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Analysing the competitiveness of industries using the Analytical Hierarchy Process and Porter's model: A case of Durgapur city

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Abstract. Declining contribution to employment of the steel industry, which used to be the number-one sector in the city of Durgapur (India), leads to a search for alternative employment sources. The article aims to identify the criteria and sub-criteria to reveal the business competence through Porter's model and ranking of business competence of each industry through the analytical hierarchy process (AHP) for Durgapur. Porter's Five Forces Framework is used as the methodological basis to find the best alternate industry option based on their competitive position and provides the framework and subsequent criteria to analyse competitiveness. The key research method is the analytical hierarchy process that helps to measure the criteria qualitatively. The empirical evidence comes from the survey of 126 respondents: 36 experts who are well-versed in the industrial development of the city and fixed the weightage of the criteria through the AHP, and 90 industry-specific experts provide the range value for each criterion level of major industries in Durgapur, the strategic framework to support the industrial transition, and a brief about their dual nature of competition. We have figured out nine employment-generating industrial sectors within the city of Durgapur, among which are steel production, information technology (IT), education, healthcare, etc. The IT industry was found to be the most competitive sector that provided additional employment opportunities; it was followed by non-metal production, healthcare, and education.

Keywords: competitive position; Porter's model; analytical hierarchy process; industry; business strategy; municipal governance; India.

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Модель рыночных сил Портера и метод анализа иерархий в оценке конкурентоспособности отраслей экономики (на примере г. Дургапур)

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Аннотация. Падающий уровень занятости в сталелитейной промышленности – в прошлом лидирующей отрасли по численности наемных работников г. Дургапур (Индия) – ставит вопрос о необходимости поиска альтернативных возможностей для трудоустройства местного населения. Статья направлена на разработку критериев оценки наиболее перспективных отраслей экономики с точки зрения увеличения занятости населения. Методологический каркас исследования представлен концепцией пяти рыночных сил М. Портера. Качественный анализ критериев бизнес-компетенций отраслей осуществлялся с помощью метода анализа иерархий. Информационную базу работы составили результаты опроса 126 респондентов, разделенных на две группы: первая (36 экспертов) участвовала в определении веса каждого критерия оценки бизнес-компетенций отрасли, вторая (90 узких специалистов) – в процессе оценки значимости критериев в соответствии с предложенной авторами шкалой. Представлены принципы оценки уровня конкуренции основных отраслей в Дургапуре, краткий анализ двойственной природы их конкуренции, а также стратегические основы для поддержания изменений в структуре промышленности. Авторами выявлены девять отраслей г. Дургапур, активно создающих рабочие места; среди них – сталелитейная промышленность, сфера информационных технологий, образование, здравоохранение и др. Установлено, что наибольшими конкурентными преимуществами и возможностями роста занятости обладают IT-сектор, несмежные для металлургии отрасли промышленности, образование и здравоохранение.

Ключевые слова: конкурентная позиция; модель Портера; метод анализа иерархий; отрасли экономики; бизнес-стратегия; муниципальное управление; Индия.

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INTRODUCTION

Durgapur was developed as a planned city during the second five-year plan to make India self-dependent in the field of the steel sector. Initially, the main economic backbone was the steel industry. Gradually due to various national and global events, the contribution of steel industries to employment was reduced at the national level. The General Agreement on Tariffs and Trade (GATT) treaty, economic liberalization, and technological advancements are some of the primary reasons. Modernization and technological upgradation in the steel industry reduced the manufacturing cost and made the industry less labour-intensive. Due to these measures, the number of employments in the steel industry fell. In addition, with this decline, other sectors developed gradually. A survey suggests that there is a decrease in employment in the steel industry and an increase in other sectors, i.e., education, service, medical, information technology, etc. The change in the employment scenario of the city has been directed towards the requirement of alternate sources of employment. This requires the business competence level of each industrial sector in the city to be estimated [Haldar et al., 2023; Choiriah, Sudibyo, 2020]. To foster development in the right direction, it is required to know the industry, which has high potential for growth.

The industry-wise competitive environment in a city is a complex issue and it has a deep impact on the company's strategy for setting up its business unit [Hafezi et al., 2020; Mani, Yudha, 2021]. Strategy formulation is multi-criteria decision-making that involves an enormous number of factors [Wu, Tseng, Chiu, 2012; Paksoy, Gunduz, Demir, 2023; Ketels, Porter, 2021; Puglieri et al., 2022]. It is necessary to understand and analyse the critical factor of this competition [Gizem, 2020]. Michael Porter proposed a model that helps to formulate the strategy of industries based on the five forces [Porter, 1979; Belton, 2017]. Stonehouse and Snowdon [2007] also mentioned Porter's work and confirmed that the five forces framework helps to assess the attractiveness and competitive position of the industry. Simultaneously, Saaty [1987] proposed a quantitative method, i.e., the Analytic Hierarchy Process (AHP), to develop the relative importance of the existing variables in a system based on the stakeholder's perception. The system faces impacts due to internal and external stakeholders' actions and needs to evaluate or measure its criteria [Tseng, 2010; Redding, 2020] as the potential to provide support during decision-making through Porter's model [Saaty, 1987; Wellner, Lakotta, 2020]. Previously, Mohammadrezaei, Nayebzadeh and Roknabadi [2016], who studied the competitive position of Kian Isatis Pars Company through AHP and Porter's framework, had also taken this kind of approach. The authors of a number of works (see, e.g., [Lee, Kim, Park, 2012; Ali, Anwar, 2021]) also applied the method of analytic network process (ANP), a generalized version of the analytic hierarchy process (AHP), to measure the forces of Porter's model. The method was used to find the competitive position of industrial sectors in the web portal industry of Korea. Varma [2016] analysed the competitive environment of the Indian petroleum industry and its supply chain system. However, he directly did not refer to the AHP but provided affirmative concern in utilizing the AHP and Porter's framework in this kind of analysis. Oneren, Arar and Yurdakul [2017] applied the AHP in Porter's model and SWOT (strengths, weaknesses, opportunities, and threats) framework to analytically review and determine the best competitive strategy for industries. It was felt necessary that the competitive nature of the industries is needed to be plotted by a measurable technique for Durgapur.

Therefore, the purpose of the present study is to find out the criteria and sub-criteria to identify the business competence through Porter's model and ranking of business competence of each industry through the analytical hierarchy process (AHP) for Durgapur.

RESEARCH METHOD

This section describes the steps adopted to figure out the competitive level of industries. Section 1 illustrates the Porter's model. Section 4 derives the sub-criteria applicable to this study from Porter's model. The sub-criteria selection is inspired by similar studies [Porter, 1979; Wu, Tseng, Chiu, 2012]. The weightage and range of each criterion are obtained from the expert's opinion and analysing it through the AHP in Microsoft Excel [Bashir, Verma, 2017]. Industrial experts have been asked to provide their opinion for each industry on Porter's framework. Expert's opinions are projected to analyse the competitiveness of industry in two steps. In the first step, the weightage of each criterion and their associated sub-criteria are evaluated as per the information provided by 36 experts through the AHP. A city planner, an economist, a councillor, and a municipal service advisor are in this expert group, whose responds are used in equal proportions. In the next step, 90 core industry experts are asked to provide the range of value for each sub-criterion based on their expertise for each industry. The persons who are directly involved in each industry are considered to be the experts in this step. During the processing of the data obtained from the survey respondents (experts), the consistency level for each respondent was checked through consistency ratio (CR), which decides the confidence level of the survey [Saaty, 1987]. The values of sub-criteria obtained from the experts are multiplied by the weightage of the sub-criteria. It provides the final value of sub-criteria for each industry. The values of sub-criteria are summarized to figure out the value for each force as per Porter's model and total competence level as well [Fernando, 2021]. The whole process is performed in Microsoft Excel. Section 5 concludes about the level of competence of each industrial sector. It also describes the dual nature of market competition.

Industry in the city. To find the most suitable industry in the city, it is important to know the current industrywise division in the city. These divisions will further be assessed for their relative importance. Industries in a city can be classified based on multiple factors, namely profit margin, type of production, number of employments, etc. Here, based on the type of production, industries in Durgapur have been categorized as in Table 1.

With the help of by-products from the steel industry and ancillary finished products, metal-based ancillary industries have also evolved in the city. Due to the regional agricultural support, metal industry base, and skilled manpower, the city continued to foster its non-metal industry (paper, chemicals, milk, and dairy products, etc.). In addition, with the emerging global trends the city has developed its service sector, IT sector, etc. On a regional scale, Durgapur has proven itself as one of the major destinations for education and medical institutions in recent times.

Values of the forces as per Porter's model. To determine the suitable industry for a location, it is required to know the criteria and their weightage. To determine the criteria, Porter's framework has been used [Mohammadrezaei, Nayebzadeh, Roknabadi, 2016; Horvathova, Mokrisova, 2020]. In addition, to know their weightage, the AHP process developed by Saaty is useful, who developed the process of the AHP through a unidirectional hierarchical relationship. It utilizes the judgement of experts on a ratio scale for multi-criteria decision analysis [Saaty, 1987; Tsai, Chen, Yang, 2021]. The AHP forms are effective in resolving problems involving multilevel decision attributes and complexities [Dyer, Forman, 1992]. Various studies have adopted the methodology of Porter's five forces framework to determine the competition in the market. Here, the study involves the use of the AHP in determining the weightage of criteria from Porter's framework and using experts' opinions in finding the value for each subcriterion for the industry.

Step-1: Describing the criteria, range of value, and logic. Michael Porter formed the framework for industries through the five forces to determine the competition level and business strategy. These forces (criteria) help to assess the position of industries in a microenvironment and determine their core competencies [Porter, 1979]. During the compilation of criteria, experts from respective industry were asked to check the impact of each force against Porter's model. While selecting the criteria from the original Porter's five-force framework, it was tried to keep all the mentioned criteria from Porter's original research work. Table 2 shows the five forces (criteria) of Porter's model along with their sub-criteria identified from the study of Porter [1979] and Wu, Tseng and Chiu [2012].

These criteria have their impact on determining the strategy. To know the magnitude of the impact on competence, it is required to project the criterion to a quantitative scale. Experts suggests a value for each sub-criterion on a scale of 0–5. To determine the intensity (high/low) of the value in the given range, experts were asked to use the logic of competition that an industry will face during its establishment and operation. City planners, economists, municipal service advisor, councillor are the major stakeholders in the expert panel. As this step determine the strategy of the state of the

Table 1 – Industrial sectors in Durgapur in 2022 Таблица 1 – Отрасли экономики г. Дургапур, 2022

Industries	Industrial sectors	Industry typology	Sample industries		
	Steel	Steel manufacturing	DSP, ASP		
industries	Heavy metal and allied	Automobile, Cement, Carbon black	Shyam Steel Industries Ltd., KIC Metallics Ltd., Haldia Steel Pvt. Ltd.		
Medium-scale industries	Non-metal industry	Milk and dairy product, Paper and print, Soft drink, Poultry	Wood, Furniture, Chemical factory, Jewellery, Packag- ing, Ceramics, Water and beverage, Tube, Polymers, Brickfield, Warehouse		
Small scale industries	Small-sized enterprise	Car showroom, Book shop, Ho- tel, Grocery shop, Consultancy office, Nursery	Local shop – unorganised sector		
	Healthcare	Hospital	Mission Hospital, Sanaka Hospital, Healthworld, IQ City, The Nation Hospital, Vivekananda Hospital		
Organisation	Education	College, Coaching centre	National Institute of Technology (NIT), BC ROY Engg. College, BECT, Sanaka, DSMS, NSHM, DAV model school, FIITJEE, PATHFINDER, Triumphant Institute of Manage- ment Education, Akash Institute, Career Launcher		
organisation	Information technology	IT office	Iglobal Impact Ites, Go IGI, Ganesha Intelliware LLP, Web- media, Digiholic Infotech Pvt. Ltd., Relyon Softech Ltd.		
	Shopping mall	Shopping mall	Dreamplex, Junction Mall, Fortune Plaza		
	Medium-sized enterprise	Jewellery shop, Restaurant, Elec- tronic shop	PC Chandra Jewelers, Senco Gold, Car shop, Grocery departmental store, Electronics, Restaurants, Food stall		

Source: Primary survey and municipality records.

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Table 2 – Assessment criteria for industry business competence through Porter's five forces analysis and its sub-criteria Таблица 2 – Оценка бизнес-компетенций отрасли: критерии (силы) и подкритерии в модели «пять сил» Портера

Target: Business competence						
Five forces (criteria)	Sub-criteria of each force					
	Economies of scale (A1)					
	Product differentiation (A2)					
Threat	Capital requirement (A3)					
of entry (A)	Switching cost (A4)					
	Access to distribution channel (A5)					
	Government's policy (A6)					
	Number of suppliers (B1)					
Power	If the supplier is concentrated to sell their product to a particular industry (B2)					
of supplier (B)	Cost of switching the supplier (B3)					
	How much the supplier can move forward in the supply chain for better gain, threat of forward integration (B4)					
	Number of buyers (C1)					
	The buyers are concentrated or bound to buy from that particular industry to run their operation (C2)					
	How many times the buyer changes its seller (C3)					
Power of buyer	Switching costs which the buyer will face to change its seller within the same industry (C4)					
	How much the buyer can bargain against the quality and price factor, price sensitivity (C5)					
	How much the buyer can go back to the supply chain for better gain, the threat of backward integration (C6)					
	Importance of the product to the buyer (C7)					
	Number of substitutes (D1)					
Threat	The obvious advantage of the substitute (D2)					
of substitute (D)	Switching the cost of the buyer to change the industry to go to the substitute product (D3)					
	Profitability level of substitute industries (D4)					
	Number of rivals (E1)					
	Cost of the rival to exit its existing industry (previous industry), exit barrier (E2)					
Intensity	The industry itself is growing high so that a rival will be attracted, industry growth (E3)					
of rivalry (E)	The typologies of the rival company produce, product differentiation (E4)					
	How much the rival industry is concentrated in this particular industry, diversity of rivals (E5)					
	The chance of merging two or more rival companies to form a single company, threat of horizontal integration (E6)					

mines the characteristics of the criterion, no direct industry-related specialist was involved in this stage. It provides the criterion for their value from an unbiased perspective due to non-involvement of any specific industry specialists. Experts were also requested to analyse the situation of competition from a neutral standpoint. It is because, for the same condition, there may be two logics if an assessor thinks from an existing business unit or a unit to be established, i.e., for 'Economies of scale (A1)', it determines the amount of economy to enter the industry not only in terms of capital, but as a whole. Now, if the amount is high for a business establishment, then for an existing business unit the condition will be less competitive as a new business unit will be discouraged. However, for a unit that is willing to establish its branch in the region, it will be a competitive environment. Now, for this kind of scenario, experts are requested to focus on the competition level a new business setup will face. Therefore, this type of condition is asked to keep in mind during the assessment. Table 3 provides the guidelines for the experts.

Step-2: Determining the weightage of five forces (criteria) and their sub-criteria. In this step, the weightage of each sub-criterion is determined through the AHP. This has been done in two steps through pairwise comparison. In the first step, the weightage of each force is established. In the second step, the weightage of each sub-criterion is computed. Finally, the weight of criteria was redistributed as per the weightage of forces. The whole process is done through group consultation to avoid individual biases. During the whole process, consistency ratio (CR) has been kept below 0.1 as per the recommendation of Saaty, which is a major condition to make the AHP applicable for any case [Saaty, 1987]. This condition of CR determines the unbiasedness and persistence of the sample. Thirty-six industry experts were asked to provide their opinion about the weightage of forces and sub-criteria through the AHP (see, Appendix 1 and Appendix 2). Four experts were chosen from each industry, which resulted in a total of 36 experts. Aged experts were chosen to provide their

Table 3 – Value for each sub-criterion and rationale for determining the scale Таблица 3 – Шкала значимости подкритериев и ее логическое обоснование

Forces (criteria)	Criteria	Range	Logic framed according to experts' opinion
	A1	High – 0 1 2 3 4 5 – Low	A large amount of resources to entry signifies more value, thus low competition
	A2	Low – 0 1 2 3 4 5 – High	A bigger number of brand items signifies more market penetration, thus more value, and more competition
Throat	A3	High – 0 1 2 3 4 5 – Low	More amount of capital requirement signifies more value, thus low competition
of entry (A)	A4	High – 0 1 2 3 4 5 – Low	More significant advantage in the location shows more value and so low competition
	A5	High – 0 1 2 3 4 5 – Low	More cost to access distribution channel directs to more value and thus low competition
	A6	Restricted – 0 1 2 3 4 5 – Intense	More restricted government law to oblige directs to more intense competition
	B1	High – 0 1 2 3 4 5 – Low	A smaller number of suppliers signifies bigger value and thus more competition
Power	B2	Low – 0 1 2 3 4 5 – High	If the supplier produces more items, then it will have the upper hand, so more value and more competition
(B)	B3	Low – 0 1 2 3 4 5 – High	More amount of shifting cost results in reluctance to change and so more value and more competition
	B4	Low – 0 1 2 3 4 5 – High	Better chance of forward integration results in more value and competition
	C1	High – 0 1 2 3 4 5 – Low	Smaller number of buyer suggests more value and more competition
	C2	High – 0 1 2 3 4 5 – Low	The more often the buyer changes its choice signifies the lower value of competi- tion
	С3	Low – 0 1 2 3 4 5 – High	If the product is not much important for buyers' side, so more change and thus more value and so more competition
Power of buyer (C)	C4	High – 0 1 2 3 4 5 – Low	If the buyer's switching cost from one product to another is low, then there will be more competition
	C5	Low – 0 1 2 3 4 5 – High	If the buyer can bargain better in a particular industry, then there will be more competition
	C6	Low – 0 1 2 3 4 5 – High	The more the chance of backward integration, the more will be the competition
	C7	Low – 0 1 2 3 4 5 – High	A more important product will create more competitive environment
	D1	Low – 0 1 2 3 4 5 – High	A greater number of substitute products leads to a more competitive condition
Threat	D2	Low – 0 1 2 3 4 5 – High	If the substitute product is more profitable, then there will be more competition
of substitute	D3	Low – 0 1 2 3 4 5 – High	If the buyer needs to pay more to switch, then there will be more competition
(D)	D4	Low – 0 1 2 3 4 5 – High	If there is more profit for the substitute product, then there will be more competi- tion
	E1	Low – 0 1 2 3 4 5 – High	A greater number of rivals leads to more competition
	E2	Low – 0 1 2 3 4 5 – High	If the exit cost is high, then there will be more competition
	E3	Low – 0 1 2 3 4 5 – High	If the industry growth is high, then competition is tougher
Intensity	E4	High – 0 1 2 3 4 5 – Low	If rivals have less differentiated products, then there will be more competition
of rivalry (E)	E5	High – 0 1 2 3 4 5 – Low	If the rival is less diverse in different industries, then there will be more competi- tion
	E6	High – 0 1 2 3 4 5 – Low	The lower the chance two companies integrating horizontally or merging, there will be stronger competition

feedback to avoid any kind of inclination. Each opinion is taken into consideration to represent the weightage of criteria in equal proportion. Their opinions are summarised and normalized to obtain the final value (Table 4).

Criteria are provided with their weightage as per the pairwise comparison in the AHP. In the next step, the criteria are re-weighted as per the weightage of each force. The final weightage of each sub-criterion is presented in Table 5. Table 4 – Forces of the business competence and their weightage Таблица 4 – Критерии и вес бизнес-компетенций отрасли

Force No	Forces (criteria)	Weightage of each force
А	Threat of entry	0.061
В	Power of supplier	0.084
С	Power of buyer	0.475
D	Threat of substitute	0.163
E	Intensity of rivalry	0.214
Total		1

Table 5 – Intermediate and final weightages of the business competence criteria Таблица 5 – Промежуточный и итоговый вес критериев бизнес-компетенций

Serial No	Forces (W _a)	Sub-criteria	Weightage (W _b)	Final weightage (W _{c =} W _a x W _b)
		Economies of scale (A1)	0.06	0.003
		Product differentiation(A2)	0.07	0.004
A Threa (weig	T I . C .	Capital requirement (A3)	0.38	0.023
	(weightage is 0.061)	Shifting cost (A4)	0.11	0.007
	(weightuge is 0.001)	Access to distribution channel (A5)	0.15	0.009
		Government's policy (A6)	0.22	0.013
		Subtotal		0.061
		Number of suppliers (B1)	0.06	0.004
		Supplier's concentration (B2)	0.49	0.041
В	Power of supplier (weightage is 0.084)	Shifting cost to change a supplier (B3)	0.20	0.016
	(weightage is 0.00 i)	The threat of forward integration (B4)	0.25	0.021
		Subtotal		0.084
	Power of buyer (weightage is 0.475)	Number of buyers (C1)	0.09	0.041
		Buyer's concentration (C2)	0.07	0.033
		Buyer's sophistication (C3)	0.04	0.019
C		Switching cost (C4)	0.09	0.043
		Price sensitivity (C5)	0.13	0.061
		The threat of backward integration (C6)	0.34	0.161
		Importance of the product to buyer (C7)	0.24	0.114
		Subtotal		0.475
		Number of substitutes (D1)	0.07	0.011
	-	The obvious advantage of substitute (D2)	0.12	0.019
D	Inreat of substitute	Buyer's switching cost (D3)	0.55	0.090
	(weightage is 0.105)	Profitability level of substitute industries (D4)	0.26	0.041
		Subtotal		0.163
		Number of rivals (E1)	0.05	0.011
		Exit barrier (E2)	0.11	0.022
		Industry growth (E3)	0.31	0.065
E	Intensity of rivalry (weightage is 0.475)	Product differentiation (E4)	0.08	0.016
	(weightage is 0.475)	Diversity of rivals (E5)	0.29	0.061
		The threat of horizontal integration (E6)	0.17	0.035
		Subtotal		0.163
Total	(Subtotal of A + B + C +	+ D + E)		1

Step-3: Deriving the final value of each industry. In this final step, each industrial sector is provided with the scale range (see Table 3) as per their stand for those criteria, and it produces the value as per the weightage of each subcriterion, i.e., an expert from the steel industry is asked to provide the scale range and it is multiplied by the weightage of that criterion. In this step, 10 industry experts from each industry are encouraged to provide their opinion for each sub-criterion in the scale of 0 to 5. As Durgapur has been divided into nine employment-generating sectors (industries), data were obtained from ninety experts. The ranges acquired from each respondent are summarised and their average are used. During data collection, it was strictly followed that surveyees of the previous stage do not overlap in this stage. The person who was responsible for generating the value of criteria and sub-criteria will be different from the person who provides the range for industries. During the collection of the final value, experts were asked to concentrate on the amount of difficulties a business unit will face during its setup and operation in an industry line. The obtained values are summed up to gain the final value. In this step, eight industry experts were asked to provide the value of range (see Table 3), and it was multiplied by criteria weightage to figure out the value for criteria.

In this stage, the final value for each sub-criterion is determined by multiplying the range value as provided by the experts and the weightage of each sub-criterion. The range is obtained from the logic in Table 3. Experts are requested to provide the range value for the industries. In this step, values for each industry are acquired from the concerned industry experts. The weightage of each sub-criterion and its force have already been defined in Table 5. The range is multiplied by sub-criteria to get the value of each force and, lastly, all the weightage of forces (criteria) are summarised to get the final total value.

The derived value from each sub-criterion is summarised and the total value is obtained (Table 6, Table 7, and Table 8).

Our study shows that in the industry typology Steel and Medium-sized enterprise have the lowest value of 1.77 and 1.76, respectively. In addition, the IT industry shows the highest score of 3.27 and is followed by the Non-metal industry with a score of 2.43 as the second highest score. Education, Healthcare, and Metal allied showed scores of 2.29, 2.26, and 2.209, respectively. Based on Porter's framework, these scores highlight the relative position of the industries of the city in the line of competition with each other, i.e., the score obtained by the IT sector is almost double of Steel and Medium-sized enterprise. However, it does not imply that the IT industry will face almost double the competition as Steel. It only implies that this industry will face more competition, if compared with the latter. During the data collection,

Table 6 – Scale range and the final value of business competence for steel, metal allied, non-metal, and IT industries at Durgapur Таблица 6 – Значимость и итоговые показатели бизнес-компетенций сталелитейной, смежных и несмежных для металлургии отраслей, а также IT-индустрии в г. Дургапур

	St	eel	Metal allied		Non-metal		IT	
Sub-criteria (W _c)	Range (R)	Final value (R × W _c)	Range (R)	Final value (R × W _c)	Range (R)	Final value (R × W _c)	Range (R)	Final value (R × W _c)
A1	2.00	0.01	2.00	0.01	3.00	0.01	4.00	0.01
A2	5.00	0.02	5.00	0.02	2.00	0.01	5.00	0.02
A3	1.00	0.02	4.00	0.10	2.00	0.05	4.00	0.10
A4	2.00	0.01	4.00	0.03	2.00	0.01	4.00	0.03
A5	2.00	0.02	3.00	0.03	3.00	0.03	4.00	0.04
A6	5.00	0.07	4.00	0.06	2.00	0.03	2.00	0.03
Subtotal		0.15		0.23		0.14		0.22
B1	5.00	0.03	3.00	0.02	2.00	0.01	1.00	0.01
B2	2.00	0.08	3.00	0.12	3.00	0.12	0.00	0.00
B3	5.00	0.08	4.00	0.07	2.00	0.03	1.00	0.02
B4	1.00	0.02	2.00	0.04	4.00	0.08	4.00	0.09
Subtotal		0.21		0.25		0.24		0.11
C1	4.00	0.17	3.00	0.12	2.00	0.08	2.00	0.08
C2	5.00	0.17	2.00	0.07	2.00	0.07	4.00	0.13
C3	1.00	0.02	2.00	0.04	3.00	0.06	2.00	0.04
C4	1.00	0.04	3.00	0.13	2.00	0.09	4.00	0.17
C5	1.00	0.06	2.00	0.12	3.00	0.19	1.00	0.06
C6	0.00	0.00	0.00	0.00	2.00	0.32	5.00	0.81
C7	4.00	0.46	4.00	0.46	2.00	0.23	3.00	0.35
Subtotal		0.92		0.94		1.04		1.64
D1	0.00	0.00	0.00	0.00	3.00	0.04	5.00	0.06
D2	0.00	0.00	2.00	0.04	3.00	0.06	2.00	0.04
D3	0.00	0.00	2.00	0.18	2.00	0.18	3.00	0.27
D4	0.00	0.00	2.00	0.08	3.00	0.13	1.00	0.04
Subtotal		0.00		0.30		0.41		0.41
E1	0.00	0.00	3.00	0.03	4.00	0.05	5.00	0.06
E2	5.00	0.12	4.00	0.09	3.00	0.07	1.00	0.02
E3	2.00	0.13	2.00	0.13	2.00	0.13	5.00	0.33
E4	4.00	0.07	1.00	0.02	2.00	0.03	3.00	0.05
E5	0.00	0.00	1.00	0.06	3.00	0.19	4.00	0.25
E6	5.00	0.18	4.00	0.14	4.00	0.14	5.00	0.18
Subtotal		0.49		0.48		0.61		0.89
Total		1.77		2.21		2.43		3.27

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 Table 7 – Scale range and the final value of business competence for small- and medium-sized enterprises, education, and healthcare

 in Durgapur

Таблица 7 – Значимость и итоговые показатели бизнес-компетенций предприятий малого и среднего бизнеса, а также компаний в сфере образования и здравоохранения в г. Дургапур

	Small-sized enterprise		Medium-sized enterprise		Education		Healthcare	
Sub-criteria (W _c)	Range (R)	Final value (R x W _c)	Range (R)	Final value (R x W _c)	Range (R)	Final value (R x W _c)	Range (R)	Final value (R x W _c)
A1	5.00	0.02	2.00	0.01	2.00	0.01	2.00	0.01
A2	4.00	0.02	3.00	0.01	3.00	0.01	3.00	0.01
A3	5.00	0.12	2.00	0.05	2.00	0.05	1.00	0.02
A4	4.00	0.03	3.00	0.02	1.00	0.01	1.00	0.01
A5	1.00	0.01	2.00	0.02	5.00	0.05	3.00	0.03
A6	1.00	0.01	2.00	0.03	2.00	0.03	5.00	0.07
Subtotal		0.20		0.14		0.15		0.15
B1	5.00	0.03	3.00	0.02	1.00	0.01	4.00	0.02
B2	4.00	0.17	2.00	0.08	3.00	0.12	1.00	0.04
B3	1.00	0.02	2.00	0.03	3.00	0.05	4.00	0.07
B4	2.00	0.04	3.00	0.06	0.00	0.00	0.00	0.00
Subtotal		0.25		0.20		0.18		0.13
C1	1.00	0.04	3.00	0.12	1.00	0.04	2.00	0.08
C2	1.00	0.03	2.00	0.07	4.00	0.13	4.00	0.13
C3	1.00	0.02	1.00	0.02	1.00	0.02	2.00	0.04
C4	0.00	0.00	1.00	0.04	3.00	0.13		0.00
C5	4.00	0.25	2.00	0.12	0.00	0.00	1.00	0.06
C6	3.00	0.49	0.00	0.00	0.00	0.00	0.00	0.00
C7	5.00	0.57	2.00	0.23	5.00	0.57	5.00	0.57
Subtotal		1.40		0.61		0.90		0.89
D1	0.00	0.00	2.00	0.02	5.00	0.06	4.00	0.05
D2	0.00	0.00	2.00	0.04	4.00	0.08	4.00	0.08
D3	0.00	0.00	1.00	0.09	1.00	0.09	2.00	0.18
D4	0.00	0.00	2.00	0.08	1.00	0.04	2.00	0.08
Subtotal		0.00		0.24		0.27		0.39
E1	5.00	0.06	3.00	0.03	4.00	0.05	4.00	0.05
E2	1.00	0.00	0.00	0.00	3.00	0.07	4.00	0.09
E3	2.00	0.13	4.00	0.26	5.00	0.33	5.00	0.33
E4	1.00	0.02	4.00	0.07	2.00	0.03	1.00	0.02
E5	2.00	0.12	3.00	0.19	4.00	0.25	3.00	0.19
E6	1.00	0.04	1.00	0.04	2.00	0.07	1.00	0.04
Subtotal		0.37		0.59		0.80		0.71
Total		2.22		1.76		2.29		2.26

Table 8 – Comparative business competences for each industry in Durgapur Таблица 8 – Сравнительный анализ бизнес-компетенций отраслей г. Дургапур

Industry sector	Business competence	Industry sector	Business competence
Steel	1.77	Small-sized enterprise	2.22
Metal allied	2.21	Medium-sized enterprise	1.76
Non-metal	2.43	Education	2.29
П	3.27	Healthcare	2.26

Note: based on data from Table 6 and Table 7.

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IMPLEMENTATION STRATEGY FOR INDUSTRY TRANSITION

divisions (Table 1). If there is any modification in the number of industries, then the relative competitive position of the industries will also change. Porter's idea was to analyse the forces that help to formulate the strategy, which will make it easier to cope with the competition in the market. Porter's framework is used to provide the strategic idea to the company for better returns. Its five forces (criteria) are represented numerically in the study. It helps to analyse each force so that the company or industry can re-orient its strategy for better results, i.e., for the force 'Threat for new entry', the non-metal sector is experiencing more value than the IT sector, though the total value for the latter is greater. It implies that there is more chance that a new business entity will easily enter the market for the Non-metal sector than the IT sector. Similarly, for the force of 'Power of supplier', all sectors have bigger competition than the IT sector with the lowest value of 0.107. It implies that it is easier to supply the necessary raw materials for IT than for any other industry. Therefore, it need not worry about its in-supply line. At the same time, it faces more intense competition in the force of 'Power of buyer', the threat of substitutes, and rivalry. It implies that it is easier for a substitute in the IT industry to attract buyers and to be its competitive rival. On the same line, the steel industry is the second last competitive industry in the region with a value of 1.774. Despite of having an overall low value, the steel industry is facing more competition in the force of 'Threat for new entry' against non-metal, medium-sized enterprise, and healthcare with a value of 0.154. However, there is no competition against substitute products. It implies that though new competitors can enter the market, it is tough to produce a substitute product. On a similar type of analysis, education and healthcare are the third and fourth competitive industries with a value of 2.29 and 2.26, respectively. However, these two sectors are having second and third highest values in the force of 'Intensity of rivalry'. In addition, in the force of 'Threat of entry', these industries display low values among the other industries. It suggests that education and healthcare can easily penetrate the market and so there is a high risk of rival units. In this way, Porter's framework provides a platform, which not only reveals the competitive position of industries in a market, but also explores the forces that need to be taken care of by individual industries for better performance. The total competition of the industries is presented in Figure. It shows that the IT industry obtains the highest score to be called the most competitive industry in the city. In addition, the steel industry gets the least score. It implies that the IT industry will face the most competition and the steel industry will face the least competition. However, with the current industry trend, there is a huge probability of the IT industry to flourish. Simultaneously, although the steel sector faces the lowest competition, it is very tough for it to open and survive. These phenomena will be discussed in the next chapter.

the industries of Durgapur were categorized into the said

Implementing a development strategy in the Indian context necessitates obtaining both legal and institutional support from the local municipality. The provision of legal support is accomplished through various laws, while institutional support is obtained from the development documents prepared by the authorized organization. Durgapur has already begun its transition from metallurgy to service sectors, such as IT, educational institutions, and non-metal production. The strategy for industrial transition holds for two types of industrial scenario. One scenario involves an established industry expanding into new business areas, leading to a transformation from one type of business profile to another. The other scenario entails the entry of a completely new player in the city.

The combination of these two scenarios constitutes the transition process within the industry. Research indicates that solution selling is often employed as a primary strategy, utilizing a blend of both products and services [Fang, Palmatier, Steenkamp, 2008; Davies, Brady, Hobday, 2007]. The establishment facilitates a collaborative atmosphere for the manufacturing industries to transit into the service sector by utilizing their expertise in manufacturing. The metallurgy and manufacturing sectors in Durgapur have demonstrated their ability to identify various types of system solutions, indicating that they are already taking steps towards offering service-oriented solutions. To effectively address this situation, it is necessary to prioritize the broader needs and circumstances of customers while facilitating their transition. By utilizing Porter's model in conjunction with the AHP analysis, the most favourable competitive industry within the city has been identified. Consequently, there will be a shift from metallurgy-based industries towards those focused on meeting consumer demands. This transformation encompasses service sectors such as IT consulting, metal-affiliated automobile manufacturing, as well as employment opportunities provided by educational institutions like schools and colleges. The city has already commenced and executed the transition. Durgapur plays a significant role as a promising provider of employment opportunities, not only in the automotive and other metal-related industries but also in service sectors like IT. This has been verified by the Confederation of Indian Industry (CII) as well [Sethi, 2022]. Additionally, Durgapur is recognized as an emerging destination for IT within India. To expedite this development, local government authorities have taken steps such as providing training to personnel and designating Special Economic Zones (SEZ).

So, a stepwise list of actions to support the industry transition are stated below.

Step-1: Assessing the land based on their industrial productivity. A brief evaluation is conducted to determine the productivity of industrial land in relation to the steel industry. Spatial distribution of Durgapur reveals that only 40% of the available land is currently being utilized.

As per a government proposal, it is suggested that additional 20% of this land should be used for expansion purposes. Considering international trends in the steel industry, it can be concluded that the remaining 40% will likely stay unused in future decades. This portion of land could potentially be repurposed for metal-related industries such as automobile manufacturing. In Durgapur, a closed industry encompasses approximately 23% of total industrial land within the city. Out of this percentage, around 12% will be allocated for service sectors including IT and other institutional activities while the remaining amount (11%) will be designated for institutional industries.

Step-2: Designating land for industrial purpose in strategic locations. Urban planners and geographers are responsible for determining the allocation of land use in urban areas through official documents such as the Land Use Development Control Plan (LUDCP) and City Development Plan (CDP). These documents aim to control haphazard development by establishing specific purposes for different parcels of land, including designated industrial zones. They serve as important institutional guidelines that not only outline proposed projects but also provide spatial information or maps indicating their strategically planned locations. By designating proposed industries within these documents, it is more likely to attract potential investors interested in those particular areas.

Step-3: Developing manpower for upcoming industries. As a result of the ongoing decline in industrial conditions, numerous industrial institutes have been inactive for an extended period. However, it would be advantageous to repurpose these institutions and utilize them as platforms for fostering skilled professionals who can make significant contributions to future industries.

Step-4: Providing legal support for land acquisition. RF-CTLARR Act 2013 (The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation, and Resettlement Act, 2013) grants governments the authority to acquire privately owned property for public use and developmental purposes while ensuring fair compensation and transparency in land acquisition, rehabilitation, and resettlement processes¹.

Step-5: Encouraging schemes for investors to business set up. In order to promote the establishment of new IT businesses, a subsidized plot of land should be allocated along with various tax incentives. Similarly, the existing business units that are undergoing transitional phases should also receive tax benefits. Additionally, there should be an exemption on imported raw materials, resulting in an approximate 25% reduction in setup costs for these businesses and further stimulating the transition process.

Step-6: Providing infrastructural support for upcoming industry. Currently, around 9% of the city's land is allocat-

ed for transportation purposes. This percentage is expected to increase to 13% in order to facilitate and accommodate upcoming developmental processes. As a result of this expansion, it is estimated that approximately 60,000 individuals will migrate to the city. To meet the housing needs of this influx population while maintaining current residential land use intensity standards, an additional area measuring approximately 15 square kilometres should be designated for their settlement. Furthermore, it should be noted that the implementation of freight corridors has already commenced as part of efforts aimed at fostering industrial growth within the region [Chakraborty, 2023].

Step-7: Products identification. At the outset, established manufacturing companies will adopt a solutionoriented approach leveraging their expertise in core products. The emerging industry will play a supporting role during this transition phase. Automation has emerged as a pivotal aspect of contemporary manufacturing and these upcoming IT sectors will reinforce its implementation. In view of market dynamics, it is widely acknowledged that industries today depend not only on local markets but also explore consumer bases across borders due to globalization's influence [Nandi, Gamkhar, 2013]. Hence, the forthcoming IT industry within the city is anticipated to successfully market its products nationwide. Similarly, emerging metal allied sectors such as automobile manufacturing will cater to a wide customer base across India and along transportation corridors due to existing demand for these services.

DUALITY NATURE OF COMPETENCE

The level of competence can be defined as the amount of competition a business unit will face during its establishment and running for that particular industry [Mugo, 2020]. It is the number of difficult aspects, which a company faces during its establishment and operation [Isabelle et al., 2020]. The concept of competence does not only cater to the amount of difficulty it faces but it also directs toward the opportunity [Khurram, Hassan, Khurram, 2020; Sudarmiatin, Hermawan, 2022]. In a remotely rural area, there is almost no competition for an expensive mobile brand, but it will not get any significant customer in that area as well. On the other hand, in a metro city, that particular brand may face a huge amount of competition though it will attract a substantial number of customers. There is a large number of potential customers in urban areas rather than rural territories. Similarly, there are some items, which will face both the competition and potential customers in rural areas. Various agricultural and husbandry products are on that list. There are also special cases. Say for an agricultural engineering product, though demanded in rural areas, their sale is done in some particular shop of the urban area. Therefore, it is observed that the dual nature of market, demand, and supply can be best analysed by the persons who are engaged in that particular business [Nyanga, Pansiri, Chatibura, 2020]. During the

¹ Government of India. (2013). The right to fair compensation and transparency in land acquisition, rehabilitation and resettlement act, 2013. New Delhi. https://lddashboard.legislative.gov.in/ sites/default/files/A2013-30.pdf

questionnaire session, experts were asked to focus on this kind of situation also. So, in many cases, more amount of competition directs towards a more favourable industry choice for that city. As the IT industry is flourishing and Durgapur is one of the most considered IT sectors in West Bengal after Kolkata, the IT industry has huge potential to grow in the city. On the other hand, the steel industry is facing very little competition because running a new steel industry is a mammoth task.

CONCLUSION

The study successfully evaluates the competencies of industries through the AHP, experts' opinions, and Porter's model. The five forces are useful for managers to make planned decisions in the existing market environment [Rashidin et al., 2020]. It helps to figure out the competitiveness of the industries in the current market situation. The application of AHP perceives the sub-criteria and forces on a quantitative scale. The framework identifies the major forces and criteria of Porter's model, identifies their weightage in the analysis procedure, and based on the experts ranking finalizes the competence level of each industry. Most of the previous research of Porter's model was targeting the qualitative aspect, while this study has emerged to be a quantitative analysis. As the objective was to find the industry in the city, which will face the competition most, stakeholders and experts during the questionnaire session were asked to focus to find the level of competition the respective industry will face. During

the questionnaire session and derivation of inference, the dual nature of the market condition and its impact on the business setup was not considered. Research on the dual nature of the industries also needs consideration from additional aspects, which can be considered as the limitation of the study. The research finds that IT is an industry, which will face the most competition and is followed by non-metal sector, education, and healthcare. Apart from the final value of the competitive position, the study also figures out the individual aspects of the five forces and positions the industries as per their acquired values. The role of competition in establishing a business unit from an investor's point of view has been highlighted in the dual nature of competition. The population of Durgapur for the census 2011 is 566,517, which is termed as 'Large city' in Urban Development Plans Formulation and Implementation 2015 (URDPFI 2015) guidelines. Establishing a new business unit in the region will accelerate the process of land conversion. The study presents a comprehensive examination on the process of establishing business entities and expediting the transition from metallurgy to the IT sector. It highlights different approaches and delves into their legal and institutional frameworks. However, further investigation is needed regarding land conversion procedures, specifically in relation to geographic aspects such as the transformation of barren, vacant, and agricultural land into built-up areas. This phenomenon points out the need for land management and optimization of the existing industrial land.

Appendix 1 Приложение 1

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Threat of entry	Economies of scale	Product differentiation	Capital requirement	Shifting cost	Access to distribution channel	Governments policy		
Economies of scale	1	0.33	0.17	0.50	0.33	0.50		
Product differentiation	3.00	1.00	0.13	0.33	0.25	0.33		
Capital requirement	6.00	8.00	1.00	2.00	4.00	2.00		
Shifting cost	2.00	3.00	0.50	1.00	0.50	0.25		
Access to distribution channel	3.00	4.00	0.25	2.00	1.00	0.50		
Governments policy	2.00	3.00	0.50	4.00	2.00	1.00		

Sample Survey responds to determine the weightage of force – Threat of entry, through the AHP Оценка респондентами веса параметра «угроза новых конкурентов» с использованием метода анализа иерархий

Sample Survey responds to determine the weightage of force – Power of supplier, through the AHP

Оценка респондентами веса параметра «власть поставщиков» с использованием метода анализа иерархий

Power of supplier	Number of suppliers	Supplier's concentration	Shifting cost to change a supplier	Threat of forward integration
Number of suppliers	1	0.14	0.25	0.25
Supplier's concentration	7.00	1.00	2.00	3.00
Shifting cost to change a supplier	4.00	0.50	1.00	0.50
Threat of forward integration	4.00	0.33	2.00	1.00
Total	16.00	1.97	5.25	4.75

Sample Survey responds to determine the weightage of force – Power of buyer, through the AHP Оценка респондентами веса параметра «власть покупателей» с использованием метода анализа иерархий

Power of buyer	Number of buyers	Buyer's concentration	Buyer's sophistication	Switching cost	Price sensitivity	Threat of backward integration	Importance of the product to buyer
Number of buyers	1	3.00	3.00	0.50	0.33	0.17	0.33
Buyer's concentration	0.33	1.00	2.00	0.33	0.50	0.33	0.50
Buyer's sophistication	0.33	0.50	1.00	0.50	0.50	0.20	0.13
Switching cost	2.00	3.00	2.00	1.00	0.50	0.11	0.25
Price sensitivity	3.00	2.00	2.00	2.00	1.00	0.50	0.33
Threat of backward integration	6.00	3.00	5.00	9.00	2.00	1.00	2.00
Importance of the product to buyer	3.00	2.00	8.00	4.00	3.00	0.50	1.00

Sample Survey responds to determine the weightage of force – Threat of substitute, through the AHP

Оценка респондентами веса параметра «угроза появления заменителей» с использованием метода анализа иерархий

Threat of substitute	Number of substitutes	Obvious advantage of substitute	Buyer's switching cost	Profitability level of substitute industries
Number of substitutes	1	0.33	0.17	0.33
Obvious advantage of substitutes	3.00	1.00	0.13	0.33
Buyer's switching cost	6.00	8.00	1.00	2.00
Profitability level of substitute industries	3.00	3.00	0.50	1.00

Sample Survey responds to determine the weightage of force – Intensity of rivalry, through the AHP Оценка респондентами веса параметра «интенсивность конкуренции» с использованием метода анализа иерархий

Intensity of rivalry	Number of rivals	Switching cost	Industry growth	Product differentiation	Diversity of rival	Threat of horizontal integration
Number of rivals	1	0.33	0.17	0.50	0.25	0.50
Exit barrier	3.00	1.00	0.13	2.00	0.50	0.33
Industry growth	6.00	8.00	1.00	3.00	0.50	2.00
Product differentiation	2.00	0.50	0.33	1.00	0.33	0.33
Diversity of rival	4.00	2.00	2.00	3.00	1.00	2.00
Threat of horizontal integration	2.00	3.00	0.50	3.00	0.50	1.00

Appendix 2

Приложение 2

Sample Survey responds to determine the weightage of the forces Итоговая оценка респондентами веса «пяти сил» Портера

Porter's five-forces framework	Threat of entry	Power of supplier	Power of buyer	Threat of substitute	Intensity of rivalry
Threat of entry	1	0.33	0.17	0.50	0.33
Power of supplier	3.00	1.00	0.13	0.33	0.25
Power of buyer	6.00	8.00	1.00	2.00	4.00
Threat of substitute	2.00	3.00	0.50	1.00	0.50
Intensity of rivalry	3.00	4.00	0.25	2.00	1.00

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