the industry's customers, a sharp rise in inflation and declining purchasing power, the consequences of the COVID-19 pandemic, and the many political and economic problems in Iran. Sales returns in various industries, including the cheminformatics industry, have approached the low levels of their small history.

Market definition of cheminformatics. Market definition of this industry requires the identification of the product and geographic markets (Besanko et al., 2013). As previously mentioned, based on the opinions of experts surveyed in this study, currently, according to the current situation in Iran, one of the markets of companies active in the field of cheminformatics includes the training market for companies to hold courses and workshops. Workshops to develop drug design, cheminformatics, structure-activity quantitative relation (QSAR), molecular dynamics, specialized Python programming courses in the industry, next gene sequencing (NGS), and many other computational skills in life sciences. They provide consulting services to many research centers, universities, and research and development departments to achieve their scientific and industrial goals. These companies also provide computer-equipped laboratories as much as possible and other computing services to consumers. One of the significant activities of these companies is genomic data analysis services. These bioinformatics services include NGS, proteomics, metabolic, transcription analysis, drug and vaccine design services, molecular dynamics, molecular binding, and many other computational services in the life sciences. Given the explanations provided, the geographic market in which the cheminformatics industry competes is certainly limited to a few metropolises, including Tehran. In this study, internal competition in this area is examined.

The threat of the entry of alternative products (the threat of substitutes). Given that in recent years there have been many advances in the bioinformatics industry worldwide, in the field of cheminformatics, there have been significant advances. From the emergence of synthetic cannabinoids in the market and the trend toward their molecular similarity with QSAR analysis and the creation of new classifications for drugs and chemical structures to new advances in the research and development process through the analysis of reproducible data and designing the KNIME platform. We are constantly witnessing the emergence of new analysis tools in line with the latest developments in the field of bioinformatics and cheminformatics on the market. Therefore, in the field of the threat of alternatives, the issue of quality and efficiency of previous tools in the cheminformatics industry is important. Of course, consumers tend to be up to date because otherwise using the previous tools will not be effective for them in this industry. Charging costs are an important factor in keeping up with new industries in the field of cheminformatics and the high cost of up-to-date equipment. Additionally, the price of products and tools that replace previous products is another important factor in this regard. Given the current situation in Iran, it is difficult to predict whether new technologies will

replace or complement previous technologies in this country. According to recent agreements with China, including the 25-year Iran-China agreement, which entered into force on January 15, 2022, the current situation is likely to change.

Bargaining power of suppliers. The main suppliers of raw materials and secondary materials in the cheminformatics industry in Iran are mainly from abroad. These suppliers include companies active in this field of the industry worldwide. Due to the conditions of Iran's economic sanctions, contracts with suppliers are done through intermediaries of other countries such as China, Russia, Turkey, and some of the other countries closed to Iran. Here, private companies are mainly considered customers. Supply companies offer their services in competitive markets, and the supply and demand forces in the new technology market, especially in recent years, have been affected by pandemic conditions and increased wages. The price of cheminformatics tools and equipment has also risen sharply. Purchasing companies have little ability to invest in this area. Companies are becoming acquainted with new technologies, but it seems that due to limitations, they cannot adapt to the new settings. Factors in this area are important, including various and scattered inputs in the cheminformatics industry. Other factors include a sharp decline in the number of suppliers and the degree to which suppliers depend on their sales. Qualitative differences between suppliers are also very important because the range of supplier choices has been severely reduced due to economic sanctions. On the other hand, supplier performance and supplier confidence play an important role in this regard. The importance of the demand for suppliers and threats through communication and coordination are other important factors in determining the bargaining power of suppliers. Suppliers of the cheminformatics industry can have very high prices due to the great variety of vital products.

Potential competitors (threat of new entrants). Given the current situation in Iran, only a very few companies are active in the bioinformatics industry, their scope of activity is very limited, and Iran's economic sanctions play a major role in this regard. Technological changes and economic pressures in Iran and the devaluation of money in this country further reduce barriers to entry. Innovations in the cheminformatics industry have opened only a small and cost-effective platform focusing on limited activities, including educational activities. This reduces available capital and limits the number of companies active in this field able to enter successfully. It seems that if the economic sanctions are lifted and the companies operating in this field are profitable, a new entry will be pursued. Factors that were considered by experts in this field are the economic size in the cheminformatics industry, the characteristics of the products offered, the identity factor and the value of the occupational context in this industry, charging costs, the amount of capital required for entry or development, how to access the distribution network according to the recent situation, the specific costs required for the profitability of companies operating in this field, how to design the product and present domestic products, how the government policy in this industry, and the expected return rate.

Bargaining power of customers. Customers mainly include private laboratories, universities, researchers, professors, students, and professionals active in this field. People who decide to do business in this field are also among the customers in the cheminformatics industry. Due to the reduction of the government budget in recent years, which is mainly dependent on oil sales, payments in this area have been declining compared to the past. Almost any factor that affects the profitability of the industry has become much worse in Iran in recent years. With all these conditions, it can be said that the factors that are effective in determining the bargaining power of customers in the cheminformatics industry are mainly related to price sensitivity, the number of consumers, the purchase amount according to the value of foreign currencies in Iran, the existence of substitute products, and the number of suppliers. They can do business with Iran or the number of suppliers who can act as intermediaries, and the focus is on consumers.

Competitive rivalry conditions between bresent competitors. Due to the bankruptcy of various companies in this field and the closure of some of these companies, only a small number of companies active in the field of cheminformatics and bioinformatics have continued to operate. It can be said that the most important factor that can intensify internal competition is the profit from operating in this industry. Another factor is the fixed costs that companies incur, such as the cost of training activists in this field. Competitors' growth rate plays an important role in domestic competition. The lower the rate is, the lower the competition. It seems that in the current situation, the competition rate in this industry has not grown significantly.

One of the most important reasons is the number of competitors that are active in this field. Other important factors are the cost of charging the status and growth rate of the cheminformatics industry in Iran. Due to the wide range of topics in the field of cheminformatics and the variety of products and services that are offered, the factor of difference between competitors is also important in domestic competition. Another factor that plays a role in domestic competition is the barriers to exit from the market.

# How Is the Hierarchy of Decision Trees in Strategic Competition in the Cheminformatics Industry?

Figure 9 shows a four-level hierarchy of the decision tree for strategic competition in the cheminformatics industry in this study. In the first level, there is strategic competition. In the second level, there are the five competitive forces that shape the competition strategy in this industry. The fourth level included the subcriteria of the five main competitive forces. In the last level, three factors interact with the above levels. These three factors include the focus strategy, end-of-price strategy, and differentiation strategy.

## What Is the Priority of Each Porter's Competitive Force in the Cheminformatics Industry?

The collected data from the questionnaires were analyzed using the AHP method. Table 2 shows that in this study, the "competitive rivalry condition between present competitors" is more important than other criteria. This criterion has the most significant impact on the cheminformatics industry. "The threat of the entry of alternative products" is in second place and the next priority. The incompatibility rate for the pair comparisons was 0.08. This value is less than 0.1. Therefore, this incompatibility is acceptable.

## What Is the Weight of Each Force (Criteria) and Related Subcriteria?

In this section, Porter's five competitive forces are reviewed in the cheminformatics industry. These forces were weighted and prioritized. Table 3 shows a weighting of the subcriteria relative to each of the relevant criteria.

Results from the relative weight of criteria (five forces). Porter's competitive forces are weighted using the AHP method. The following criteria (force) were determined:

- a. Competitive rivalry condition between current competitors,
- b. The threat of the entry of alternative products (the threat of substitutes),
- c. potential competitors (the threat of new entrants),
- d. Bargaining power of customers
- e. Bargaining power of suppliers.

Results of weighting the subcriteria relative to each of the relevant criteria

- The relative importance of subcriteria relative to the competition between current competitors
- The results show that the sub-criteria of "barriers to new entrants", "threat of substitute products", and "bargaining power of customers" are relatively important.
- If the inconsistency rate of a decision matrix is less than 0.1, that matrix is acceptable. Here, the pairwise comparison matrix of the sub-criteria shows that "cost of status change" is preferred with a relative weight of 0.302 and its inconsistency rate is 0.08. Therefore, this decision matrix is acceptable.
- As the pairwise comparison matrix shows, in examining the criteria related to "barriers to new competitors", "first serve" has a relative weight of 0.255 with an inconsistency rate of 0.09. Therefore, this matrix is also acceptable.
- Examining the paired matrix of criteria related to "threat of substitutes" shows that "customers' interest in alternative products or services" has a relative weight of 0.588 in the first priority and "quality of alternative products or services" has a relative weight of 0.275 in the second priority. Considering that the inconsistency rate is 0.08, this matrix is also acceptable.
- Further, the analysis of the pairwise comparison matrix of the criteria related to "customers' bargaining power" shows that "price sensitivity" has a relative weight of 0.235 and is placed in the first priority compared to other criteria. The inconsistency rate of 0.06 was less than 0.1, and this decision matrix is acceptable.

## **Discussion and Conclusion**

As mentioned in the review of previous research, we compare the results of past research with the results of the present study. In this section, only the research results that used the Porter model for their research are reviewed and compared. Comparison of the results of the present study with the results of previous research were comparable only in general cases because it seems that thus far, no specific research has been done in line with the present study. For example, Manteghi and Zohrabi (2011) proposed a comprehensive framework for strategy formulation in organizations. In the present study, the obtained results can be used as an aid to formulate a comprehensive framework for formulating strategies in the cheminformatics industry for for-profit management. Dulčić et al. (2012) then introduced the dynamics of time in the



Figure 9. Four-level hierarchy of decision trees for strategic competition in the cheminformatics industry.

No.	Basic criteria	Weight	Priority
1	Competitive rivalry condition between present competitors	0.449	I
2	Bargaining power of customers	0.10	4
3	Potential Competitors (the threat of new entrants)	0.215	3
4	Bargaining power of suppliers	0.049	5
5	The threat of the entry of alternative products (the threat of substitutes)	0.239	2

Table 2. Prioritizing Porter's Five Competitive Forces for the Cheminformatics Industry.

Table 3. The Weighting of the Subcriteria Related to Each of the Forces.

No.	Criteria (Porter's five forces)	Sub-criteria	The relative importance of subcriteria than to the related criteria
I	Competitive rivalry condition between present competitors	Cost of changing the situation	Relative weight of 0.302/first priority/ Inconsistency rate 0.08 < 0.1/Incompatibility of this decision matrix is acceptable
2	Bargaining power of customers	First Served	Relative weight of 0.255/first priority/ Inconsistency rate of 0.09 < 0.1/acceptable
3	Potential Competitors (the threat of new entrants) Bargaining power of suppliers	3-1. Different inputs (the existence of substitute inputs)	Relative weight of 0.311/first priority/ Inconsistency rate of 0.08 < 0.1/acceptable
		3-2. Suppliers number	Relative weight of 0.191/second priority/ Inconsistency rate of 0.08 < 0.1/acceptable
4	The threat of the entry of alternative products (the threat of substitutes) Competitive rivalry condition between present competitors	4-1. Customers' interest in substitute's products	Relative weight of 0.588/first priority/ Inconsistency rate of 0.08 < 0.1/acceptable
		4-2. Substitutes' quality	Relative weight of 0.275/first priority/ Inconsistency rate of 0.08 < 0.1/acceptable
5	Bargaining power of customers	Sensitivity of prices	Relative weight of 0.235/first priority/ Inconsistency rate of 0.06 < 0.1/acceptable

form of five forces. Certainly, in the present study, the dynamic dimension of time is of particular importance. Strategic planners in the field of cheminformatics must be up to date and comfortable with the introduction of new technologies. Z. Y. Zhao et al. (2016) concluded that the development of procurement strategies in China's biomass energy industry contributes to sustainable development. Certainly, sustainable development is one of the topics in the cheminformatics industry, and in managing the competitive forces in this industry, it is also important to pay attention to this issue. Chen et al. (2017) showed that the level of competition in the health club is not high and suggested that it is necessary to increase the club's competitiveness, increase publicity in this field, increase government support, strengthen the industry norm, improve the personal system and introduce high-level coaches. In the cheminformatics industry in Iran, competition is not high for the other reasons already mentioned. The results of the present study show that increasing government support and strengthening the industry norm in Iran can be a significant help to increase

competitiveness in the cheminformatics industry. In general, the results obtained from this study are in line with the present study. Marek (2018) concluded that the economic strength of the Polish offshore container terminal market is one of the most important factors in this regard. The results of this research are in line with the present research. Due to the unfavorable economic conditions in Iran, the level of economic power comes first. The results of the present study also confirm this. L. Zhao (2018) shows that there are seven indicators to assess the competitiveness of the food industry in China, which include production, demand conditions, supporting industries, company strategy, industry or competitive environment structure, government policies, and innovation. They identified innovation as a key factor influencing other indicators. The main results of this study are in line with the present study. The indicators obtained from this study are also very close to the indicators obtained from Zhao's research. Ge and Li (2019) showed that growth strategies are considered a strengthening strategy and three aspects of market penetration, market development, and product development in the market of Chinese sportswear brands. Although growth strategy is an important issue in strengthening the market, its basis is economic strengthening. In the cheminformatics industry, if it is strengthened enough economically, the growth strategy will also play an important role in the competitive market and profitability management. Tsai et al. (2021) showed that in the solar photovoltaic industry in Taiwan, these six dimensions should be promoted in order of company strategy priority, structure and competition, demand conditions, chance or opportunity, operating conditions, and finally related or supporting industries. The results of Zhao's research are in line with the results of the present study and confirm it. Lord et al. (2021) concluded that the impact of foreign market forces on the financial problems of nursing homes is limited, but organizational level variables have a significant effect on these problems. Similarly, the results of the present study show that due to the conditions of economic sanctions in the study population, foreign market forces are not colored, and unlike the results of research by Lord et al. (2021), organizational level variables in this market are weak.

In detail, we concluded that competitive strategy refers to how a company competes in a particular business. Competitive strategy is concerned with how a company can gain a competitive advantage through a distinctive way of competing. The study aimed to determine, review, and evaluate the competitive status of the cheminformatics industry in this study based on Porter's competitive forces. Considering the results of the research, the following is proposed to increase the effectiveness of strategic plans in cheminformatics:

- a. Regarding the first rank of importance for the "competition between current competitors of the company," the competitive strategies can be adjusted based on the strengths and weaknesses of competitors. This strategy is considered the first priority in the company. For example, none of the competitors have products under license. Additionally, competitors do not cooperate with the world's largest companies. Adopting this strategy by the company can be a factor in their success in qualitative competition and technology over competitors.
- b. The weight of the subcriteria "cost of change" warns the company to give more attention to investment. Instead of developing a product, it focuses on the development of the market. In this situation, heterogeneous variety has a perfect advantage over homogeneous diversity.
- c. For the subcriteria "the bargaining power of customers" (distributers) versus the subcriteria "the

bargaining power of suppliers," we concluded that in vertical integration strategies, the company should choose a vertical upward integration because buying stocks and taking ownership of broadcasting companies will take out strong bargaining power against the company.

- d. The importance of the subcriteria "price sensitivity" determines the need to use Porter's general strategy based on "overhead management and cost reduction." This strategy also placed at the first priority the subcriteria "diversity with focus."
- e. To adopt development strategies in the cheminformatics industry, it recommended entering high technology areas, which require considerable financial and technical investment because "needed capital" has a higher priority in the industry to enter new entrants. Adopting this strategy could create a market with more guarantees for the company.
- f. Finding more suppliers for each raw material is another of the essential strategies of the cheminformatics industry. Regarding the first priority of subcriteria, "the existence of substitute inputs," the most potent bargaining power of suppliers is their "single source."
- g. Another important strategy of the company is "branding" and "introducing products to customers," because the subcriteria, "customer reluctance to substitute products," is the most critical threat to the loss of the market by customer substitution of foreign products. Given the importance of the subcriteria "product quality," in case of increasing product quality and maintaining the advantage in subcriteria "product price," we can adopt the best strategy against the hard-core foreign competitors.

The innovation of this research can say that thus far, the development of strategic plans based on Porter's model in the cheminformatics industry is new. In the literature review, in some cases, only a qualitative difference was considered between criteria and subcriteria. In our research, in a scientific and precise manner, the prioritization and weighting of forces and subcriteria are calculated using the decision hierarchy and AHP technique to prioritize the organization's strategies.

In this industry's exports, with the economic structure of Iran, the more companies move toward the final, more complex, and higher value-added products, the harder it becomes to export and compete with regional competitors because the value chain behind the product becomes more complex and competitiveness becomes a problem in the cheminformatics economy. Production costs accumulate at every step, and competition becomes tougher. In Iran's cheminformatics industry, we are witnessing unbalanced development, so a significant part of this development has the potential to become a development in the production of more value-added products.

### Limitations

This study is limited to the cheminformatics industry and Porter's Model with a special issue in Iran. In addition, the analysis method is limited to MCDM techniques such as AHP. The following proposals are recommended for future study:

- a. To increase accuracy and reduce uncertainty in prioritizing benchmarks and indicators, we suggest that this model be combined with neural network models and genetic algorithms.
- b. Indicators of this research should be tailored to the scope of the research, according to the cheminformatics industry. We propose to review similar initiatives by comparing similar models to other major sectors that include all the criteria. For example, Treacy and Wiersma (1993, 1996)

strategies can be used to compare results. Treacy and Wiersma's model outline three competitive strategies: operational excellence, product development or differentiation, and customer intimacy. These criteria can be suitable criteria for examining the competitive situation of various industries, including the cheminformatics industry.

## Appendix

## Porter Competitive Forces Pair Comparison Questionnaire

Dear expert, based on your knowledge and experience, please compare each pair of competitive forces mentioned in the questionnaire on a 9-point scale. The degree of each criterion is measured by its pairwise criterion. For example, if you compare the X criterion with the Y criterion and give the X criterion a score of 3 and the Y criterion a score of 6, you should mark a score of 3 for the X criterion. In the following questionnaire, a score of 9 is considered the most important, and a score of 1 is considered the least important.

Criteria (Porter's		Nine degree scale (importance) (Low———High)						Criteria (Porter's
(Forces)	Sub-criteria	I	3	5	7	9	Sub-criteria	forces)
I	Cost of changing the situation						First Served	2
	Cost of changing the situation						Different inputs (the existence of substitute inputs)	3-1
	Cost of changing the situation						Suppliers number	3-2
	Cost of changing the situation						Customers' interest in substitute's products	4-I
	Cost of changing the situation						Substitutes' quality	4-2
	Cost of changing the situation						Sensitivity of prices	5
2	First Served						Different inputs (the existence of substitute inputs)	3-1
	First Served						Suppliers number	3-2
	First Served						Customers' interest in substitute's products	4-1
	First Served						Substitutes' quality	4-2
	First Served						Sensitivity of prices	5
3-1	Different inputs (the existence of substitute inputs)						Suppliers number	3-2
	Different inputs (the existence of substitute inputs)						Customers' interest in substitute's products	4-1
	Different inputs (the existence of						Substitutes' quality	4-2
	Different inputs (the existence of substitute inputs)						Sensitivity of prices	5

#### (continued)

Criteria (Porter's		Nine degree scale (importance) (Low——High)						Criteria (Porter's
forces)	Sub-criteria	Ι	3	5	7	9	Sub-criteria	forces)
3-2	Suppliers number						Customers' interest in substitute's products	4-1
	Suppliers number						Substitutes' quality	4-2
	Suppliers number						Sensitivity of prices	5
4-1	Customers' interest in substitute's products						Substitutes' quality	4-2
	Customers' interest in substitute's products						Sensitivity of prices	5
4-2	Substitutes' quality						Sensitivity of prices	5

### Acknowledgments

The Corvinus University of Budapest supported this paper for proofreading.

### **Declaration of Conflicting Interests**

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The present publication is the outcome of the project "Project no. TKP2020-NKA-02 has been implemented with the support provided from the National Research, Development and Innovation Fund of Hungary, financed under the Tématerületi Kiválósági Program funding scheme."

### **ORCID** iD

Asefeh Asemi D https://orcid.org/0000-0003-1667-4408

### References

- Ahmadpour, A., & Shahsavari, M. (2016). Earnings management and the effect of earnings quality in relation to bankruptcy level (Firms Listed at the Tehran Stock Exchange). *Iranian Journal of Management Studies*, 9(1), 77–99. https: //doi.org/10.22059/ijms.2016.55036
- Barnard, C. I. (1938). *The functions of the executive*. Harvard University Press.
- Baxter, G. (2019). A strategic analysis of Cargolux airlines international position in the global air cargo supply chain using porter's five forces model. *Infrastructures*, 4(1), 6. https://doi.org/10.3390/infrastructures4010006
- Begam, B. F., & Kumar, J. S. (2012). A study on cheminformatics and its applications on modern drug discovery. *Procedia Engineering*, 38, 1264–1275. https://doi.org/10.1016/ j.proeng.2012.06.156

- Bender, A., & Glen, R. C. (2004). Molecular similarity: A key technique in molecular informatics. *Organic & Biomolecular Chemistry*, 2(22), 3204–3218. https://doi.org/10.1039/B409 813G
- Besanko, D., Dranove, D., Shanley, M., & Schaefer, S. (2013). *Economic of strategy* (6th ed.). Wiley. https://edisciplinas. usp.br/pluginfile.php/4253472/mod\_resource/content/1/Eco nomics%200f%20Strategy%2C%206th%20Edition.pdf
- *Bioinformatics* | *science* | *Britannica*. (n.d.). Retrieved April 1, 2022, from https://www.britannica.com/science/bioinformatics
- Bridwell, L., & Kuo, C.-J. (2005). An analysis of the computer industry in China and Taiwan using Michael porter's determinants of national competitive advantage. *Competitiveness Review*, 15(2), 116–121.
- Chen, L.-X., Liu, C., & Zhang, X. (2017, April 7–8). Analysis of competitiveness of health club in Weifang based on Porter's diamond model [Conference session]. 3rd International Conference on Education and Social Development (Icesd 2017), Woodlands, TX, United States (Vol. 129, pp. 989–995). https://docslib.org/doc/11372171/analysis-of-competitiveness-of-health-club-in-weifang-based-onporters
- Chu, S.-Z., Zhu, X., & Shi, Y.-R. (2015). Influence of national cheap drug price reform on pharmaceutical industry. *Chinese Journal of New Drugs*, 24(14), 1578–1583.
- Clancy, P., O'Malley, E., O'Connell, L., & Van Egeraat, C. (2001). Industry clusters in Ireland: An application of Porter's model of national competitive advantage to three sectors. *European Planning Studies*, 9(1), 7–28. https://doi.org/ 10.1080/09654310124159
- Cross, R. (2018). DNA from doggie doo-doo helps catch phantom poopers. *Chemical & Engineering News*, 96(2). https://cen.acs.org/articles/96/i2/DNA-doggie-doo-doo-helps. html
- Cyert, R., & March, J. (1963). *A behavioral theory of the firm.* Prentice-Hall. https://doi.org/10.1016/j.renene.2015.12.035
- Dulčić, Z., Gnjidi, V., & Alfirev, N. (2012). From five competitive forces to five collaborative forces: Revised view on industry structure-firm interrelationship. *Procedia - Social* and Behavioral Sciences, 58, 1077–1084. https://doi.org/ 10.1016/j.sbspro.2012.09.1088

- Engel, T. (2006). Basic overview of chemoinformatics. *Journal* of Chemical Information and Modeling, 46(6), 2267–2277. https://doi.org/10.1021/ci600234z
- Garcia-Nunes, P. I., & Antunes da Silva, A. E. (2019). Using a conceptual system for weak signals classification to detect threats and opportunities from web. *Futures*, 107, 1–16. https://doi.org/10.1016/j.futures.2018.11.004
- Gasteiger, J. (Ed.). (2003). Handbook of chemoinformatics: From data to knowledge (Vol. 4). Wiley-VCH. https:// doi.org/10.1002/9783527618279
- Gasteiger, J. (2006). Chemoinformatics: A new field with a long tradition. Analytical and Bioanalytical Chemistry, 384(1), 57–64. https://doi.org/10.1007/s00216-005-0065-y
- Gasteiger, J., & Engel, T. (2006). *Chemoinformatics: A textbook*. John Wiley & Sons.
- Ge, L., & Li, C. (2019, April 6–8). Analysis of competitive power of Chinese sports apparel brand based on Porter's five force model [Conference session]. Proceedings of 3rd International Conference on Information System and Data Mining (Icisdm 2019) (pp. 54–58), Houston, TX, United States. https:// doi.org/10.1145/3325917.3325951
- Hann, M., & Green, R. (1999). Chemoinformatics- A new name for an old problem? *Current Opinion in Chemical Biology*, 3, 379–383.
- Jamal, S., & Grover, A. (2017). Cheminformatics approaches in modern drug discovery. In A. Grover (Ed.), *Drug design: Principles and applications* (pp. 135–148). Springer. https:// doi.org/10.1007/978-981-10-5187-6 9
- Johnson, G., Scholes, K., & Whittington, R. (2008). *Exploring corporate strategy*. Pearson Education. Retrieved October 11, 2018, from https://books.google.hu/books/about/Expl oring\_Corporate\_Strategy.html?id=SmjnLQwlSdsC&redir\_ esc=y
- Kao, I.-L. (2018). Business plan of labiNet an rfid-enabled chemistry laboratory management solution. http://search.ebscohost.com/login.aspx?direct = true&db = edsbas&AN = edsbas .268ED71F & site = eds-live
- Kim, S., Bucholtz, E. C., Briney, K., Cornell, A. P., Cuadros, J., Fulfer, K. D., Gupta, T., Hepler-Smith, E., Johnston, D. H., Lang, A. S. I. D., Larsen, D., Li, Y., McEwen, L. R., Morsch, L. A., Muzyka, J. L., & Belford, R. E. (2021). Teaching cheminformatics through a collaborative intercollegiate online chemistry course (OLCC). *Journal of Chemical Education*, 98(2), 416–425. https://doi.org/10.1021/acs.jchemed.0c01035
- Kumar, V., Sandhu, G. S., Harper, C. M., Ting, H. H., & Rihal, C. S. (2021). Analysis of the changing economics of US hospital transcatheter aortic valve replacement programs. *Mayo Clinic Proceedings*, 96(1), 174–182. https:// doi.org/10.1016/j.mayocp.2020.04.012
- Li, X., Mo, Z., Liu, J., & Guo, L. (2015). Revealing chemical reactions of coal pyrolysis with GPU-enabled ReaxFF molecular dynamics and cheminformatics analysis. *Molecular Simulation*, 41(1–3), 13–27. https://doi.org/10.1080/ 08927022.2014.913789
- Lord, J., Weech-Maldonado, R., Blackburn, J., & Carroll, N. (2021). Examination of nursing home financial distress via Porter's five competitive forces framework. *Health Care*

Management Review, 46(3), E50–E60. https://doi.org/ 10.1097/HMR.00000000000297

- Mahoney, J.T. (2005). *Economic foundations of strategy*. SAGE.
- Manteghi, N., & Zohrabi, A. (2011). A proposed comprehensive framework for formulating strategy: A hybrid of balanced scorecard, SWOT analysis, porter's generic strategies and Fuzzy quality function deployment. *Procedia— Social and Behavioral Sciences*, 15, 2068–2073. https:// doi.org/10.1016/j.sbspro.2011.04.055
- March, J. G., & Simon, H. A. (1958). Organizations. Wiley.
- McCoy, M. (2018). Inside the rarefied world of polymer drug manufacturing. *Chemical & Engineering News*, *96*(42). https: //cen.acs.org/pharmaceuticals/drug-development/Inside-rare fied-world-polymer-drug/96/i42
- McCoy, M. (2020). Big drug makers create \$1 billion antibiotics fund. *Chemical & Engineering News*, 98(27). https: //cen.acs.org/business/Big-drug-makers-create-1/98/i27
- Marek, R. (2018, September 27–28). The analyses of the polish marine container terminal market based on Porter's model of five competitive forces [Conference session]. In O. Cokorilo (Ed.), International conference on traffic and transport engineering (ICTTE 2018), Belgrade, Serbia (pp. 356–366). Belgrade. City Net Scientific Research Center.
- Martinez-Mayorga, K., Madariaga-Mazon, A., Medina-Franco, J. L., & Maggiora, G. (2020). The impact of chemoinformatics on drug discovery in the pharmaceutical industry. *Expert Opinion on Drug Discovery*, 15(3), 293–306. https://doi.org/10.1080/17460441.2020.1696307
- Mind Tools Content Team. (2018). *What is strategy? The three levels of strategy*. Retrieved October 11, 2018, from https://www.mindtools.com/pages/article/what-is-strategy.htm
- Molloy, P. L., & Johnson, L. W. (2016). Biotechnology, a strategic planning orphan: Towards an effective strategy framework for biotechnology firms. *Journal of Commercial Biotechnology*, 22(3), 118–125. https://doi.org/10.5912/jcb748
- Mussa, H. Y., Marcus, D., Mitchell, J. B. O., & Glen, R. C. (2015). Verifying the fully "Laplacianised" posterior Naïve Bayesian approach and more. *Journal of Cheminformatics*, 7(1), 27. https://doi.org/10.1186/s13321-015-0075-5
- Nanoinformatics 2020 Roadmap. (2011, April). [Data set]. National Nanomanufacturing Network. https://doi.org/ 10.4053/rp001-110413
- Poorinmohammad, N., & Mohabatkar, H. (2014). A combined cheminformatics and computational approach for the prediction of anti-HIV small molecules. *Current Computer-Aided Drug Design*, 10(4), 349–353. https://doi.org/10.2174/ 157340991004150518150646
- Porter, M. E. (1979). How competitive forces shape strategy. *Harvard Business Review*, 57(2), 137–145.
- Porter, M. E. (1980). Competitive strategy. Free Press.
- Porter, M. E. (2001). Enhancing the microeconomic foundations of prosperity: The current competitiveness index. In The Global (Ed.), *Competitiveness report* (pp. 2001–2002). Oxford University Press for the World Economic Forum.
- Porter, M. E. (2008). The five competitive forces that shape strategy. *Harvard Business Review*. January, 79–94.

- Porter, M. E., Argyres, N., & McGahan, A. M. (2015). An interview with Michael Porter. *The Academy of Management Executive*, 16(2), 44.
- Prieto-Martínez, F. D., Norinder, U., & Medina-Franco, J. L. (2019). Cheminformatics explorations of natural products. In A. D. Kinghorn, H. Falk, S. Gibbons, J. Kobayashi, Y. Asakawa, & J.-K. Liu (Eds.), *Progress in the chemistry of* organic natural products 110: Cheminformatics in natural product research (pp. 1–35). Springer. https://doi.org/ 10.1007/978-3-030-14632-0 1
- PRNewswire. (2015a). Ink solvents market by chemistry type (alcohols, acetates, hydrocarbons), by product type (conventional, green & bio-based), by process (flexographic, gravure, & others) & by application (packaging, corrugated, publication)—global forecasts to 2019. *NY-Reportlinker*. http://search.ebscohost.com/login.aspx?direct = true&db = b wh&AN = 201502021601PR.NEWS.USPR.BR21813&site = eds-live
- PRNewswire. (2015b). Flow chemistry market for pharmaceutical, chemical, academic & industrial research, petrochemical and other end-user industries—global industry analysis, size, share, growth, trends and forecast, 2014—2020. *NY-Reportlinker*. http://search.ebscohost.com/login.aspx?direct = true&db = bwh&AN = 201502091217PR.NEWS.USPR.B R27318&site = eds-live
- PRNewswire. (2016). Battery recycling market—global industry analysis, size, share, growth trends, and forecast 2016— 2024. LON-Reportbuyer. http://search.ebscohost.com/login. aspx?direct = true&db = bwh&AN = 201608241619PR.NEWS. USPR.BR75680&site = eds-live
- Rothaermel, F. T. (2016). "Competitive Advantage in Technology Intensive Industries", Technological Innovation: Generating Economic Results (Advances in the Study of Entrepreneurship, Innovation and Economic Growth, Vol. 26, pp. 233–256). Emerald Group Publishing Limited. https: //doi.org/10.1108/S1048-473620160000026008
- Sagheer, S., Yadav, S. S., & Deshmukh, S. G. (2007). Assessing international success and national competitive environment of shrimp industries of India and Thailand with Porter's diamond model and flexibility theory. *Global Journal of Flexible Systems Management*, 8(1–2), 31–43. https://doi.org/ 10.1007/BF03396518
- Saaty, T. L. (1980) *The analytic hierarchy process*. McGraw-Hill.
- Simon, H. A. (1947). Administrative behavior: A study of decision-making processes in administrative organizations (4th ed.). Macmillan.
- Slater, S. F., & Olson, E. M. (2002). A fresh look at industry and market analysis. *Business Horizons*, 45(1), 15–22. https://doi.org/10.1016/S0007-6813(02)80005-2

- Snowdon, B., & Stonehouse, G. (2006). Competitiveness in a globalised world: Michael Porter on the microeconomic foundations of the competitiveness of nations, regions, and firms? *Journal of International Business Studies*, 37, 163–175. https://doi.org/10.1057/palgrave.jibs.8400190
- Tbalvandani, M. R., & Aghajan Nashtaei, R. (2017). Investigating the earnings quality characteristic and earnings management type in bankrupt and distressed companies (Case study: Companies listed on Tehran Stock Exchange). *Helix*, 8, 907–915.
- Thareja, R., Singh, J., & Bansal, P. (2021). Chapter 4—Computational tools in cheminformatics. In N. Sharma, H. Ojha, P. K. Raghav, & R. K. Goyal (Eds.), *Chemoinformatics and bioinformatics in the pharmaceutical sciences* (pp. 105–137). Academic Press. https://doi.org/10.1016/ B978-0-12-821748-1.00012-9
- Treacy, M., & Wiersema, F. (1993). Customer intimacy and other value disciplines. 12. https://edisciplinas.usp.br/plugin file.php/1704697/mod\_resource/content/1/TreacyWiersema% 20-%20Disciplinas%20de%20Valor.pdf
- Treacy, M., & Wiersema, F. (1996). *The discipline of market leaders: Choose your customers, narrow your focus, dominate your market.* Perseus Books.
- Tsai, P.-H., Chen, C.-J., & Yang, H.-C. (2021). Using Porter's diamond model to assess the competitiveness of Taiwan's solar photovoltaic industry. *Sage Open*. Advance online publication. https://doi.org/10.1177/2158244020988286
- Tullo, A. H. (2021). Bankrupt PET recycler CarbonLite is sold off. Chemical & Engineering News, 99(21). https://cen.acs.org/environment/recycling/Bankrupt-PET-recycler-Carbon Lite-sold/99/i21
- Varela, J. N., Lammoglia Cobo, M. F., Pawar, S. V., & Yadav, V. G. (2017). Cheminformatic analysis of antimalarial chemical space illuminates therapeutic mechanisms and offers strategies for therapy development. *Journal of Chemical Information and Modeling*, 57(9), 2119–2131. https://doi.org/ 10.1021/acs.jcim.7b00072
- Yewno Discovery. (2021, July 19). Yewno Discovery. https://www.yewno.com
- Zhao, L. (2018, April 1–4). Determinants of food industry competitiveness in China from the perspectives of Porter's diamond model [Conference session]. In R. Green, I. Solovjeva, Y. Zhang, R. Hou, & E. McAnally (Eds.), Proceedings of the 3rd international conference on judicial, administrative and humanitarian problems of state structures and economic subjects (JAHP 2018), Domodedovo, Russia (Vol. 252, pp. 281–286). Atlantis Press.
- Zhao, Z. Y., Zuo, J., Wu, P. H., Yan, H., & Zillante, G. (2016). Competitiveness assessment of the biomass power generation industry in China: A five forces model study. *Renewable Energy*, 89, 144–153.