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Positioning of Galician's Seaports Depending on Their Perceived Innovative Effort

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ABSTRACT

Since the introduction of competition and the application of the principle of financial sufficiency, Spanish Port Authorities have developed their business in a highly competitive environment. Against this background, and considering that the Spanish Port System may be oversized, it seems interesting to know the position of each Port Authority by analyzing its strengths and weaknesses. The objective of this study is to conduct a comparative analysis of the Galician Port Authorities in terms of the variable "innovative effort". First we analyze its strengths and weaknesses compared to the national situation and then we carry out a comparative analysis and benchmarking between the mentioned authorities

1. Introduction

Globalization has resulted in a spectacular increase in international transactions and freight. It has also required increases in the capacity and speed of the movement of goods, accompanied by a need for lower unit costs of transport. As a result, there has been a steady increase in the international merchant fleet, both in terms of the number and the size of vessels.

Additionally, the European Transport Policy has been committed to get freight off the road encouraging, as well as the rail transport, the Short Sea Shipping (further information is available in the Marco Polo Project).

All of the above calls for the emergence of new requirements for ports, raising the need to innovate. Therefore ports, if they are to be competitive, must be able to handle (process / load / unload / transfer) large quantities of merchandise quickly, to incorporate new activities and logistic services that add value and to adopt the new requirements. In addition, they must be able to incorporate other value adding activities and logistical services.

If countries wish to be competitive, they must have a port system that allows them to be part of international supply chains. In addition, each individual port must be competitive with the other ports operating within their national port system. Therefore, competitiveness and competition must be understood from two perspectives, international and national.

In Spain, the port system is state-owned. It comprises of 44 General Interest Ports, managed by 28 Port Authorities, dependent in turn on the Public Authority of State Ports within the Ministry of Development. Since the introduction of competition and the application of the principle of financial sufficiency, Spanish Port Authorities have developed their business in a highly competitive environment. Internal competition is mainly located within the same geographical zones (North coast, Mediterranean, etc.).

Furthermore, in the Spanish case, there is another factor which introduces an additional type of competition: the concession of competences by the State to the Spanish Autonomous Communities. This concession, together with the corresponding decentralisation of decision-making, generates competition for the institutional support within each of the Autonomous Communities. Facing that situation, and consid-

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ering that the Spanish port system could be oversized, knowing the position of commercial ports and their strengths and weaknesses may be interesting.

Ideally, the best option would be to do this analysis for each of the Spanish Port Authorities and based on different positioning variables. However, this is an ambitious goal that exceeds the scope of this study.

In this case, due to innovation is said to be one of the key drivers in improving social welfare and a crucial factor in the growth and survival of long-term business (Schumpeter, 1939; Baumol 2002), the variable "perceived innovative effort of the Port Authority" will be used for positioning.

Innovation, as it was stated in previous studies, is a highly important factor for port operations (Serrano et al., 2009; Blanco et al. 2010, p.72). Therefore, we consider innovation an important factor to analyse when positioning the ports. So, if it was necessary to select which Port Authorities should "survive" considering this variable, the most innovative Port Authorities or, what is the same, those who have made a greater innovative effort would be selected.

Moreover, due to internal competition mainly appears among ports that are geographically proximate, Galician Port Authorities have been chosen for the analysis. Selection of the Port Authorities analysed has been based on geographical proximity (they are located in the same watershed) and on their belonging to the same Autonomous Community. As a result they are potential competitors, even regarding the resources of their region.

Overall, the aim of this paper is to make a comparative analysis of the five Galician Port Authorities based on their perception of their "innovative effort". First we analyse its strengths and weaknesses compared to the national situation and then we carry out a comparative analysis and benchmarking between the mentioned authorities

In order to achieve the mentioned objectives, Rasch methodology will be applied to the data obtained from a survey conducted in 2009. Specifically, PKMAPs and Guttman Scalogram will be used. Further information about these techniques could be found in the previous study of Sánchez et al. (2012) that includes a brief explanation about these tools. The computer software used to process the data was Winsteps in version 3.75 (Linacre, 2012).

2. Strengths and weaknesses analysis

This paper is based on the findings of a previous study (Sanchez et al., 2010) in which a survey was conducted among the 28 Spanish Port Authorities, having response from 25 of them. Among other aspects, Spanish Port Authorities were asked about their perception about the innovative effort they had made in each of the areas included in the question (see Appendix I).

In the above-mentioned research, as well as checking the reliability and validity of the measures related to the construct "innovative effort of Port Authorities", items were ranked. Thus, the resulting list of items ordered from highest to lowest importance was as follows (Table 1):

Table1: Item hierarchy.

Position	Item Number	Item
1	P10-1	Strategic planning
2	P10-13	Contingency plans and security systems for protecting infrastructure and the environment
3	P10-11	Information systems and certifications
4	P10-12	Plans and Protection systems
5	P10-14	Projects and construction
6	P10-3	Port services
7	P10-15	Maintenance
8	P10-10	Environmental issues
9	P10-9	Quality
10	P10-16	Promotion and Sponsorship of scientific and technological R&D
11	P10-2	Human Resources
12	P10-4	Management of concessions and authorizations
13	P10-5	Sales and marketing
14	P10-8	External relationships
15	P10-6	Finance and economics
16	P10-7	Legal services and adminitrative management

Source: Adapted from Blanco et al. (2010).

Building on this previous paper, the current objective is to know what the main strengths and weaknesses from the five Galician Port Authorities are, in comparison with the Spanish total. It is based on their perception of the effort they have made.

One of the most interesting applications offered by the Rasch methodology is the PKMAP (diagnosis map) with identifies the strengths and weaknesses of a subject based on the hierarchy made by the total sample of subjects. The program performs a comparison between the individual assessment of each item and the general assessment of items made for all subjects, see (González Aponcio et al., 2012; Oreja-Rodriguez and Montero-Muradas, 2012). The five PKMAPs from the five Galician Port Authorities (A Coruña, Ferrol, Marín-Ría de Pontevedra, Vigo and Vilagarcía) are shown in Figures 1 to 5 which are included in Appendix II.

In the present case, the program will compare the scores that each subject (Port Authority) has given to each of the 16 items that make up the construct "innovative effort made by the Spanish Port Authorities" (see Table 1), with the average score given by the 25 Port Authority to each of items. For instance, if a Port Authority scored 5 to item P10-7, it would have a strength due to the innovative effort made by this Authority in that item is much higher than the effort made by the whole set of Port Authorities. By contrast, if a Port Authority scored 1 to the item P10-1, it would have a weakness, as its innovative effort is too small in an item in which, generally, the innovative effort made is larger.

The diagnosis map is divided into six quadrants in which different items are distributed depending on the response of the subject to each of them. The intermediate area represents the level of the subject. Items which are above that level are difficult for the subject. Those who are below that level are easy items. And finally, those in the shaded area are items placed in the subject's level.

Strengths are included in the upper-left quadrant. Moved to the current study would be activities in which the Port Authority makes a larger innovative effort than the average. Weaknesses, on the contrary, are included in the bottom-right quadrant. In the present study it would contain activities in which the subject is not doing enough innovative effort.

The five PKMAPs from the five Galician Port Authorities (A Coruña, Ferrol, Marín- Ría de Pontevedra, Vigo y Vilagarcía) are shown in Figures 1 to 5 included in Appendix II. In each PKMAP, strengths are in the upper-left quadrant and weaknesses in the bottom-right quadrant, as mentioned above. Results are summarised in Table 2 which includes those ítems which are strengths and weaknesses for the Galician Ports with respect to the national result.

Table 2: Galician Ports' Strengths and weaknesses with respect to the national result according to the PKMAPs.

Ports	Strengths	Weaknesses
A Coruña	Items: 1-5-7-8-13-14-16	Items 3-4-6-9-12-15
Ferrol	Items 2-3-5-8-13-16	Items 1-6-7-9-10
Marín-Ría de Pontevedra	Items 1-3-4-8-9-12-15	Items 10-13-14-16
Vigo	Items: 2-3-4-5-9-15-16	Items 7-10-11-13
Vilagarcía	Items: 1-4-7-14-16	Items 2-5-9

Source: Authors.

Additionaly, Table 3 includes, for each of the Port Authorities, the following three data:

— Measure: It represents the average value of the distribution (the three "x" which are in the PKMAP).
— Standard deviation (S.E.): the horizontal lines represent the average value plus or minus one standard deviation, showing the level of the subject (central strip).
— And score: it is the sum of the scores given by the Port Authority to all the items. The higher the value, the better position of the Port Authority.

Table 3: PKMAP information summary.

Ports	Measure	S.E.	Score
A Coruña	1.73	0.34	61
Ferrol	1.39	0.33	58
Marín-Ría de Pontevedra	1.06	0.33	55
Vigo	0.26	0.34	48
Vilagarcía	2.09	0.35	64

Source: Authors. From the "measure" values it can be seen that the best positioned Port Authority is Vilagarcía, followed by A Coruña, Ferrol, Marín and finally, Vigo.

However, we must be careful. We should not forget that the question is about "perception" of the innovative effort made in the last previous years (2004-2008) and, as a result, subjectivity exists. Therefore, results may be influenced by company size: a lower investment in a small port may be perceived as a big effort compared to another investment which is higher is absolute terms but relatively less important. Moreover the initial situation, which may be different in every port, is not analysed. Thus, a port which had previously done a big innovative effort has to do a lower effort and this is not detected in the analysis.

3. Benchmarking analysis

Once we had analyzed the strengths and the weaknesses of the five Port Authorities regarding the overall national situation, we will compare them directly among them. We will use the information provided by the Guttman Scalogram, another tool offered by Rasch Model.

Guttman Scalogram is a two-way table: each row represents the responses of one Port Authority and the columns represent the responses to each item.

Items are listed from left to right according to their global score, being the most important item in the left. Subjects, however, are listed from top to bottom, beind the best positioned Authority located on the top. After taking the data from the Guttman Scalogram, a benchmarking analysis was done.

In table 4, taking into consideration the scores given by the five Galician Port Authorities to each of the 16 items, which integrate the construct "Innovative Effort made" (data are not included due to confidentiality) and the information from the PKMAPs, the different strengths (S) and weaknesses (W) for each Port Authority are shown. In describing the results rows and columns from the Guttman Scalogram have been reversed. As a result the most important ítem is in the first row and the best positioned Port Authority is in the left column.

Table 4: Scores given to the items by Galicians Port Authorities. Stregthns (S) and weaknesses (W) with respect to the national result.

Items' hierarchy	ITEMS	VILAGARCÍA (3)	CORUÑA (6)	FERROL (7)	PONTEVEDRA (11)	VIGO (18)
1	P10-1. Strategic planning	S	S	W	S	
2	P10-13. Contingency plans and securitysystems for protecting infrastructureand the environment		S	S	W	W
3	P10-11. Information systems and certifications					W
4	P10-12. Plans and Protection systems		W		S	
5	P10-14. Projects and construction	S	S		W	
6	P10-3. Port services		W	S	S	S
7	P10-15. Maintenance		W		S	S
8	P10-10. Environmental issues			W	W	W
9	P10-9. Quality	W	W	W	S	S
10	P10-16. Promotion and Sponsorship of scientific and technological R&D	S	S	S	W	S
11	P10-2. Human Resources	W		S		S
12	P10-4. Management of concessions and authorizations	S	W		S	S
13	P10-5. Sales and marketing	W	S	S		S
14	P10-8. External relationships		S	S	S	
15	P10-6. Finance and economics		W	W		
16	P10-7. Legal services and adminitrative management	S	S	W		W

Source: Authors.

Overall, it can be concluded that Galician Ports are not bad positioned with respect to the national total. If we analyse the data, from the 80 scores (16 scores for each of the five ports) included in Table 4, there are 32 strengths (40%); 22 weaknesses (30%); and 26 cases (30%) which are not strengths neither weaknesses.

It can be highlighted that four of the Galician Ports have a strength in the item "Promotion and Sponsorship of scientific and technological R&D" (item 16). They are also well positioned concerning the item "External relationships" (Item 8). On the contrary, on the whole they are not well positioned regarding the item "Environmental issues" (Item 10) and they are even worse positioned concerning the item "Finance and economics" (Item 6). See Tables 2 and 4.

In addition, differences between the score of each Port Authority and the average Galician score have been calculated (Table 5). Positive values, which are shaded in green, mean that the Port Authority value is higher than the average. Negative values, which are shaded in pink, mean that the Port Authority value is lower than the average. The absolute maximum and minimun values for each item are written with a larger font size. Moreover, items are ordered according to the national hierarchy from the highest to the lowest importance.

Table 5: Score differences with respect to the Galician average.

	ITEMS	VILAGARCÍA (3)	CORUÑA (6)	FERROL (7)	PONTEVEDRA (11)	VIGO (18)
1	P10-1. Strategic planning	0.8	0.8	-1.2	0.8	-1.2
2	P10-13. Contingency plans and securitysystems for protecting infrastructureand the environment	0.4	1.4	1.4	-1.6	-1.6
3	P10-11. Information systems and certifications	0.6	0.6	0.6	-0.4	**-1.4**
4	P10-12. Plans and Protection systems	0.4	-0.6	0.4	0.4	-0.6
5	P10-14. Projects and construction	1.0	1.0	0.0	-1.0	-1.0
6	P10-3. Port services	0.0	**-1.0**	**1.0**	0.0	0.0
7	P10-15. Maintenance	0.2	**-0.8**	0.2	0.2	0.2
8	P10-10. Environmental issues	0.6	**1.6**	**-1.4**	-0.4	-0.4
9	P10-9. Quality	-0.4	**-1.4**	-0.4	**1.6**	0.6
10	P10-16. Promotion and Sponsorship of scientific and technological R&D	0.8	0.8	-0.2	**-1.2**	-0.2
11	P10-2. Human Resources	-0.4	-0.4	**1.6**	-0.4	-0.4
12	P10-4. Management of concessions and authorizations	0.6	-0.4	-0.4	0.6	-0.4
13	P10-5. Sales and marketing	-0.4	0.6	0.6	-0.4	-0.4
14	P10-8. External relationships	-0.2	0.8	0.8	-0.2	**-1.2**
15	P10-6. Finance and economics	**1.0**	0.0	**-1.0**	0.0	0.0
16	P10-7. Legal services and adminitrative management	**1.8**	0.8	-1.2	-0.2	-1.2

Source: Authors.

From the results included in Table 5, it may be concluded that Vilagarcía is the best positioned, followed by A Coruña, Ferrol, Marín and Vigo, as we already concluded with the PKMAP analysis.

Taking into consideration the five Galician ports, it is concluded that:

— Vilagarcía is the best positioned concerning items 6 (Finance and economics) and 7 (Legal services and administrative management) and it does not have any weaknesses. It scores above the average in 11 items and below the average in 4 items.

— A Coruña is the best positioned concerning item 10 (Environmental issues) and it is the worst positioned in items 3 (Port Services), 9 (Quality) and 15 (Maintenance). It scores above the average in 9 items and below the average in 6 items.

— Ferrol is the best positioned in items 2 (Human resources) and 3 (Port services) and the worst positioned in items 6 (Finance and economics) and 10 (Environmental issues). It scores above the average in 7 items and below the average in the other 7 items.

— Marín- Ría de Pontevedra is the best positioned in item 9 (Quality) and the worst positioned in item 16 (Promotion and Sponsorship of scientific and technological R&D). It scores above the average in 5 items and below the average in the other 9 items.

— Finally, Vigo is the worst positioned in items 8 (External relationships) and 11 (Information systems and certifications). It scores above the average in 2 items and below the average in 11 items.

The position of Vilagarcía, A Coruña and Ferrol is better in the Galician comparison (they have more strengths); whereas Pontevedra and Vigo worsen their strategic position with respect to the national comparison.

4. Conclusions

The present study analyses the positioning of five Galician Port Authorities: A Coruña, Ferrol, Marín- Ría de Pontevedra, Vigo y Vilagarcía. First the strengths and weaknesses of each authority over the whole of Spanish Port Authorities have been identified. Secondly, a benchmarking analysis was performed among the five Galician Port Authorities.

Overall the positioning of the Galician ports with respect to the other national Port Authorities is not bad, having strengths in 40% of the cases and weaknesses in 30% of the cases.

The best positioned is Vilagarcía, followed by A Coruña, Ferrol, Marín and, finally, Vigo. This classification is maintained both in the national and in the Galician comparison.

Vilagarcía, A Coruña and Ferrol are better positioned in Galicia than in the Spanish case, whereas Marín and Vigo are worse in Galicia than in the Spanish case, that is they are better positioned in Spain than in Galicia.

Overall, the Galician ports have strengths in "Promotion and Sponsorship of scientific and technological R&D" and "External relationships". On the contrary, they could have a weakness in "Environmental issues" and "Finance and economics".

References

Arévalo Quijada, M.T.; Castro Nuño, M. and Castillo Manzano, J.I. (2005): El sistema portuario español ante los cambios legislativos de la década de los noventa. *XII Encuentro de Economía Pública: Evaluación de las Políticas Públicas*, 3-4 February, Palama de Mallorca, Spain.

Baumol, W.J (2002) *The Free-Market Innovation Machine*. Princeton: Princeton University Press.

Blanco, B.; Pérez-Labajos, C.; Sánchez, L., Serrano. A.; López, M. and Ortega, A. (2010): Innovation in Spanish port sector, *Journal of Maritime Research* 7 (1), 71-86.

Blanco, B.; Sánchez, L.; Pérez-Labajos, C. and Serrano. A.M. (2011): Financing and development of Innovation in commercial sea ports, *Journal of Maritime Reseach,* 8(2), 75-90.

Febles Acosta, J. (Coord.) (2008): *Los Modelos de Rasch en Administración de Empresas*. *Aplicaciones avanzadas*. Santa Cruz de Tenerife: Fundación FYDE-CajaCanarias.

González Aponcio, Z., Calvo Aizpuru, M. and Oreja-Rodríguez, J.R. (2012): Situación de las PYMES para generar valor en las actividades internas con TI. una aproximación con el diagrama KIDMAP. In: Oreja-Rodriguez, J.R. and Febles Acosta, J. (Eds.) *Modelos de Rasch en Administración de Empresas. Técnicas de diagnóstico y posicionamiento.* Santa Cruz de Tenerife: Fundación Fyde Cajacanarias, 151-169.

Linacre, J. M. (2012): *Winsteps® Rasch measurement computer program User's Guide*. Beaverton, Oregon: Winsteps.com

Oreja Rodríguez, J.R. (2005): *Introducción a la medición objetiva en Economía, Administración y Dirección de Empresas: El Modelo de Rasch. IUIDE. Documento de Trabajo. Serie Estudios 2005/47.* Santa Cruz de Tenerife: Instituto Universitario de la Empresa de la Universidad de la Laguna.

Oreja-Rodríguez, J.R. and Montero-Muradas, I. (2012): El uso del KIDMAP como soporte del benchmarking de diagnóstico en el análisis competitivo de las empresas. Estudio de casos de empresas partipantes en una cadena de suministros agroalimentaria. In: Oreja-Rodríguez, J.R. and Febles Acosta, J. (Eds.) *Modelos de Rasch en Administración de Empresas. Técnicas de diagnóstico y posicionamiento.* Santa Cruz de Tenerife: Fundación Fyde CajaCanarias, 31-60.

Sánchez, L.; Blanco, B. and Pérez-Labajos, C. (2012): Rasch Model as a Tool for Strategic Positioning of Commercial Seaports. *Journal of Maritime Research* 9(2), 23-28.

Sánchez, L.; Blanco, B.; Serrano, A.M. and Pérez-Labajos, C.A. (2010): *La innovación en los puertos comerciales españoles. Análisis con Metodología Rasch*. In: Oreja-Rodríguez, J.R. and Febles Acosta, J. (Eds.). *Modelos de Rasch en Administración de Empresas. Nuevos desarrollos.* Santa Cruz de Tenerife: Fundación Fyde CajaCanarias.

Schumpeter, J.A. (1939). *Business Cycles: A Theoretical, Historical and statistical Analysis of the Capitalist Process*. New York: McGraw-Hill.

Serrano, A.M.: Blanco, B. and López, M.C. (2009): *La innovación en el sector portuario español*. Santander: Puertos del Estado.

APPENDIX 1: Question 10

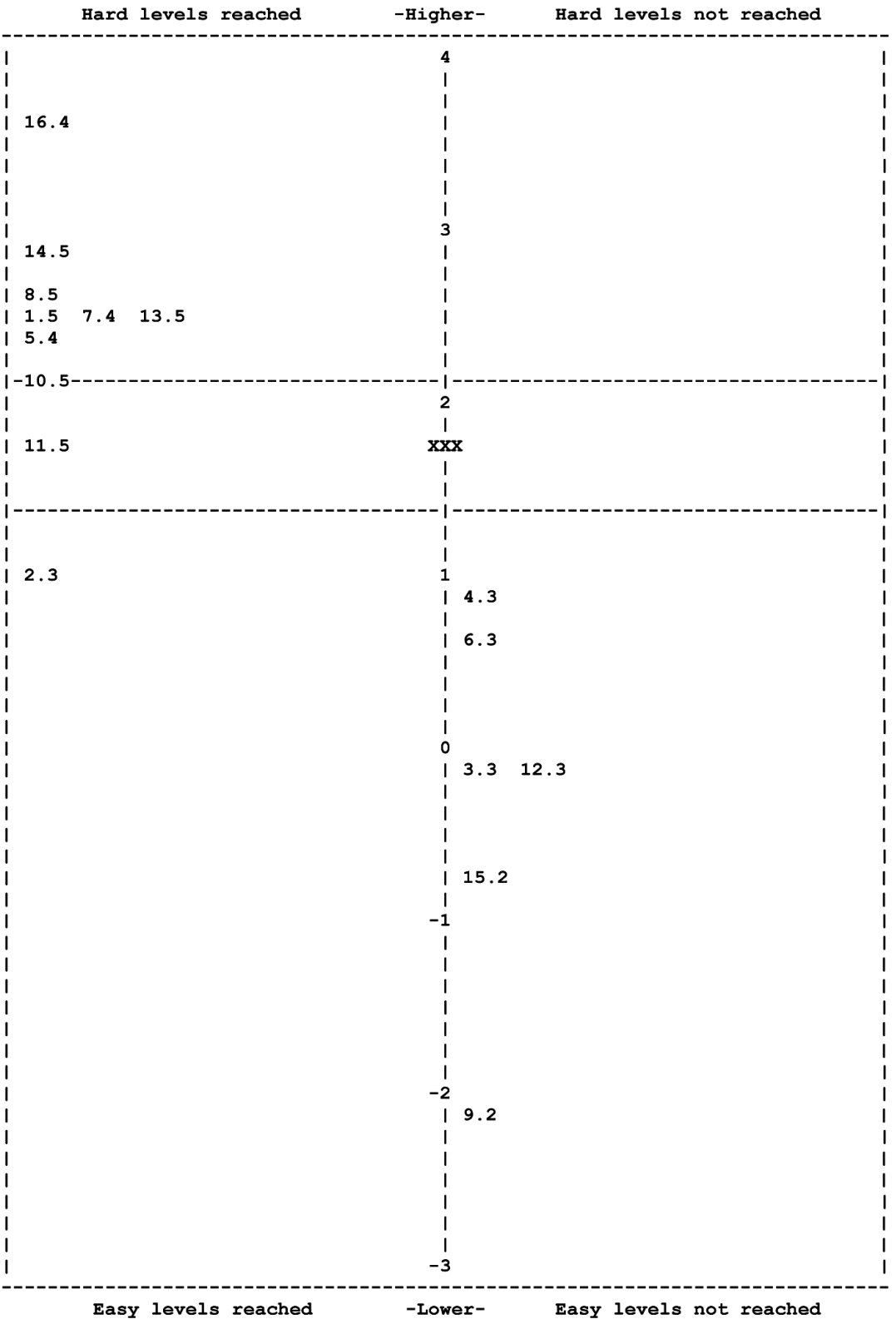
According to your point of view, and with reference to the last five years (2004-08), give a score between 1 (no effort) and 5 (extremely high level of effort) for the degree of effort to innovate that has been developed within the Port Authority in the following areas:

1	Strategic planning (business plan development, annual reports, planning for the use of port areas, objective monitoring, etc.)
2	Human resources (selection, training, internal promotion, labor relations, etc.)
3	Port services (the control of operations, the regulation of services, etc.)
4	Management of concessions and authorizations
5	Sales and marketing (Searching for new traffic, relationships with clients, carrying out studies, etc.)
6	Finance and economics (economic management, coordination and budgeting, internal financial control, etc.)
7	Legal services and administrative management (e-administration)
8	External relationships (corporate image, web, community relationships with the port and city communities).
9	Quality (quality systems and certifications, etc.)
10	Environmental issues (environmental impact, sustainability, waste management, certifications, etc.)
11	Information systems, communication and control systems (IT, telematics, cameras and sensors, etc.)
12	Plans and Protection systems (ships and port facilities)
13	Contingency plans and security systems for protecting infrastructure and the environment (port operations and services, monitoring and forecasting of environmental effects).
14	Projects and construction (the design and development of new infrastructure and port facilities).
15	Maintenance (the management of a preventive maintenance plan and a plan for the maintenance of infrastructure)
16	Promotion and Sponsorship of scientific and technological R & D within the port (agreements with universities or research centers, research grants and doctoral programs and the development of patents, etc.)

Source: Authors.

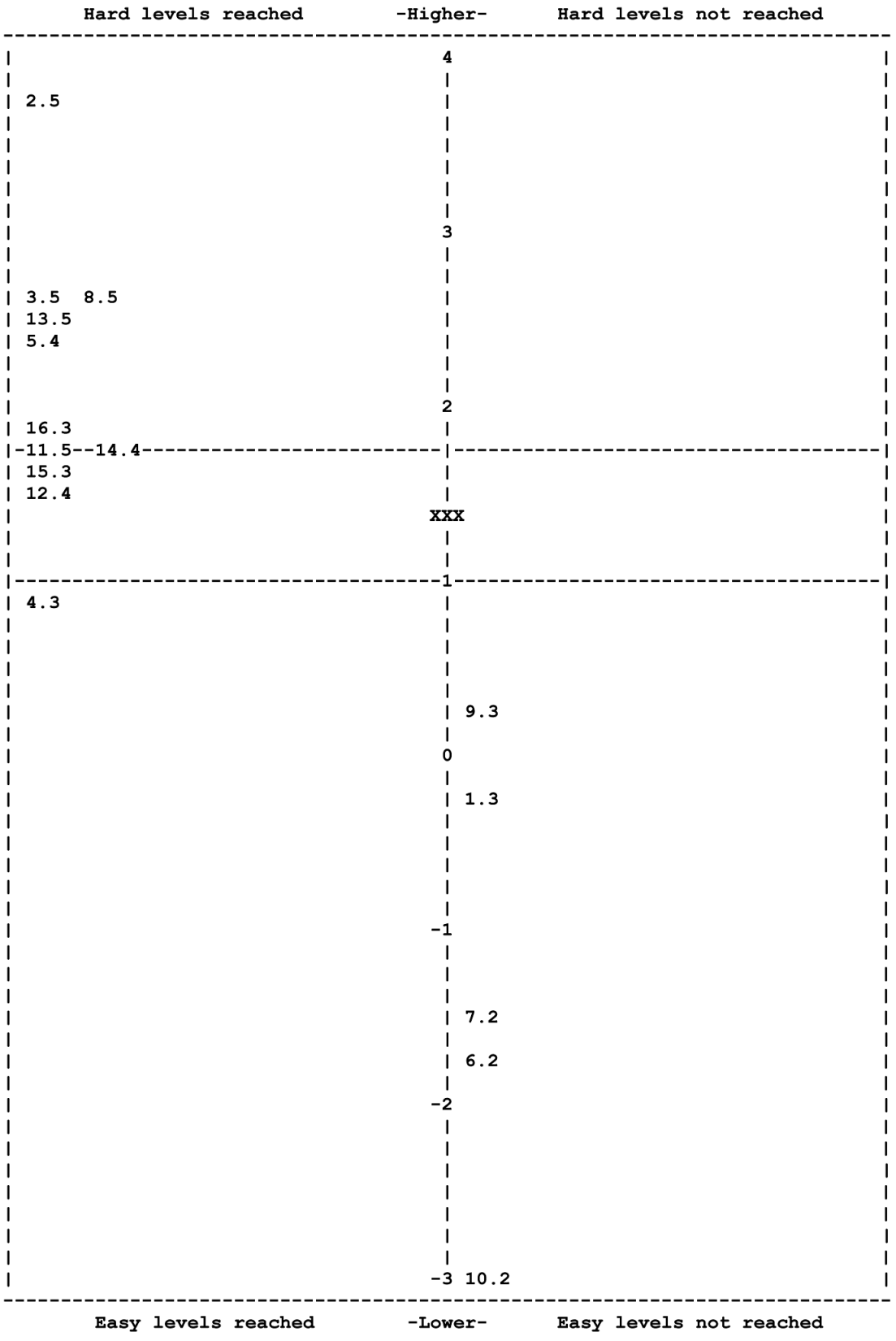
APPENDIX 2: Galicians Seaports Pkmaps

Figure 1: A Coruña Pkmap.



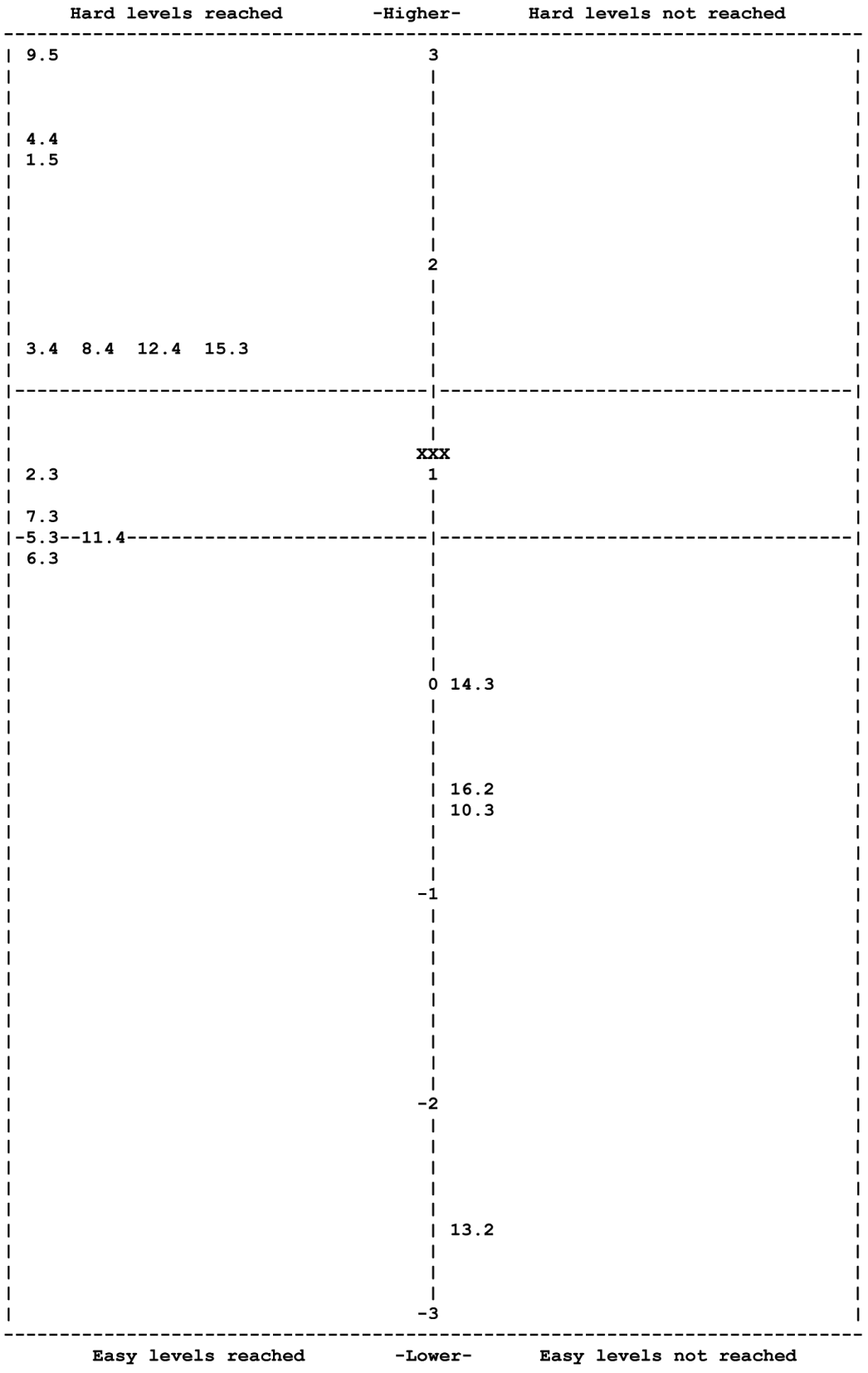
Source: Authors.

Figure 2: Ferrol Pkmap.



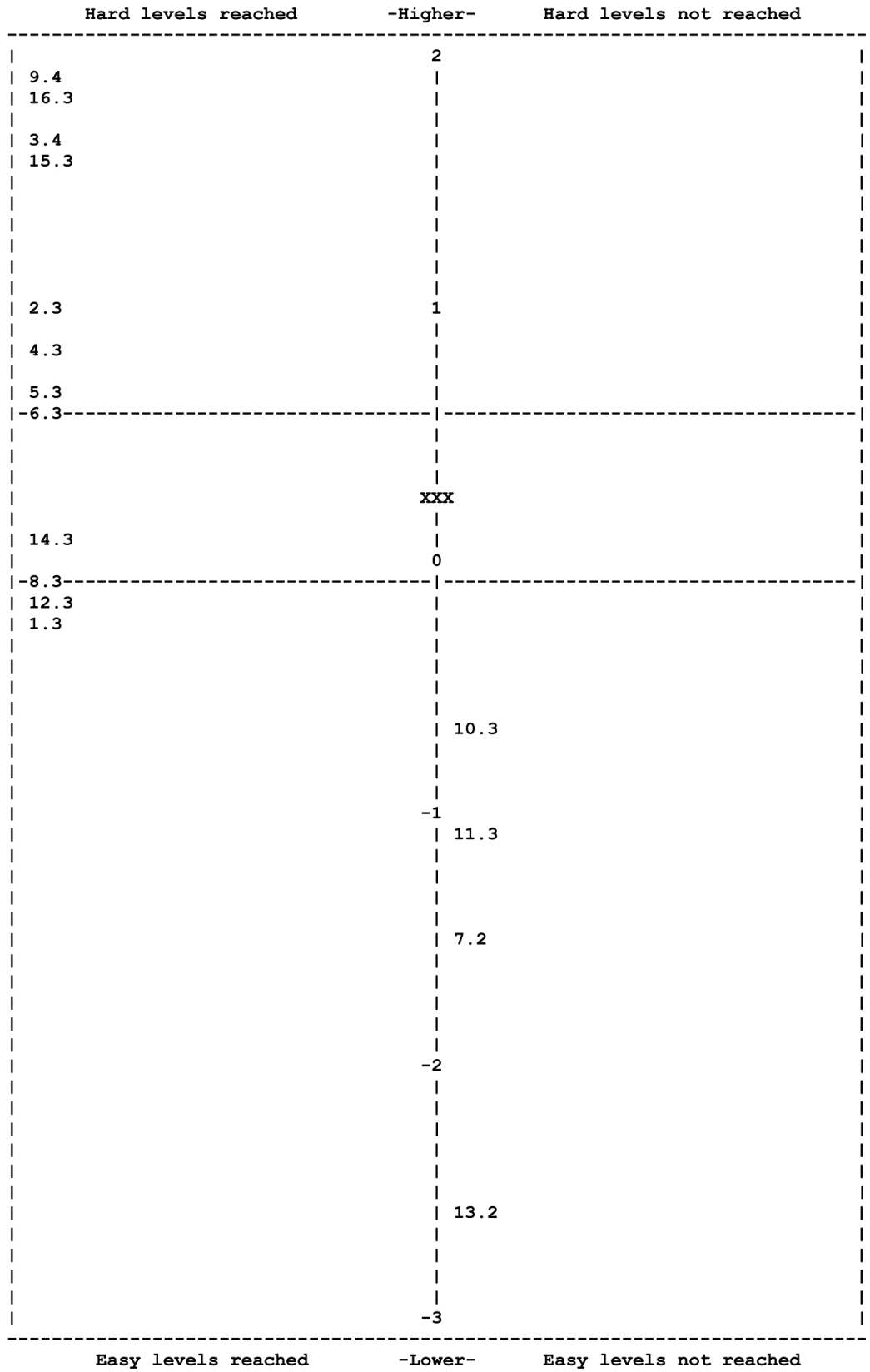
Source: Authors.

Figure 3: Marin - Pontevedra Pkmap.



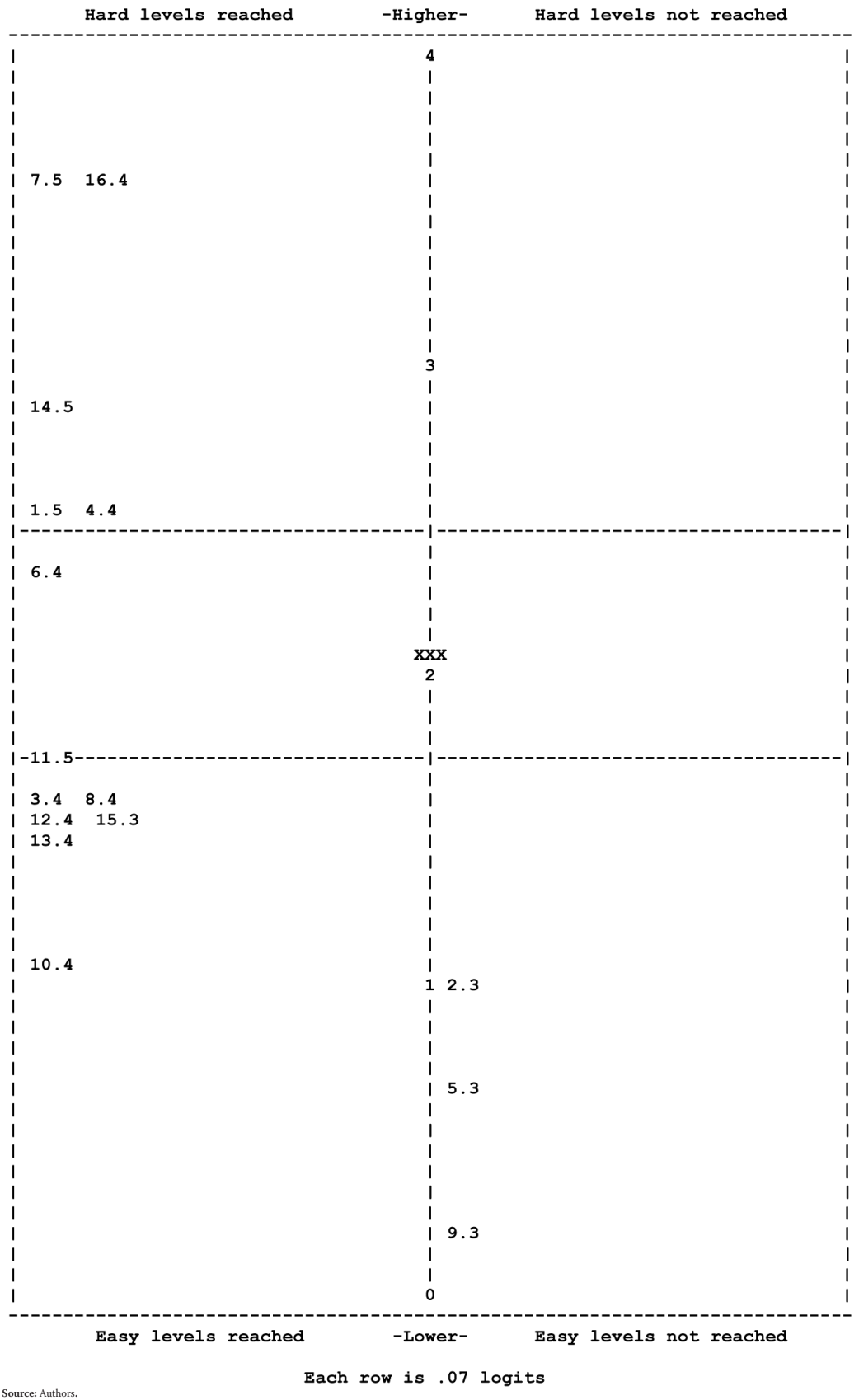
Source: Authors.

Figure 4: Vigo Pkmap.



Source: Authors.

Figure 5: Villagarcía Pkmap.



Source: Authors.