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Effect of Green Intellectual Capital Practices on the Competitive Advantage of Companies: Evidence from Polish Companies

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Abstract: The purpose of this research was to determine the impact of Green Intellectual Capital practices on the competitive advantages of companies in Poland. The study included 150 Polish producing enterprises located across Poland. The first stage of the analysis was an assessment of the level of impact of GIC practices on the competitiveness of the studied organizations with the use of the 5-point Likert scale. The second stage involved an investigation into the correlation between the rating of the impact of GIC practices and their implementation on the basis of the Spearman's rank correlation coefficient and the regression function. In the course of this research, it was determined that GIC practices had an impact on the competitiveness of organizations and that the impact varied according to the GIC component. Polish managers hold that the major impact was attributed to Green Organizational Capital. The impact of the component was rated at 2.4 on the adopted 5-point scale. In turn, the impact of Green Human Capital and Green Relational Capital was only 2.1. The identification of the correlation between GIC practices and the competitiveness of organizations provides an opportunity for the managers to better understand how companies can achieve a competitive advantage through investment in green intellectual capital. The research findings may, therefore, generate increased interest in GIC development in companies.

Keywords: green human capital; green organizational capital; green relational capital; green intellectual capital; competitive advantage

Citation: Bombiak, E. Effect of Green Intellectual Capital Practices on the Competitive Advantage of Companies: Evidence from Polish Companies. *Sustainability* **2023**, *15*, 4050. https://doi.org/10.3390/su15054050

Academic Editor: Jacob Guinot

Received: 17 January 2023
Revised: 17 February 2023
Accepted: 21 February 2023
Published: 23 February 2023

1. Introduction

In the era of globalization, rapid technological advances, growing customer needs and global economic turmoil, companies seek new solutions to survive in a highly competitive market. To achieve and maintain a competitive edge, businesses are compelled to draw on their resources more effectively and develop novel competencies. The basis for taking advantage of new opportunities and developing key competencies is an organization's knowledge. A specific intangible asset based on knowledge is Intellectual Capital (IC). A number of studies have found that IC is the principal source of a competitive advantage in the knowledge economy [1–3]. However, emerging crises and transforming economic and political structures make it necessary for enterprises to review their strategies to ensure lasting competitive advantages. Growing environmental awareness and special emphasis on sustainable management point to the conclusion that investment in Green Intellectual Capital (GIC) may prove an effective strategy for gaining a competitive edge [4].

The true potential of GIC with respect to competitive advantage development has not been unlocked, as demonstrated by the relatively few studies in the field. Pioneer research was conducted by Chen. The empirical results of the study showed that the three types of green intellectual capital, i.e., green human capital, green structural capital, and green relational capital, had positive effects on the competitive advantages of firms in Taiwan [5]. With time, more and more authors started to investigate GIC. Yusoff et al. conducted studies aimed at presenting information about the ways small and medium production enterprises in Malaysia perceive GIC [6]. Next, Rezaei et al. studied the relations

between green intellectual capital (and its components) and the competitive advantage of Malaysian enterprises [7]. Yong et al. explored the relationship between GIC and GHRM [8]. Yusliza et al. [9], Yadiati et al. [10] and Malik et al. [11], in turn, undertook research into the impact of GIC on the sustainable development of organizations.

The above studies inspired the author to conduct research into the issue of green intellectual capital in Polish organizations. The analysis of the literature revealed the absence of publications about the impact of GIC practices on the competitiveness of organizations and the scope of practice implementation given the Polish conditions. It demonstrated that the relationship between green intellectual capital and Polish company competitiveness is insufficiently explored. The author intended to bridge the gap, at least to some extent. The conducted research allowed the author to draw conclusions regarding Polish managers' awareness of the importance of GIC practices. The said awareness is vital for the process of the implantation of the model of GIC in the managerial practice. The research further allowed the author to discover a correlation between the form of capital ownership in the studied enterprises and the extent of implementation of GIC practices and the evaluation of their impact on company competitiveness. According to the author's knowledge, this plot has not been investigated in the source literature to date.

The purpose of this research article is to diagnose the activity of companies operating in Poland with respect to GIC use to gain a competitive edge and improve financial performance. The main research problem is to determine a correlation between the impact of GIC practices on the competitiveness of enterprises and their practical implementation. This paper addresses the following research questions:

- Which green human capital practices are key to the competitiveness of organizations in the Polish reality?
- Which green organizational capital practices are key to improve the competitiveness of the organization?
- Which green relational capital practices develop the competitive advantage of enterprises?
- Is there a relationship between the evaluation of the impact of GIC practices on the competitiveness of the organization and their implementation?
- Is there a difference in the evaluation of the impact of GIC practices on company competitiveness and regarding their implementation depending on the form of company capital ownership?

The article has been organized in the following way. The first section will present a critical review of the literature on intellectual capital and its impact on the financial performance and competitiveness of organizations. The subsequent section will comprise the specificity of green intellectual capital with particular emphasis on green human capital. A description of the research methodology, a presentation of research findings, and a discussion will follow. The final part will include the conclusions and research limitations, with a simultaneous outline of possible areas of further research.

This research article is a pioneer attempt to evaluate the impact of GIC practices on the competitiveness of enterprises in Poland. The study contributes to the source literature by diagnosing a gap in terms of GIC application as a tool for gaining a competitive edge under Polish conditions. The pioneering approach is seen, above all, in the analysis of the evaluation and the scope of implementation of GIC practices with regard to the forms of capital ownership in the studied organizations. In the study, a division into three groups was applied: entities based solely on Polish capital, entities based solely on foreign capital, and entities with mixed capital. This allowed the author to identify the differences in managers' approaches to GIC practices depending on the sources of financing company operations. The author of the study believes that the presented research findings may generate managers' interests in GIC in Polish organizations.

2. Theoretical Background and Hypotheses Development

2.1. Definition and Classification of Intellectual Capital

Intellectual Capital is a category that incorporates the intangible resources of organizations and accounts for the inter-linkages between them [12]. The resources may be seen as "assets" (such as brands, trademarks, contracts, databases) or "skills" (such as know-how) [13]. Stewart defines IC as new wealth of organizations [14]. Roos et al. claims that it consists of all but the physical resources that are completely or partly controlled by the organization and contribute to the creation of its value [15]. Klein and Prusak, in turn, define IC as "the intellectual material that can be formalized, captured and leveraged to produce a higher value asset" [16]. Sullivan, on the other hand, sees IC as knowledge that can be converted into profits [17]. Intellectual capital is a gap between the book value and the market value of companies [18]. It is further defined as assets not included in the balance sheet [19], but which constitute strategic resources that may generate value and secure a competitive advantage [20].

A considerable number of researchers distinguish three IC components, i.e., human capital, structural (organizational) capital and relational (social) capital [21–26].

Human capital encompasses the knowledge, skills, abilities, experience, and know-how of organizations' employees and their engagement in task performance [27]. It also includes personal features, such as intelligence, energy, ability to learn, agility, imagination and creativity, willingness to share information, working as part of a team and focusing on company objectives [28]. Human capital is considered to be the major IC component. It is a factor that increases efficiency; enterprises rich in HC perform better compared to their competitors [29]. Egbu claims that human capital provides innovation and intuition, which structural or relational capital cannot offer [30]. It is of key importance to the generation of new products and perfection of novel business procedures. However, we must note that this capital is not the property of the organization. It is inextricably linked to the staff, which signifies that it is lost by the organization whenever an employee leaves the company. Thus, it is so crucial to preserve said capital [31]. It may be partially achieved through the codification of employee work in databases, which leads to the development of another IC component, i.e., organizational capital.

Organizational capital, also referred to as structural capital, is defined as everything that is left with the organization when its employees have gone home [18]. It consists of various forms of express knowledge supporting employee productivity. It comprises not only databases, but also internal structures, management systems and methods, organizational processes and procedures, trademarks, patents, organizational culture, and infrastructure that is essential to assist the organizational strategy [32–34]. Tseng and Goo [35] and Cohen and Levinthal [36] highlight that this type of capital is generated by the environment that facilitates the management and flow of knowledge across the organization. User-friendly systems and processes enhance knowledge exchange both within and outside the organization [37].

The final component, relational or social capital, refers to the relations which the company maintains with its surroundings. It encompasses relations with its external and internal stakeholders, i.e., customers, suppliers, employers, shareholders, strategic partners, the state and the entire society [38]. Stakeholders are perceived as partners in the process of creation of an added value. RC is also described as knowledge embedded in all relations related to the interpersonal interactions that companies develop [39]. According to Bontis [40], relational capital also amasses component knowledge acquired by companies maintaining successful relations with their stakeholders [26,41]. Among other components of relation capital, there are organizational loyalty, customer satisfaction, and environment-oriented operations [42].

The intellectual assets forming IC are intangible in nature, which means that they do not have a specific shape. Although they are referred to as "hidden assets" because they are hard to quantify and present in financial reports [43], they bring about the most tangible results.

2.2. Intellectual Capital and Company Performance

Many researchers have investigated the relationship between IC and company financial performance and competitiveness. The research carried out by Riahi-Belkaoui in a group of international American companies tested the dependencies between IC and the relation of a net value added to the total of assets [44]. The results of the study demonstrated a positive input of IC in the financial performance of multinational companies. Wang, in turn, examined the relation between IC and the market value of American electronic enterprises, finding that IC had a positive impact on their market capitalization [45].

The studies conducted in Singapore by Tan et al. on 150 listed companies confirmed positive correlations between the IC effectiveness and the measures of financial performance, i.e., return on capital or annual return on shares [46]. The studies further proved that IC input varied according to an industry. In a study conducted in the health-care industry in the USA, Cheng et al. concluded that there was a significant correlation between IC and company performance [47]. Sharabati et al. investigated the relationship between IC and the financial performance of pharmaceutical companies in Jordan and also observed that IC components had a positive effect on business results [48]. Similarly, the research conducted by Zeghal and Maaloul based on data from 300 companies from the United Kingdom showed a positive relationship between IC and company economic performance [49]. What is more, Clarke et al. proved that IC effectiveness was causally related to the financial performance of Australian companies [50].

Mention and Bontis analyzed the relationship between IC and financial results in the banking sector of Luxembourg and Belgium and determined that human capital contributed to the improvement of financial performance, whereas the relations between structural capital and relational capital were insignificant [34]. Analogous research was undertaken by Komnenic and Pokrajcic, who analyzed 37 international companies in Serbia. The study showed that human capital was positively correlated with the principal measures of company performance, i.e., return on assets, return on equity capital, and productivity, while structural capital showed a significant relationship only with return on equity capital [38].

Narwal et al. probed the relationship between the components of intellectual capital (i.e., human capital and structural capital) and the measures of financial performance (i.e., profitability, return on capital, productivity, and market appraisal). The analysis coveredthe100 largest enterprises of the Indian pharmaceutical industry. The results asserted that intellectual capital was significantly and positively correlated with the measures of financial performance. The examination of individual IC components revealed that structural capital had a positive impact on company financial performance, whereas HC played no vital role [51]. Moreover, it was established that IC had a major impact on the market valuation of companies. However, the above findings were not accordant with some earlier studies by Maditinos et al., who found that the disclosure of intellectual capital did not result in an increase in the market value of companies [43].

Wang et al. analyzed the input of intellectual capital in the performance of 228 Chinese enterprises [52]. They demonstrated that all components of intellectual capital were crucial for the improvement of company operational performance. Research studies conducted by Syahcharia and Sahbanba also showed that intellectual capital had a major role in the development of a competitive advantage. They proved that the higher the level of intellectual capital, the greater the competitive edge [53].

Nonetheless, not all research findings confirm the vital role of IC in the improvement of the financial standing of companies. Firer and Williams explored the relationship between IC and productivity, profitability, and market valuation. However, they found no strong relation between the listed variables [54]. The only correlation they reported was a moderate link between structural capital and profitability. Similarly, Kujansivu and Lonnqvist carried out a research study on a population of Finish companies to establish a relation between IC and productivity and the profitability of companies. Their research did not show any linear relationship between investment in IC, IC value, IC efficiency

and return on assets (ROA) [55]. The studies by Kamatha, who tested the relationship between IC and profitability, productivity, and market valuation in Indian pharmaceutical companies, did not show any significant relationships between company performance and their profitability, productivity, or market valuation [56]. Correspondingly, Chan, in a study conducted on a stock-exchange in Hongkong, demonstrated no strong relationship between IC and the measures of financial performance (productivity, profitability (ROA), return on equity (ROE) and market valuation) [57,58].

On the other hand, Pal and Soriya, in a study carried out amongst Indian pharmaceutical and textile corporations, observed that IC effectiveness played a major role in encouraging profitability. Still, they found no significant correlation between IC and productivity and market valuation in either industry branch [42]. Additionally, Ghosh and Mondal analyzed the relationship between IC efficiency and the measures of financial results in Indian software producing companies and saw that IC was positively correlated only with company profitability [59]. In turn, Mehralian et al., in a study on Iranian pharmaceutical corporations, established that the relation between IC and the traditional measures of efficiency varied. It was reported that company IC could account for its profitability but did not affect productivity or market valuation. The empirical analysis further proved that physical capital had the greatest impact on the profitability of the studied companies [60].

All in all, even though the results of various research studies are not equivocal, the majority of the researchers have confirmed the positive correlation between IC and company financial performance. In general, therefore, it seems that effective IC management may generate enhanced performance and reinforce companies' competitive advantages. Today, however, with an increasing frequency we come across a thesis that sustainable development is key to future competitiveness at both micro- and macroeconomic levels [61]. Investment in the practices of environmental management is a new direction for companies to gain and maintain competitiveness [62]. This, in turn, draws our attention to GIC, which is a special type of IC.

2.3. Specificity of Green Intellectual Capital

Green intellectual capital is a type of intellectual capital. It is described as the entire knowledge the organization has and employs in environmental management [39]. Similarly, Liu has defined GIC as the integration of the green and environment knowledge sources and knowing capability of companies for improving a competitive advantage [63]. On the other hand, Chen has described green intellectual capital as the kinds of knowledge, capabilities and relationships about environmental protection or green innovation at the individual and the organization levels [5].

A significant number of researchers identify three basic components of GIC, using an analogy to IC:

- Green human capital (GHC);
- Green organizational capital (GOC), also referred to as structural;
- Green relational capital (GRC).

GHC comprises the knowledge and competencies of employees in terms of solving environmental problems, which are provided and communicated to the entire organization [39]. This further refers to the attitudes to and involvement in environmental issues, which play major roles in environmental innovations [64].

GOC is the sum of organizational solutions, systems, mechanisms, and processes associated with environment protection and green innovations in companies. In addition, it is the organizational philosophy and culture supporting environment protection, ecological patents and strategies of environmental management [5–8].

GRC is based on company relationships with stakeholders. It is the total of relations with customers, suppliers, and other partners in the area of environment protection and an increase of eco-friendly product sales [39]. These relationships are based on trust between partners, which reinforces the corporate green image [64].

Yahya et al. have provided for a different classification of GIC. According to the authors, it covers green human capital, green innovation capital, green process capital, and green social capital. The authors believe that green human capital pertains to the environmental skills of employees, which are distributed across the organization via environmental leadership, training and green staff teams. Green innovation capital represents the company capacity to generate new knowledge, innovative products and all creative ideas aimed at solving environmental problems. Green process capital involves the procedures and systems of environment protection, green organizational capital and integration, and the equal co-operation of an organization's departments in the area of environment protection. Finally, green social capital includes organization's ecological relations with the market on which it operates, i.e., with suppliers, customers, and other entities [39].

To sum up, irrespective of the adopted GIC classification, it comprises valuable, rare, unique, intangible resources that facilitate environment protection and sustainable corporate operations. Nevertheless, we should note that the category is not homogeneous. Its specificity has not been fully explored. As a consequence, the issue of GIC use to generate a competitive advantage is a relatively new research subject, in particular in Poland. This fact has been the main motive for the author to investigate the opinion of Polish managers on the impact of GIC on the competitiveness of the companies they manage.

The prior empirical research results allowed the author to put forward the following research hypotheses:

Hypothesis 1. *GHC practices, GOC practices and GRC practices are positively associated with the competitiveness of organizations.*

Hypothesis 2. *There is a correlation between the evaluation of the impact of green intellectual capital practices on corporate competitiveness and their implementation in enterprises.*

Hypothesis 3. *Companies with foreign capital and mixed capital involvement evaluate the importance of GIC practices in the development of corporate competitive advantage higher than companies with domestic capital, and they implement GIC practices to a greater extent.*

3. Materials and Methods

This research focused on GIC practices in Polish enterprises. The purpose of this research was to rate the impact of activities supporting GIC formation on the competitiveness of the studied enterprises, and to establish the relationship between the impact of individual practices oriented at GIC formation and their practical implementation in Polish companies.

To address the above-presented problems, this study was based on a review of the literature, a diagnostic survey method, and a statistical analysis based on the SPSS software. To verify the hypotheses, basic statistics, the Spearman's rank correlation coefficient and the linear regression model were used. Table 1 shows a list of practices accounted for in the study. The diagnosis encompassed the following three components:

- Green human capital (practices 1–12);
- Green organizational capital (practices 13–23);
- Green relational capital (practices 24–30).

The framework of the present research is based on the literature studied above to explore the links between GIC practices and corporate competitiveness. The relations are illustrated in Figure 1.

Table 1. Green intellectual capital practices.

Green Intellectual Capital Components	Practice No.	Practice
Green Human Capital	1	The company invests in environmental training for employees
	2	The company awards financial bonuses for pro-environmental achievements
	3	The company provides flexible working hours in order to undertake pro-ecological activities
	4	The company evaluates employees' ecological competences
	5	The company uses public praise/awards/certificates for environmental activities
	6	Responsibility for the environment is included in the job instructions
	7	The company encourages its employees to be involved in waste reduction and pollution prevention
	8	The company informs employees about their contribution to the company's achievements in the area of ecological efficiency
	9	The company supports sharing ecological knowledge
	10	The organization's ethical code considers pro-ecological attitudes and behaviors
	11	The company promotes its ecological image on the labor market
	12	The company uses ecological competence as a criterion for evaluating candidates applying for a job
Green Organizational Capital	13	The company includes ecological goals in the company's strategy
	14	The company has implemented an environmental management system
	15	Ecological values are put into the company's mission
	16	The organization conducts environmental audits
	17	The organization implements a proactive environmental strategy
	18	The organization implements a reactive environmental strategy
	19	The organization implements a business model based on green innovation
	20	The company improves green corporate culture
	21	The company runs an environmental analysis of the product lifecycle
	22	The company has an environmental knowledge management system
	23	The organization has created a department responsible for implementing the environmental strategy
Green Relational Capital	24	The company shares information related to environmental aspects with key customers to improve green practices within the supply chain
	25	The company cooperates with key suppliers in the implementation of environmental initiatives
	26	The company applies green marketing
	27	The company cooperates only with partners who respect ecological standards
	28	The company prepares environmental reports
	29	The company cares about its green image
	30	The company is involved in charity work for environmental initiatives

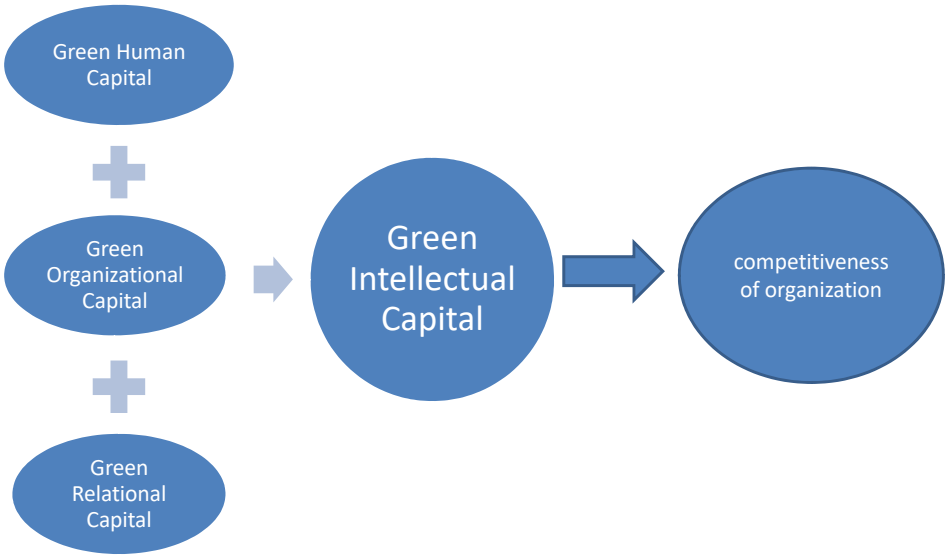

Figure 1. Research Framework.

The study was conducted based on a questionnaire survey. The survey was carried out in the year 2021 on a population of 150 enterprises. The study's target population was Polish manufacturing companies. The characteristic features of the population are shown in Table 2. The study respondents were top-level executives, such as general managers and HR managers, who were part of policy/strategy development.

Table 2. Profiles of the studied enterprises.

Criterion	Number of Enterprises	Percentage
Employment number:		
50–249 employees	87	58.0
250–499 employees	23	15.3
500–749 employees	32	21.3
Over 500 employees	8	5.3
Industry experience:		
Up to 5 years	11	7.3
5–7 years	23	15.3
7–9 years	47	31.3
Over 9 years	69	46.0
Scope of operations:		
International	79	52.6
European	33	22.0
National	27	18.0
Regional	6	4.0
Local	5	3.4
Capital structure		
Polish	101	67.3
Foreign	28	18.6
Mixed	21	14.0

4. Results

The author of this research attempted to evaluate the impact of GIC practices on the competitiveness of the studied enterprises. The evaluation was conducted with the application of the Likert scale, where 1 signified a very low impact and 5 a very high impact. The results of the analysis are presented in Table 3.

Table 3. The impact of GHC, GOC and GRC practices on company competitiveness.

Practice No.	Aggregate Assessment of Impact (Points)	Mean Impact of Practice (Points)	Median (Points)	Modal Value (Points)	Standard Deviation (Points)	Asymmetry (Points)	Kurtosis (Points)
1	406	2.71	3	3	1.256	0.078	−1.018
2	435	2.90	3	3	1.151	−0.150	−0.891
3	343	2.29	2	1	1.244	0.477	−0.935
4	305	2.03	2	1	1.255	0.947	−0.314
5	293	1.95	1	1	1.228	0.950	−0.350
6	322	2.15	2	1	1.228	0.553	−1.027
7	329	2.19	2	1	1.224	0.579	−0.905
8	360	2.40	2	1	1.210	0.387	−0.908
9	262	1.75	1	1	1.100	1.285	0.614
10	261	1.74	1	1	1.065	1.214	0.321
11	226	1.51	1	1	0.925	1.862	2.785
12	232	1.55	1	1	0.924	1.802	2.940
13	391	2.61	3	3	1.269	0.017	−1.192
14	397	2.65	3	1	1.352	0.023	−1.429
15	335	2.23	2	1	1.318	0.540	−1.171
16	354	2.36	2	1	1.265	0.320	−1.250
17	362	2.41	2	1	1.391	0.439	−1.154
18	284	1.89	1	1	1.238	1.131	0.013
19	410	2.73	3	4	1.359	-0.040	−1.400
20	307	2.05	1	1	1.266	0.817	−0.680
21	441	2.94	3	4	1.399	0.587	−1.056
22	300	2.00	1	1	1.259	0.901	−0.466
23	365	2.43	2.5	1	1.223	0.145	−1.340
24	365	2.43	2	1	1.318	0.351	−1.142
25	300	2.00	1	1	1.295	0.864	−0.713
26	295	1.97	1	1	1.308	0.993	−0.432
27	294	1.96	1	1	1.164	0.778	−0.772
28	290	1.93	1	1	1.145	0.893	−0.413
29	360	2.40	2	1	1.447	0.418	−1.361
30	266	1.77	1	1	1.112	1.113	−0.089

The analysis demonstrates that GIC practices have an impact on the competitiveness of the studied organizations. The assessment of the impact of individual activities ranged from 1.77 to 2.94. Activity number 21, i.e., the conduct of an environmental analysis of the lifecycle of products, had the greatest impact. The respondents most frequently rated its impact as high (mode 4), with a mean activity impact of 2.94. Other activities the respondents found essential for the competitiveness of organizations were:

- Financial bonuses for pro-environmental achievements (practice 2), the average impact of which was 2.90.
- Implementationof a business model based on green innovation (practice 19), the average impact of which was assessed at 2.73;

- Investing in environmental training for employees (practice 1), the average impact of which was 2.71;
- Implementation of the system of environmental management (practice 14), with an impact average of 2.65;
- Inclusion of environmental goals in company strategy (practice 13), with an impact average of 2.61.

On the contrary, the following actions had a minor impact on the competitiveness of companies:

- Promoting ecological image on the labor market (practice 11)—average impact of 1.51;
- Using ecological competence as a criterion for evaluating candidates applying for a job (practice 12), with an impact average of 1.55;
- Taking into account pro-ecological attitudes and behaviors in the organization's ethical code (practice 10)—average impact of 1.74;
- Supporting sharing ecological knowledge (practice 9)—average impact of 1.75;
- Charitable support for environmental initiatives (practice 30), the mean impact of which was at the level of 1.77.

Table 4 presents an aggregated evaluation of the impact of GIC components on the competitiveness of the organization.

Table 4. The mean impact of green intellectual capital components on the competitiveness of the organization.

Green Intellectual Capital Components	Practice No.	Mean Impact of Practice (Points)	Mean Impact of Component (Points)
Green Human Capital	1	2.71	2.1
	2	2.90	
	3	2.29	
	4	2.03	
	5	1.95	
	6	2.15	
	7	2.19	
	8	2.40	
	9	1.75	
	10	1.74	
	11	1.51	
	12	1.55	
Green Organizational Capital	13	2.61	2.4
	14	2.65	
	15	2.23	
	16	2.36	
	17	2.41	
	18	1.89	
	19	2.73	
	20	2.05	
	21	2.94	
	22	2.00	
	23	2.43	

Table 4. *Cont.*

Green Intellectual Capital Components	Practice No.	Mean Impact of Practice (Points)	Mean Impact of Component (Points)
Green Relational Capital	24	2.43	2.1
	25	2.00	
	26	1.97	
	27	1.96	
	28	1.93	
	29	2.40	
	30	1.77	

The studies conducted by the author confirm the key role of GOC in the development of the competitive advantages of the studied organizations. The mean impact of the component was rated at 2.4 on the adopted 5-point scale. The impact of GHC was as important as that of GRC. Nonetheless, the studies do not confirm the major role of GHC in the development of the competitive advantages of the studied organizations. The above findings conflict with the popular thesis that business performance depends, above all, on the proper use of human capital.

Against this background, the scope of implementation of the analyzed practices becomes a critical research issue. Therefore, over the course of the research, an attempt was made to examine the relationship between the evaluation of the impact of GIC practices on the competitiveness of enterprises and their practical implementation. Table 5 demonstrates the figures that were the basis for the calculation of the number of enterprises pursuing individual practices and the assessment of their impact on competitiveness.

Table 5. The impact of GIC practices on the competitiveness of the organization and their implementation in companies.

Practice No.	Aggregate Evaluation of Practices' Impact on the Competitiveness of the Organization (Variable X)	Number of Enterprises Pursuing the Practices (Variable Y)	Percentage of Enterprises Pursuing the Practices (%)
1	406	135	90
2	435	141	95
3	343	81	54
4	305	59	39.3
5	293	56	37.3
6	322	78	52
7	329	95	63.3
8	360	112	74.7
9	262	49	32.7
10	261	37	24.7
11	226	29	19.3
12	232	25	16.7
13	391	102	68
14	397	107	71.3
15	335	73	48.7

Table 5. *Cont.*

Practice No.	Aggregate Evaluation of Practices' Impact on the Competitiveness of the Organization (Variable X)	Number of Enterprises Pursuing the Practices (Variable Y)	Percentage of Enterprises Pursuing the Practices (%)
16	354	105	70
17	362	88	58.7
18	284	51	34
19	410	52	34.7
20	307	74	49.3
21	441	66	44
22	300	104	69.3
23	365	89	59.3
24	365	87	58
25	300	63	42
26	295	50	33.3
27	294	70	46.7
28	290	60	40
29	360	73	48.7
30	266	39	26

The most frequently implemented practices in the studied Polish enterprises were:

- Awarding financial bonuses for pro-environmental achievements (95%);
- Investing in environmental training for employees (90%);
- Informing employees about their contribution to the company's achievements in the area of ecological efficiency (74.7%);
- Implementing an environmental management system (71.3%);
- Having an environmental knowledge management system (69.3%);
- Including ecological goals in the company's strategy (68%).

With a view to establishing the strength and direction of the interdependence of the variables X and Y, the Spearman's rank correlation coefficient was calculated. The r = 0.810 rank correlation coefficient at the level of significance 0.01 demonstrates a very strong positive relationship between the assessment of the impact of the practices on the competitiveness of organizations and their practical implementation in the studied enterprises. This indicates that the practices pursued are those that are viewed by the management as necessary to improve the organization's competitiveness, as expressed by the high rating of their impact.

The analysis of the impact of GIC practices on the competitiveness of organizations, broken down by the form of capital ownership in the studied entities, produced a number of interesting results. The figures are presented in Table 6. It was established that the average evaluation of the impact of GIC practices on the competitiveness of organizations in the group of domestic capital companies was 2.1 and was lower than the one in the group of foreign and mixed capital companies by 0.2 points. Differences were also observed with respect to the implementation of practices. The analyses revealed that GIC practices were more often implemented in foreign capital companies (average implementation rate—57.6%) and mixed capital companies (average implementation rate—51.3%) than in companies financed by capital of Polish origins (average implementation rate—46.9%).

Table 6. An evaluation of GIC practices and the scope of their implementation broken down by the form of capital ownership of the studied entities.

Practice No.	Evaluation of GIC Practices Impact on the Competitiveness of Organizations on a Scale of 1–5			Implementation of GIC Practices (Data Shown in %)		
	Companies with Polish Capital	Companies with Foreign Capital	Companies with Mixed Capital	Companies with Polish Capital	Companies with Foreign Capital	Companies with Mixed Capital
1	2.7	2.7	2.7	79.3	91.3	81.3
2	2.9	2.9	3.3	90.1	100.0	87.5
3	2.2	2.3	2.5	47.7	60.9	62.5
4	2.1	1.9	2.1	37.8	31.1	25.0
5	1.8	2.2	2.3	30.6	52.2	50.0
6	2.1	2.3	2.1	51.4	43.5	56.3
7	2.1	2.3	2.3	58.6	60.9	56.3
8	2.4	2.6	2.4	66.7	78.3	68.8
9	1.7	1.6	2.1	27.0	30.4	37.5
10	1.7	1.8	1.9	22.5	26.1	31.3
11	1.5	1.7	1.7	16.2	26.1	18.8
12	1.5	1.5	1.9	14.4	21.8	12.5
13	2.5	2.8	2.9	61.3	78.3	87.5
12	2.6	3.1	2.4	65.8	82.6	56.3
15	2.1	2.9	2.0	41.4	69.6	50.0
16	2.3	2.7	2.5	61.3	82.6	75.0
17	1.3	2.9	2.4	58.6	82.6	50.0
18	1.9	1.7	1.9	34.2	31.1	31.3
19	2.0	2.2	2.5	36.0	47.8	50.0
20	2.2	2.4	2.4	49.6	47.8	56.3
21	2.0	2.1	2.1	42.3	52.2	50.0
22	2.7	3.0	2.5	65.8	73.9	68.8
23	2.4	2.6	2.6	53.2	65.2	75.0
24	2.4	2.6	2.7	55.9	69.6	75.0
25	1.9	2.4	2.7	39.6	31.1	31.3
26	1.8	2.2	2.7	31.5	65.2	50.0
27	1.9	2.4	1.7	43.2	60.9	31.3
28	1.9	2.2	1.8	42.3	60.9	31.3
29	2.4	2.4	2.3	48.7	26.1	50.0
30	1.8	1.8	1.7	36.0	28.4	31.3
Arithmetic mean	2.1	2.3	2.3	46.9	57.6	51.3

To describe the correlations between the evaluation of the impact of GIC practices on the competitiveness of the organization and their pursuance in the studied enterprises, the author used a regression analysis. Figure 2 represents a linear regression function, which specifies the development of correlations between the GIC-forming practices under the

influence of changes in the rating of their impact on the competitiveness of organizations in the study sample.

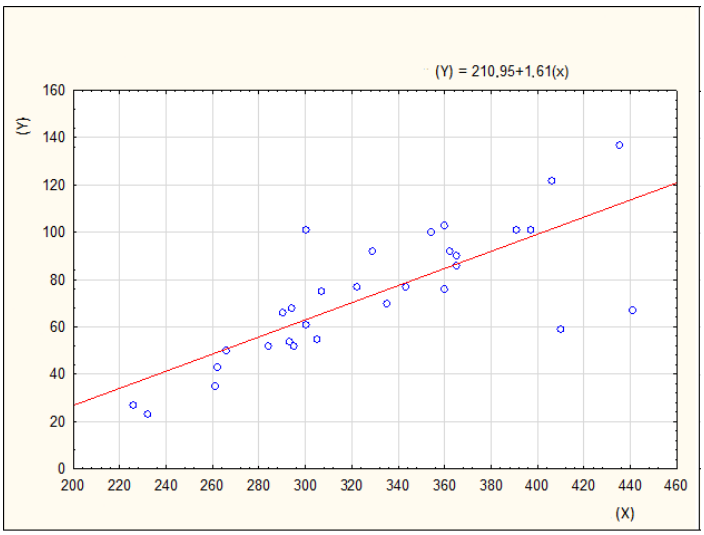

Figure 2. The correlation between the impact of GIC practices on the competitiveness of organizations (x) and their implementation in companies (y).

The linear regression model is represented by the following equation:

$$y = 1.61x + 210.95$$

The resultant regression coefficient $a_y = 1.61$ shows that, in the study population, a 1-point growth in the assessment of the impact of an activity on the competitiveness of the organization results in an average increase of its realization by 1.61. In addition, the authors conducted a regression analysis with regard to the studied entities, broken down by domestic, foreign and mixed capital. The data will serve as the basis for developing the regression models included in Appendix A. Figures 3–5 present the linear functions of regression determining the shaping of correlations between the studied variables in the individual study groups.

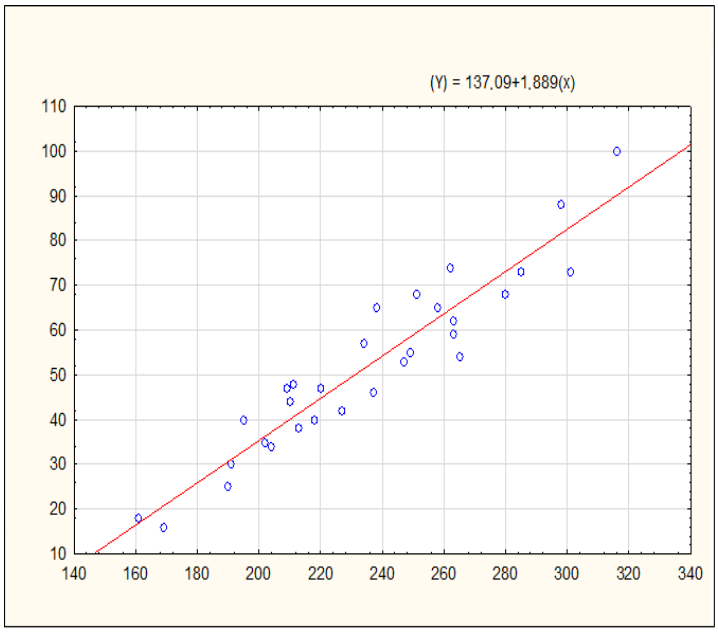

Figure 3. Regression model in the group of Polish capital entities.

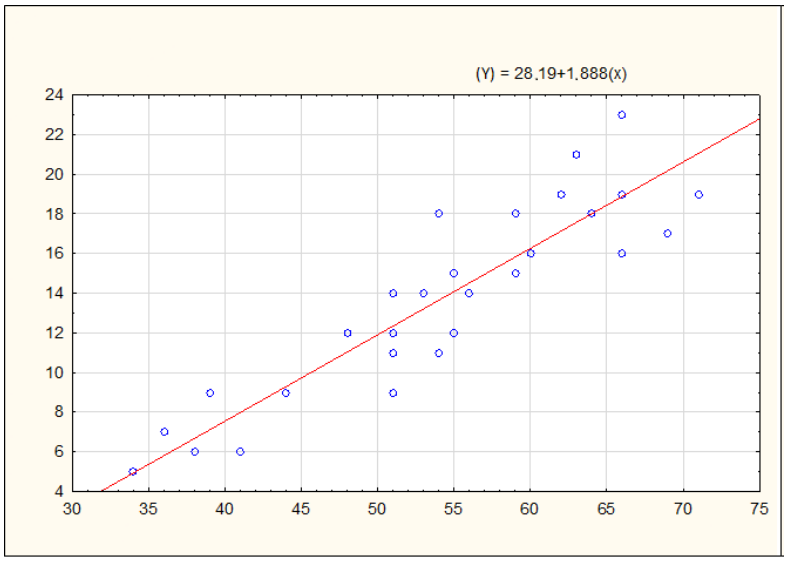

Figure 4. Regression model in the group of foreign capital entities.

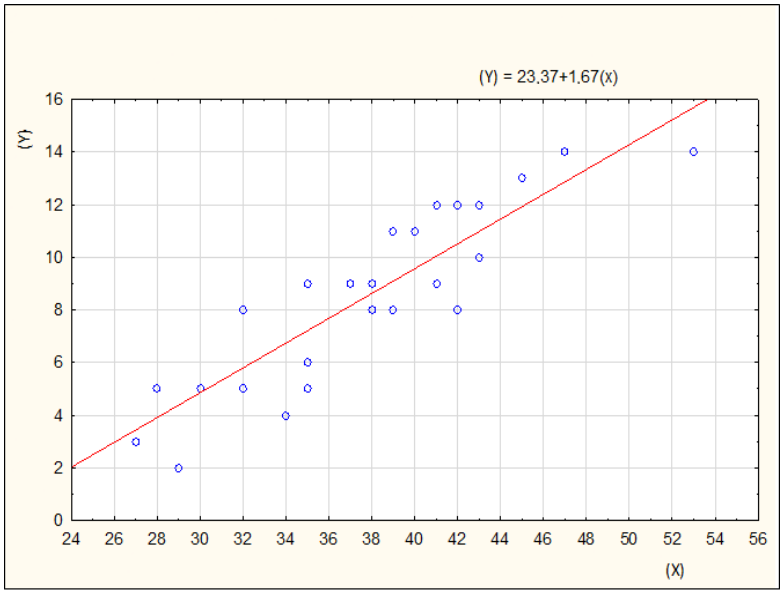

Figure 5. Regression model in the group of mixed capital entities.

The obtained regression coefficient in the group of domestic capital companies, a_y = 1.89, shows that a 1-point growth in the assessment of the impact of an activity on the competitiveness of organizations results in an average increase of its implementation by 1.89. In the event of companies with foreign capital, the reported regression coefficient was at a similar level: a_y = 1.88. Nonetheless, in the group of mixed capital organizations, the regression coefficient was lower (1.67).

5. Discussion

A competitive advantage is the ability of a company to outperform its competitors [65]. In modern economies, the main factor of a competitive advantage is IC, which is viewed as the principal strategic asset [50] and the key source of economic value [66]. Since the intangible assets it comprises are valuable, rare, and difficult to imitate, they may generate a lasting competitive edge and significant financial results [67].

The studies conducted by various authors have demonstrated that GIC, as a specific form of IC, has considerable potential as a booster of company competitiveness. Chen, in his

research conducted in SMEs in Taiwan, showed that all three forms of GIC have a powerful impact on the competitiveness of SMEs. He determined that companies that invest in green intellectual capital not only contributed to the development of green awareness in consumers but also reinforced their competitive advantages. Nonetheless, the author reported the greatest impact on an organization's competitiveness with respect to GRC [5]. The studies by Nivlouei and Khass also proved that all GIC elements, i.e., GHC, GRC and GOC, had a major relationship with and effect on a green competitive advantage [68].

Sidik et al. arrived at similar conclusions in their studies conducted amongst manufacturing enterprises in Indonesia. They proved that GIC had a positive and profound impact on the improvement of environmental performance and the development of the competitive advantages of companies in the Indonesian production industry [69]. A study by Susandya et al. also showed a correlation between GIC and a competitive advantage. The study involved 120 respondents representing Balinese financial institutes. The author found that GIC had a 17.6% impact on competitive advantages [70]. Furthermore, he reported that GHC and GOC had a positive impact on competitive advantages, whereas green GRC had no effect thereon. In this respect, the study differs from that of Chen [5].

Some authors focused on the determination of a relationship between selected assets constituting GIC and the competitive advantage. Chang and Lin proved that companies' green intangible assets were positively related to their green competitive advantages [47].

In turn, the role ofagreen strategy (an element of GOC) in developing a competitive advantage was highlighted by the studies by Zhang et al. carried out across the Chinese real estate market. They showed that an environmental strategy could support competitive advantage development or developers asit enhanced company reputation, reduced costs, yielded good land prices and increased the number of funding channels [71].

On the other hand, Crassous and Gassmann showed the importance of green marketing (an element of GRC) in the development of a competitive edge [72]. Papadas et al., in a study of over 226 Greek companies, also asserted the role of green marketing in the development of a competitive advantage [73]. Then, the research by Li et al. conducted on 500 Chinese enterprises showed that a green brand had an effect on company performance. It was reported that green branding investment could increase company efficiency in the conditions of green consumption [74].

What is more, Lin and Chen reported that green knowledge sharing and innovations with respect to green services were related to green competitive advantages [75]. Furthermore, Qiu et al., on the basis of studies on the Chinese production industry, reaffirmed that innovative ecological products were positively correlated with a competitive advantage [76]. According to Porter and Linde, green innovations play a crucial role as they allow the more productive use of a number of outlays, from resources, through energy, to workforce. In the end, such an increased productivity of resources makes firms more competitive [77].

A study on the relationship between GIC and company competitiveness was also conducted in 224 manufacturing companies in Malaysia. The study asserted that green innovation capital, GOC and GRC were positively and significantly correlated with a competitive advantage [78]. The major importance of green HRM practices in the shaping of environmental effectiveness and organizational performance has been demonstrated by studies by Jirawuttinunt and Limsuwan conducted on 242 companies holding ISO14000 certificates and located in Thailand [79].

Rezaei et al. also aimed at determining the relation between GIC (and its components) and the competitive advantage of firms. Their study sample included 27 Iranian companies. The research findings show that there is a considerable and positive correlation between green structural capital and the competitive advantage of companies. However, in this research, the correlations between GRC and GHC and competitive advantage were not remarkable [7].

On the other hand, a study conducted in Indonesia on a group of 106 listed companies showed that even though GIC had a positive impact on financial performance, its effect

was insignificant. In the opinion of the authors of the study, it was due to a lack of balance in investments in the individual elements of GIC. The researchers suggested that investing in GIC had to be sustainable for financial results to be high [80]. Similar results were also obtained by the author of this research conducted in Polish organizations. The studies confirmed that the impact of green organizational practices on the competitiveness of the companies was greater than the impact of the other components of GIC.

6. Conclusions

The analysis of the source of value of contemporary organizations reveals that tangible and financial resources are only a part of their real value. The real needs have shifted to intangible assets. Their unique combination and complex cause-and-effect dependencies allow the formation of a specific type of capital, which, on the one hand, remains invisible and, on the other hand, yields quantifiable outcomes when applied properly. The research findings presented in this paper further assert the growing importance of intellectual capital.

This research shows that GIC has an impact on the competitiveness of organizations and that the rate of impact varies according to individual practices. Furthermore, it has been established that the assessment of the relevance of individual practices fostering GIC and their practical implementation are correlated. This research demonstrates that the higher the rating of the impact of a given activity, the more frequently it is implemented in the studied companies. The analysis found that a 1-point increase in the impact of any activity stimulates an average growth of activity implementation in a company by 1.61. The established correlation may be used for predicting the purposes and the scope of implementation of GIC-supporting activities in the future. We can conclude that an increase in the assessment of the relevance of GIC practices may broaden the scope of their practical implementation. With the aim of increasing the scope of practical implementation of the GIC model in Poland, it is necessary to raise awareness of its importance among management. This is particularly essential due to a relatively limited extent of GIC practice implementation in Poland.

The analyses allowed the researchers to positively verify the hypothesis, assuming that in the case of companies with foreign and mixed capital involvement, GIC practices in the development of corporate competitiveness are considered to be more important than in domestic capital enterprises. It was noted that managers hired with foreign capital entities are more aware of the significance of GIC for the success of contemporary organizations, which was reinforced by the higher rating of the impact of GIC practices on the competitiveness of organizations and the greater scope of their implementation in those entities. The research findings allow one to suspect that the origins of company capital may have an effect on the understanding and practical use of GIC. This may be due to the fact that enterprises financed with foreign capital are more open to modern theories of management. Foreign capital favors corporate innovativeness. As far as the companies financed with Polish capital are concerned, it appears that the approach to developing the sources of competitive edge tends to follow advantages stemming from environment-friendly intangible assets. To conduct effective changes in the management model, managers must be environmentally oriented.

Nonetheless, we ought to emphasize that the process of discovering GIC and attempting to use it to generate added value has only begun to develop over recent years. GIC as an instrument for developing competitiveness is not widely applied. Thus, Polish managers have not yet developed the skill of its effective management. However, given the rising importance of environmental management, we can assume that companies that develop their competencies in the area of the sustainable management of their green intangible assets will have a chance to increase their market value. On the contrary, in the case of entities that will not be capable of acquiringa high synergy of intangible resources or implementing sustainable business strategies, the negative spread between the market valuation and the book value is likely to widen. In the opinion of the author of this article,

effective GIC management may be supported by the measurement and monitoring of green intangible assets, above all:

- Measuring the level of expenditure regarding the formation of individual GIC components;
- Analyzing sub-indices for individual GIC components (i.e., environmental trainings, ecological initiatives, ecological patents, suppliers following the principles of eco-development);
- Drafting GIC-related reports for internal and external stakeholders.

The outcomes of this research article have consequences not only for practitioners but also for scientists. They assert that further research regarding the impact of individual GIC components on the competitiveness of organizations is needed, because the corresponding research findings of various authors are ambiguous. Therefore, it is postulated that further research with the application of financial methods is conducted in order to quantify the effects of GIC on the financial performance of organizations.

7. Limitations and Future Research

Several limitations to this study need to be acknowledged. First, the research sample is restricted to managers of human resource management departments in the manufacturing industry. Therefore, further work is needed to examine other industries. Moreover, the survey refers to Polish firms. From a scientific perspective, it seems advisable to verify the research findings against the samples from other countries. Another limitation to the study is the subjectivity of respondents' opinions and a relatively small sample size.

As far as further research is concerned, it would be worth exploring the issue of GIC management effectiveness measurement and identifying the barriers to the practical implementation of the model. Such an approach would allow one to present a markedly broader context of conditions of the process of GIC management, throwing some light on the meaning of various factors in the process of model implementation. Further research could, therefore, account for the application of financial methods, enabling the quantification of the impact of GIC practices on the financial performance of organizations.

Funding: Ministry of Science and Higher Education of the Republic of Poland. UPH/No.175/23/B.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: All the data have been included in the manuscript.

Conflicts of Interest: The author declares no conflict of interest.

Appendix A

Table A1. Data on the impact of GIC practices and their implementation in organizations broken down by the form of capital ownership.

Practice No.	Companies with Polish capital		Companies with Foreign Capital		Companies with Mixed Capital	
	Aggregate Evaluation of Practices' Impact on the Competitiveness of the Organization (X)	Number of Enterprises Performing the Practices (Y)	Aggregate Evaluation of Practices' Impact on the Competitiveness of the Organization (X)	Number of Enterprises Performing the Practices (Y)	Aggregate Evaluation of Practices' Impact on the Competitiveness of the Organization (X)	Number of Enterprises Performing the Practices (Y)
1	298	88	63	21	45	13
2	316	100	66	23	53	14
3	247	53	53	14	43	10

Table A1. *Cont.*

Practice No.	Companies with Polish capital		Companies with Foreign Capital		Companies with Mixed Capital	
	Aggregate Evaluation of Practices' Impact on the Competitiveness of the Organization (X)	Number of Enterprises Performing the Practices (Y)	Aggregate Evaluation of Practices' Impact on the Competitiveness of the Organization (X)	Number of Enterprises Performing the Practices (Y)	Aggregate Evaluation of Practices' Impact on the Competitiveness of the Organization (X)	Number of Enterprises Performing the Practices (Y)
4	227	42	44	9	34	4
5	204	34	51	12	38	8
6	234	57	53	14	35	9
7	238	65	54	18	37	9
8	262	74	59	18	39	11
9	191	30	36	7	35	6
10	190	25	41	6	30	5
11	161	18	38	6	27	3
12	169	16	34	5	29	2
13	280	68	64	18	47	14
14	285	73	71	19	41	9
15	237	46	66	16	32	8
16	251	68	62	19	41	12
17	258	65	66	19	38	8
18	213	38	39	9	32	5
19	218	40	51	11	38	8
20	249	55	54	11	38	9
21	220	47	48	12	32	8
22	301	73	69	17	40	11
23	263	59	59	15	43	12
24	263	62	60	16	42	12
25	210	44	55	12	35	5
26	202	35	51	9	42	8
27	211	48	55	15	28	5
28	209	47	51	14	30	5
29	265	54	56	14	39	8
30	195	40	41	6	30	5

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