18 Labour in the Brazilian shipbuilding industry

A contribution to an analysis of the recovery period

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Introduction

This chapter analyses the changes that took place in labour relations and activities within the Brazilian shipbuilding industry during the recovery in activity in the main shipyards from the late 1990s. The study has three central parts: first, the start and increase in the regional employment decentralisation process in the country's shipbuilding industry; secondly, it considers variables, mainly those linked to the number of jobs, education level, time working in the same company, age, and wage rate; the third part analyses information regarding manpower costs and productivity.[1]

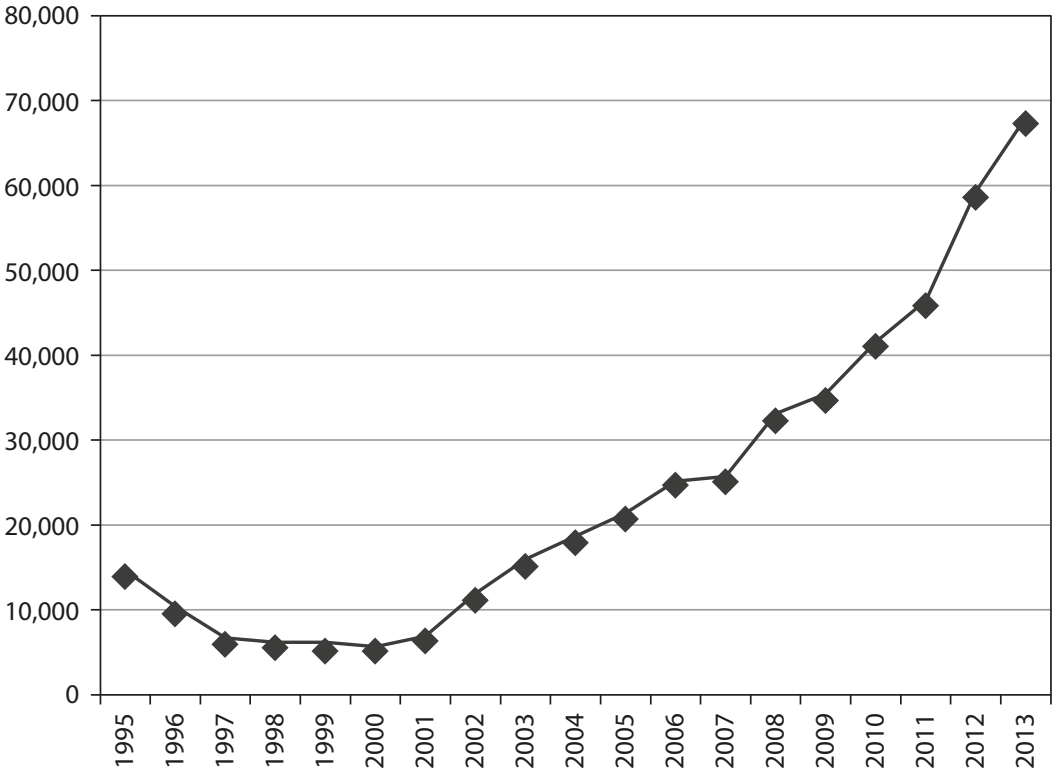
The Brazilian shipbuilding industry has passed through distinct stages during its development. The period from the mid-1950s through to the early 1980s witnessed the sector's structural development, growth, and peak;[2] thereafter, during the 1980s and 1990s, the industry faced a marked drop in production and in employment leading to the closure of a number of shipyards.

In the late 1990s, government policies promoted the sector's recovery in Brazil. The Brazilian government stimulated production through orders from the state-owned Petrobras/Transpetro monopolies, and the state demanded minimum local-content percentages in oil and gas exploration

1 The main sources utilised in this chapter, besides the technical literature, are the Work and Employment Ministry Annual List of Social Information-RAIS/MET Database and interviews with key industry personnel. In order to set methodological information, data from RAIS/MET was used to verify information about shipbuilding workers at year-end (31 December) in Brazil from 1995 to 2010. It is important to highlight that due to changes in the National Classification on Economic Activities (CNAE), in 2006, the shipbuilding labour categories were adjusted. In this chapter I used the following categories: CNAE 1.0 (between 1995 and 2005); CLASS 35114 – construction and recovery of ships and floating structures; CLASS 35112 – construction and recovery of ships for sports and leisure); CNAE 2.0 (since 2006): CLASS 30113 – construction of ships and floating structures; CLASS 30121 – construction of ships for sports and leisure; CLASS 33171 – ship maintenance and recovery.

2 In steel processing volume.

Figure 18.1 The number of jobs in the Brazilian shipbuilding industry, 1995-2013



Note: RAIS/MET: for 1995 to 2005 – CNAE 1.0 (CLASS 35114 – construction and recovery of ships and floating structures and CLASS 35122 – construction and recovery of ships for sports and leisure); from 2006 – CNAE 2.0 (CLASS 30113 – construction of ships and floating structures: CLASS 30121 – construction of ships for sports and leisure and CLASS 33171 – ship maintenance and recovery). All the attributes describe the situation of those who were working on 31 December of that year
Source: Data from RAIS/MET from 1995 to 2013 (Group 301, CNAE 1.0 and CNAE 2.0)

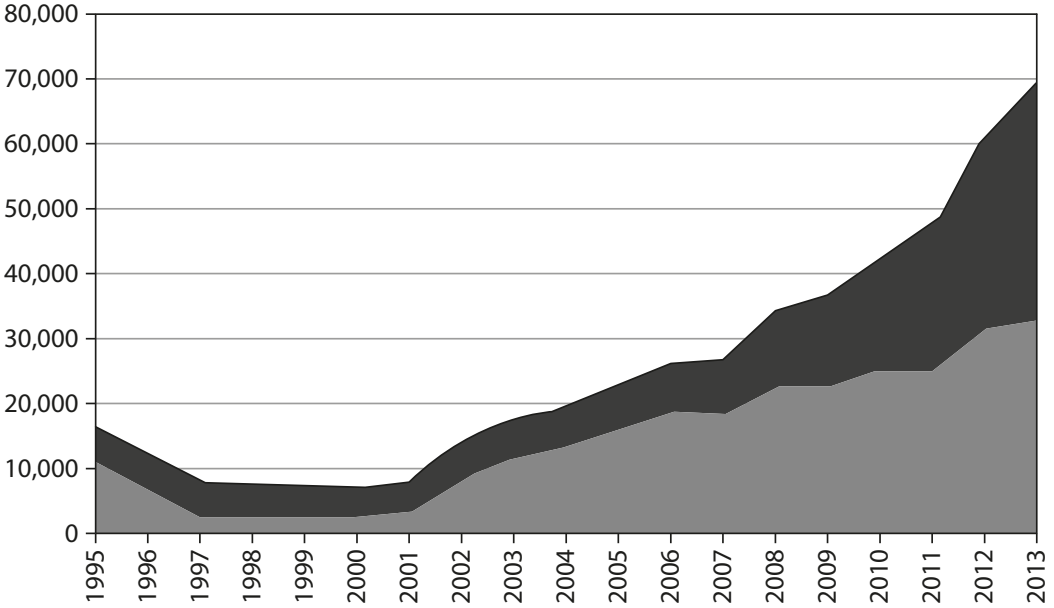
and production activities, and promoted tax and credit incentives from the Merchant Marine Fund (Fundo de Marinha Mercante, FMM).[3]

The current study highlights the definition of the Brazilian shipbuilding industry as a collection of small and medium-sized shipyards.[4] Within the production chain, shipyards are responsible for the construction and assembling of ships often involving complex production processes. Employment

3 The FMM is the accounting fund used to provide resources to merchant navy and shipbuilding industry development. Its basic source is the Additional Freight and the Freight for Merchant Navy Recovery (AFRMM) fees paid for waterway transportation of any nature and unloaded in a Brazilian harbour, i.e., a fee paid based on goods' cabotage and importation activities. See Dores, Lage, and Processi, "A retomada da indústria naval brasileira".

4 According to the CNAE, the shipbuilding industry is part of the transformation industry within the metal-mechanical sector within Transportation Equipment Manufacturing. Thus, shipbuilding workers are also called steelworkers.

Figure 18.2 Jobs in the Brazilian shipbuilding industry in Rio de Janeiro state, 1995-2013



Source: Data from RAIS/MET data between 1995 and 2013 (Group 301, CNAE 1.0 and CNAE 2.0)

peaked during the 1970s at approximately 39,000 workers, and thereafter declined to the year 2000 when just over 5,000 workers remained in the sector. However, in the subsequent recovery period, there were more than 68,000 workers by 2013 (see Figure 18.1).

The increase and start of the decentralisation of employment in the Brazilian shipbuilding industry

From 1995 to 2013, there was a significant increase – 464.2 per cent – in the number of workers in the shipbuilding industry in Brazil. Employment rose from 14,700 workers in 1995 to 68,000 in 2013 (see Figure 18.1). Throughout the period analysed, there were distinct moments. There was reduction and expansion in numbers employed. First, between 1995 and 2000, during the crisis period, there was a 257 per cent reduction – from 14,700 to 5,600 workers. At this time, the shipyards were closing. The recovery arrived after 2000 when the number of jobs constantly increased.

When we observe the distribution of these workers within the Brazilian states, their concentration in Rio de Janeiro state is clear. This state is the origin of the sector, and historically it hosted most of the shipyards. In 1995, the percentage of workers in Rio de Janeiro went from 74 per cent of

Table 18.1 Employment distribution, by state, in the Brazilian shipbuilding industry, 1995 and 2013

Position	State	1995	%	2013	%
1	Rio de Janeiro	10,906	74.40	32,476	47.73
2	Pernambuco	80	0.55	11,027	16.21
3	Santa Catarina	360	2.46	6,029	8.86
4	São Paulo	1,425	9.72	3,522	5.18
5	Amazonas	231	1.58	2,416	3.55
	Others	1,657	11.30	12,572	18.48
	Brazil	14,659	100.00	68,042	100.00

Source: RAIS/MET data 1995 and 2013 (Group 301, CNAE 1.0 and CNAE 2.0)

the national total to approximately 48 per cent, in 2013 (Figure 18.2 and Table 18.1).

Although shipyards were concentrated in the state of Rio de Janeiro, the state had a small loss in its participation during the years analysed (Figure 18.2) with state investment transferred mainly to the north-east region, and from 2007 particularly to the state of Pernambuco.

In Table 18.1, we can observe the percentage of employment from the five main states in 1995 and 2013, i.e., Rio de Janeiro, Pernambuco, Santa Catarina, São Paulo, and Amazonas. Pernambuco stands out for its sharp growth. Until 2007, it had virtually no representation in the industry. However, when the Atlântico Sul Shipyard (EAS) began its activities in 2008, it hired more than 1,500 workers in its first year.[5] In 2013, it reached 16.2 per cent of the total employment in the industry and occupied the second position in the national ranking.

Santa Catarina and São Paulo states had historical representation within the shipbuilding industry because they hosted important shipyards such as Itajaí (1996) and Navship (2005) as well as the old Wilson Sons Shipyard (SP), which had been operating since 1937. Amazonas state stands out for its large amount of small and medium-sized shipyards.

5 In 2010, 4,748 workers were registered in the EAS/PE.

Table 18.2 Percentage distribution of workers within the Brazilian shipbuilding industry according to time working in the same company, 1995-2010

Year	Up to 2.9 months	From 3.0 to 5.9 months	From 6.0 to 11.9 months (1/2 to 1 year)	From 12.0 to 23.9 months (1 to 2 years)	From 24.0 to 35.9 months (2 to 3 years)	From 36.0 to 59.9 months (3 to 5 years)	60.0 to 119.9 months (5 to 10 years)	120 months or more (10 years or more)	Total number of workers
1995	4.48	5.10	11.04	20.17	9.05	14.75	20.67	14.70	14,659
1996	10.33	5.53	8.33	14.12	15.41	10.93	21.71	13.56	10,428
1997	10.45	12.80	13.49	14.33	10.63	14.57	16.74	6.94	6,725
1998	8.22	10.25	18.26	19.26	8.92	14.05	12.83	8.16	6,178
1999	9.45	12.46	17.85	17.17	13.87	12.84	9.93	6.33	6,180
2000	14.87	9.83	17.94	18.67	9.50	12.54	10.22	6.37	5,696
2001	14.12	14.60	19.57	17.80	9.57	10.12	9.16	5.07	6,900
2002	9.66	10.32	26.81	26.44	10.88	6.54	6.29	3.04	11,961
2003	11.08	10.82	22.19	23.66	15.34	9.46	5.11	2.33	15,970
2004	9.23	7.35	21.35	23.33	14.95	16.30	5.46	1.96	18,692
2005	11.35	7.48	16.71	21.33	15.31	18.10	7.41	2.18	21,381
2006	10.90	12.14	12.78	19.15	13.31	18.17	11.47	2.10	25,138
2007	9.93	8.49	13.92	19.25	12.91	18.07	14.81	2.60	25,739
2008	8.84	13.50	20.30	16.19	10.35	13.72	14.79	2.26	33,112
2009	11.43	7.79	15.23	24.41	10.68	12.53	15.62	2.26	35,431
2010	10.27	10.82	16.62	18.23	13.96	12.17	14.98	2.89	41,554

Source: RAIS/MET data between 1995 and 2010 (Group 301, CNAE 1.0 and CNAE 2.0)

Time working in the same company, age, education level, and wage rate in the Brazilian shipbuilding industry

Another trend that can be observed is the reduction in the time workers remained in the same company throughout the period, indicative of high manpower turnover in an industry, which responds to the demand cycle with a propensity to use short-term working contracts. Between 1995 and 2010, the percentage of workers who stayed five years or more in the same company went down from 35.4 per cent to 15 per cent, whereas employees who stayed up to two years went up from 23.8 per cent to 26.1 per cent (Table 18.2).

By analysing the changes in the workers' age distribution in the Brazilian shipbuilding industry during the period, we can observe an increase in the number of younger individuals. On the other hand, we can highlight the increase in the number of workers over 50 years old. Between 1995 and 2010, employees up to 29 years old increased from 9.3 per cent to 17.8 per cent. In 1995, more than 67 per cent of employees were concentrated in the age group between 30 and 49; this scenario has changed and the number had dropped down to approximately 46 per cent in 2010. A decrease both in the length of employment contracts and in workers' age have led to younger workers in Brazilian shipbuilding.

Regarding Table 18.3 on wage evolution, in the period analysed there was a strong increase in the number of workers who earn five or fewer minimum wages; in all together they jumped from 32.6 per cent to 74 per cent, whereas all ranges regarding workers who have earned more than five minimum wages had diminished. In 1995 they were almost 66 per cent and in 2002, just 21.5 per cent of the total. In 1995, the higher percentage of workers, 26.3 per cent, was within the range of wages above seven and up to ten minimum wages. This group went down to just 5 per cent of the total. In 2010, the situation changed the range with the higher percentage – 21.6 per cent – which corresponds to employees who earn between two and three minimum wages. We concluded that there was a significant reduction in shipbuilding workers' incomes, in minimum wages, during the period. However, it is salient to note the increase in the minimum wage values in the country between May 1995 and January 2010, a real accumulated increase of 71.8 per cent.[6]

6 From May 1995 to January 2010, as reported by Jesus, "Retomada da indústria de construção naval brasileira", 113, the minimum wage had a nominal adjustment of 410 per cent and an adjustment of approximately 197 per cent according to the INPC-IBGE.

Table 18.3 Percentage distribution of workers in the Brazilian shipbuilding industry in minimum wages, 1995-2010

Year	Up to 2.00 m.w.	From 2.01 to 3.00 m.w.	From 3.01 to 4.00 m.w.	From 4.01 to 5.00 m.w.	From 5.01 to 7.00 m.w.	From 7.01 to 10.00 m.w.	More than 10 m.w.
1995	8.93	8.46	8.06	7.15	17.03	26.26	22.61
1996	14.35	14.1	11.17	10.93	14.25	18.65	12.91
1997	16.03	19.57	12.73	8.50	20.48	14.5	8.09
1998	19.95	21.19	14.08	11.25	17.21	9.21	6.82
1999	20.84	19.51	16.30	10.95	17.91	7.54	6.70
2000	22.70	23.87	15.26	12.78	12.48	6.27	6.46
2001	22.12	21.35	15.46	15.35	14.22	6.12	5.27
2002	14.15	17.42	13.29	17.44	22.8	8.02	6.81
2003	11.53	15.40	14.32	20.07	22.44	9.23	6.89
2004	12.45	14.14	14.58	13.88	24.01	11.05	8.59
2005	13.10	15.18	17.46	13.92	22.53	8.60	6.77
2006	13.85	17.19	15.58	14.42	21.82	7.81	6.35
2007	16.97	18.44	17.42	14.18	16.89	6.21	5.74
2008	18.13	18.16	17.78	16.55	14.50	5.52	5.75
2009	21.37	19.03	17.83	15.01	12.16	4.74	5.55
2010	19.61	21.57	18.35	14.47	11.30	4.54	5.67

Source: RAIS/MET data between 1995 and 2010 (Group 301, CNAE 1.0 and CNAE 2.0)

Training of workers in the Brazilian shipbuilding industry varies from shipyard to shipyard. Manpower levels in shipyards have a significant impact on productivity and ship production.[7] The division of labour within Brazilian shipyards was based on the master-apprentice relationship. Thus, it is linked to a vertical organisation in which the professional groups clearly reflect the education level achieved.

Usually, a worker starts his career in shipbuilding as a "freshman" worker, directly after training. For instance, in the BrasFels shipyard in Angra dos Reis, the worker begins as an assistant and takes steps upward until achieving the "in charge of" position. It is highlighted that, in this shipyard, workers follow a functional progression set by the job category's collective agreements as described by Paulo Inácio Furtuozo:

> even by the power of the agreement, our collective agreement, just for you to have an idea, a young worker who starts as assistant, he has a complete scale to get the "in charge of" position; this will depend on him alone [...]

7 Marins, "Técnicas avançadas em planejamento e controle da construção naval", 31.

> he starts up and within two years he already has to become official, in his third year he becomes a professional and then professional 1, professional 2, and after that leader, master and "in charge of". The last criterion in there is a test and the attendance, punctuality.[8]

Training among shipbuilding workers is, to a great extent, characterised by learning by doing. The professional training based on real working practices remains the practical way of transmitting knowledge and skills, mainly in cases of master workers (or "in charge of" ones) responsible for part of the production process.

When the shipyards were relaunched, it was observed that this kind of shipbuilding culture was valorised. Brazil and mainly Rio de Janeiro state – due to its background in the industry – have specialised manpower trained on the shop floor. An example is the case of Angra dos Reis workers. When the BrasFels shipyard was reopened, the masters and the more experienced workers, who had been dismissed when the Verolme shipyard was closed in 1990, were all hired back by the new shipyard in order to work in their old positions. Since the recovery period, these expert workers have also been contracted by the new shipyards such as the Atlântico Sul Shipyard – EAS – in Pernambuco, which invited workers from Rio de Janeiro to work there.

In regard to shipbuilding culture and its technology in the Brazilian shipyards, Roberto Coelho Gonçalves, EISA CEO, highlighted in a 2011 interview that:

> This is a thing which is sophisticated; Brazil had produced vessels since the 1950s, so experience has accumulated. Many people, initially, left Brazil, studied abroad, [and] brought the technology back here.

However, he highlighted that, as there are few records and documents regarding the working processes, a lot can be lost.

Almost all shipyards have their own professional training and employee development systems. According to the employers' organisation, SINAVAL,[9] the amounts invested are not reported publicly because of commercial confidentiality. Training is crucial. Although the shipyards do their own training, they prefer people with some education and technical background.

8 Paulo Inácio Furtuozo, interviewed 2 December 2011.

9 Sindicato Nacional da Indústria da Construção e Reparação Naval e Offshore, the national association representing shipbuilding, ship repairing and offshore work in Brazil: SINAVAL, *Report 2010*, 10.

Table 18.4 Percentage distribution of Brazilian shipbuilding workers by education level, 1995-2010

Year	Elementary school not finished	Elementary school finished	High school not finished	High school finished	College (finished or unfinished)	Total %	Total number
1995	54.84	17.92	5.57	14.01	7.18	100.00	14,659
1996	59.51	17.42	6.20	11.20	5.47	100.00	10,428
1997	51.49	23.15	7.12	12.24	5.62	100.00	6,725
1998	48.23	22.17	8.75	15.51	5.19	100.00	6,178
1999	43.20	27.35	9.75	14.24	5.39	100.00	6,180
2000	42.45	26.87	8.00	16.24	6.41	100.00	5,696
2001	42.86	26.81	7.78	16.42	6.09	100.00	6,900
2002	35.67	29.55	8.50	20.48	5.78	100.00	11,961
2003	34.84	28.03	8.50	22.57	6.04	100.00	15,970
2004	31.81	28.35	8.51	25.21	6.1	100.00	18,692
2005	31.52	25.55	9.60	27.42	5.88	100.00	21,381
2006	30.93	24.33	9.48	28.85	6.32	100.00	25,138
2007	30.26	21.44	10.27	31.57	6.36	100.00	25,739
2008	26.04	20.69	9.92	36.57	6.71	100.00	33,112
2009	23.60	19.15	10.06	39.85	7.27	100.00	35,431
2010	22.30	17.39	9.91	42.60	7.72	100.00	41,554

Source: RAIS/MET data between 1995 to 2010 (Group 301, CNAE 1.0 and CNAE 2.0)

Speaking a second language is especially important to working in areas such as project development and sales, since the technical documentation is often in English. Speaking a second language is fundamental to shipbuilding engineers and, in many cases, to the master workers.

Table 18.4 shows the range of employees who have finished high school. They increased from 14 per cent to 42.6 per cent within the period. Yet, it shows the concentration of such workers in 2010. The range corresponding to workers who finished elementary school (17.9 per cent) and to the group with college graduation (7.2 per cent) remained relatively stable (Table 18.4). It is also worth highlighting that the number of workers with post-graduate degrees (master's degree and/or PhD) remained low, going up from 0.01 per cent to 0.04 per cent within the period.[10] In 1995, there was only one PhD professional; fifteen years later, there were eleven with master's degrees and three with PhDs.

10 In Table 18.4, data correspond to post-graduate individuals who are within the range of graduate workers, in view of their reduced number.

By analysing the income and education level rates, by comparing Tables 18.3 and 18.4, it is possible to see that those who had finished or were studying for college degrees together ranged from 7.2 per cent in the income table and those who earned ten minimum wages or more ranged more than 5.7 per cent. Certainly, higher salaries were paid to the most qualified workers.

The number of engineers in Brazil is much lower than the total number of employees, particularly in comparison to other countries. According to Cassiano Marins:

> generally, Brazilian shipyards contain a small number of engineers in relation to the total number of employees. The percentage of engineers, overall, falls below 5 per cent. As a general comparison, Korean shipyards can have up to 2,000 engineers who represent approximately 10 per cent of the total manpower.[11]

Two Shipbuilding Engineering Schools in Brazil stand out, one at USP in São Paulo (launched in 1956) and another one in UFRJ in Rio de Janeiro (launched in 1959). Both universities have important shipbuilding research centres, engineering schools, and post-graduate courses, which also cover waterway transportation and ocean systems. Recently, a third shipbuilding engineering formation course was launched at UFPA in Belém (PA). Its first class graduated in 2010.[12] In addition, a new Shipbuilding Engineering School at the Federal University of Pernambuco (UFPE) was launched in 2010. Its first classes started in 2011. It was the first Shipbuilding Engineering School in the north-east of Brazil.

According to a study by the Brazilian Development Bank (BNDES),[13] it is necessary to highlight

> the great demand for qualified manpower in Brazil due to the indifference to training in the sector in the past few years: the level of investment is almost zero. Such a scenario may change in the medium term, since different training programmes have been launched by the industry and

11 Marins, "Técnicas avançadas em planejamento e controle da construção naval", 31.

12 Assis, "Desafios, necessidades e perspectivas na formação e capacitação de recursos humanos na área aeronáutica e aquaviária". In 1959, the first shipbuilding engineering class graduated in Brazil – from the Escola Politécnica da Universidade de São Paulo – and in 1962, another class graduated in Rio de Janeiro from the Escola Politécnica da Universidade Federal do Rio de Janeiro (at that time, the institution was known as National Engineering School).

13 Dores, Lage, and Process, "A retomada da indústria naval brasileira", 293.

the government as well as by some university schools related to the shipbuilding industry.

As for gender distribution, the percentage of women among shipbuilding workers in Brazil increased from 5.3 per cent in 1995 to 6.8 per cent in 2010.

Manpower cost and productivity in the Brazilian shipbuilding industry

Manpower costs represent between 15 and 20 per cent of the total costs within Brazilian shipbuilding; they can vary according to two factors: the position of the shipyard on the learning curve, which defines the speed of productivity gains, and its level of technology, which determines the mechanisation level in its process.[14]

Studies done by consultancies at the time PROMEF (Program to Modernise the Fleet of Transpetro/Petrobras) was launched, in 2011, showed that the learning curve in the Brazilian shipbuilding industry presented a drop of 85 per cent. This means that every time the accumulated production doubles, there is 15 per cent reduction in manpower – measured by the mh/cgt (man-hours/compensated gross tonnage) indicator.[15] The curve declivity in the Asian countries is of approximately 70 per cent.[16]

The cost of manpower in this sector in Brazil is low in comparison to the cost in the leader countries. According to Priscila Dores, Elisa Lage, and Lukas Processi, such costs vary between USD $11 and USD $19/mh, which is lower than that of some Asian and European countries, although it is higher than in China.[17] According to C.G. Jesus in 2008, the cost including manpower varied between USD $6 and USD $10/mh (Table 18.5).[18]

In Table 18.5, we can observe the variation (from minimum to maximum) and the best estimation for the average cost per hour of shipbuilding manpower in Europe, Japan, Korea, China, and Brazil. China is in the leading position due to its very low cost in comparison to other countries, varying between USD $1 and USD $4/mh.

14 *Ibid.*, 292-293.

15 This is the standard manpower productivity indicator in the shipbuilding industry; it balances the variations in the level of complexity among the existing ship types. As for the offshore sector, mainly for probes and platforms, the mh/t indicator is used: *ibid.*, 291.

16 *Ibid.*, 292-93.

17 *Ibid.*

18 Jesus, "Retomada da indústria de construção naval brasileira".

Table 18.5 Average cost of manpower, per hour, in the shipbuilding industry (in USD), 2008

	Minimum	Best estimate	Maximum
Europe	27.0	30.0	36.0
Japan	22.0	25.0	30.0
South Korea	11.5	13.0	17.0
China	1.0	1.4	4.0
Brazil	6.0	8.0	10.0

Source: Jesus, "Retomada da indústria de construção naval brasileira", 122

According to Jesus, Brazil does not need to reach the same productivity rates as Asian shipyards in order to become competitive, because one of the great advantages of the national industry is low manpower costs.[19]

In regard to the numbers of workers in the Brazilian shipbuilding industry, Jorge Roberto Coelho Gonçalves, CEO of EISA, pinpointed in an interview from 2011 that the productivity of labour in Brazil is lower than in Japan:

> The more their [Japanese] workers produce, the less they need manpower. And, if you go deep in the MH, what these guys spend are numbers which go beyond perception, like, they reach 1/10 of what we spend to make the same thing. But I always say that you do not count the robot hours; isn't it so? The robot hours do not count. But, robot have a high cost, in fact, a huge cost from mobilising assets they order, and this is another problem. Today we import almost 100 per cent of the machines – imagine that.[20]

As it is a manpower-intensive industry, reduced costs due to the experience of workers used to be significant in Brazilian shipbuilding, since it has a high share of manpower in its production process. Thus, if the costs

19 Some recent research co-ordinated by Prof. Floriano Pires (UFRJ), "Benchmarking internacional para indicadores e desempenho na construção naval", which is not yet publicly available, conclusions were shown in August 2007 in seminars on shipbuilding in COPPE/UFRJ (Alberto Luiz Coimbra Institute for Graduate Studies and Research in Engineering, Federal University of Rio de Janeiro). Brazil does not need to reach productivity levels like those from Asian shipyards in order to become competitive. According to the research, one of the great advantages of the national shipbuilding industry is its low manpower cost: Jesus, "Retomada da indústria de construção naval brasileira", 122.

20 Jorge Roberto Coelho Gonçalves, interviewed 23 February 2011.

with experience drop and if experience must be retained by these stable companies, then this effect will lead to an entry barrier.[21]

A common feature among all shipyards worldwide is the growing use of outsourcing. Outsourcing has been adopted by Brazilian shipbuilding on a wide scale, and not just in complementary fields in the industry (such as cleaning, provision of meals for workers, etc.) but actually as part of the production process. According to Leda Gitahy: in this sense, the reduction in the number of formal jobs and the consequent elimination of expenses of social insurance, as well as the reduction in the interference of trade unions within an economic crisis context, give rise to production externalisations.[22]

Therefore, what we have observed in the Brazilian shipyards is a more and more intense outsourcing as a traditional cost-reduction strategy, thus reinforcing the deverticalisation and externalisation of the company's activities. This makes it difficult to measure the number of jobs in this industry due to high manpower turnover (short-term working contracts). As the shipbuilding industry operates in cycles, it depends on purchase orders. Outsourcing processes are used more and more. In an interview from 2011, Paulo Inácio Furtuozo highlights: "there are two things which are the evil of the century: [...] drugs [...] and here for us [it is] the sub-contractors, contractors".[23]

Both safety and working conditions in the shipyards in 2010 deserve attention. The Regulatory Police – following NR 34, termed "Working Conditions and Environment in the Shipbuilding and Repair Industry" – aimed at setting the minimum requirements and safety protection actions to support health and the working environment in this industry's activities in Brazil. Such legislation considers shipbuilding as all the activities performed within the building plants or within ships and floating structures such as vessels, boats, speedboats, and fixed and floating platforms, among others.[24]

The process was laid out by a three-part commission formed by government representatives, companies, and workers who, for approximately two and a half years, discussed and approved all that is written in the standardisation rules. The labour category points out that this is a victory and that the rules were essential to the formulation process. Other countries are using this regulation as their basis since it is a pioneer project in this

21 Fadda, "Construção naval – uma indústria global".

22 Gitahy, "Inovação tecnológica, subcontratação e mercado de trabalho".

23 Interview, 2 December 2011.

24 NR 34 – Working Conditions and Environment in the Shipbuilding and Recovery Industry, Publication DOU Ordinance SIT no. 200, from 20 January 2011, Changes/updates DOU, Ordinance SIT no. 317, from 8 May 2012. For more details see: http://portal.mte.gov.br/data/files/8A7C816A36A27C14013750E887B25674/NR-34%20(Atualizada%202012).pdf (last accessed 8 May 2012).

particular matter. Therefore, NR-34 regulated safe working in shipbuilding. Thus, the basis for the regulations on working conditions will be the same in the national territory for all the different activities. This of course raises another question: is it fully observed more in the breach than in the actuality?

Conclusion

The Brazilian shipbuilding industry's recovery relied on a significant increase in the number of jobs to satisfy mainly domestic demand in shipbuilding and offshore work. The level of certainty in the increase in the number of domestic orders brought up the expectancy that the number of jobs would keep growing (mainly the purchase orders from Petrobras to 2020). Thus, the need for trained manpower also grew and it reflected on the opening of new shipbuilding engineering schools in the country, in addition to all the technical schools inside the shipyards.

However, on the other hand, we can observe the trend of casualisation of working conditions, resulting from manpower turnover linked to shorter work contracts and to the hiring of younger individuals as well as to lower salaries and the use of outsourcing. By following world market trends, it is interesting to observe that, in comparison to leading Asian and European countries, with the exception of China, Brazil has lower manpower costs and a lower number of engineers, especially in relation to the industry's total number of employees. The differential in this labour market is the importance given to the "learning by doing" process and to the contracting processes based on orderbook demand.

The current indicators from the Brazilian shipbuilding industry corroborate the recovery of this sector in the country. The annual publication "Review of Maritime Transport of the United Nations Conference on Trade and Development" (UNCTAD), published in 2012, noted that Brazil is the country producing the highest volume of ships when its present fleet is taken under consideration. Moreover, it is the highest volume in the domestic shipbuilding industry's history. This, combined with expectations relative to oil exploration in the pre-salt Libra layer, gives rise to projections of an increase in orders, in conjunction with the effective guarantee of demand from Petrobras/Transpetro. This combination of demand factors promises a potentially new era for the shipbuilding industry in Brazil, which goes beyond the "recovery period", not only in fulfilling domestic demand but also in reducing dependence on foreign technologies.