

THE IMPACT OF RADICAL AND INCREMENTAL INNOVATION ON BUSINESS THE SUCCESS OF SMALL COMPOSITE SHIPBUILDING IN CROATIA

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Abstract The aim of this paper was to determine how radical and incremental innovations affect the business success of composite small shipbuilding in the Republic of Croatia.

Composite small shipbuilding, with its innovation in the transition period immediately after the Patriotic War, experienced its pronounced boom, both through the number of new organizations and through the number of new models on the market. The boom of the composite small shipbuilding industry was marred by the economic crisis of 2008/9. by the loss of approximately 70% of the organizations active then. At the same time, the recovery process was underway with the announcement of new organizations, so today it can be said that next year will be the year of the resurgence of the composite small shipbuilding industry in Croatia.

Keywords:

composite small shipbuilding, innovation, business success, Republic of Croatia.

1 Introduction

It should be noted that the composite (fiberglass) small shipbuilding industry in Croatia with only 27 models, which it had with the beginning of the nineties of the end of the first decade of the 21st century, was greeted with 237 basic and with auxiliary modifications with almost 400 models.

The survey research in this paper found that 73 organizations of small composite shipbuilding have 307 basic models, and with auxiliary modifications certainly 500 models. Proper, fast, cohesive, appealing, innovation is the basic "modus vivendi" of any production. In it, managers at all levels of production must be innovative managers of the organization, and through the development of innovative capacities, with all the innovative cultures, policies and factors at their disposal, must lead production in organizations in the best possible way.¹ Innovative managers, through the development of innovative capacity of the organization, are the reason for the existence of each organization, including composite small shipbuilding.

The aim of the paper was to determine the success of the business of the composite small shipbuilding organizations of the Republic of Croatia by applying radical and incremental innovations. The topic is very topical, as it deals with issues that are vital to the life of any composite small shipbuilding organization, and thus affect the development of the economy of the Republic of Croatia.

2 Methodology

Secondary sources of information on composite small shipbuilding are catalogs and publications and fairs exhibiting manufacturers' ships: the latest "Small Shipbuilding Catalog" (Croatian Chamber of Commerce, January 2013²) and the publication "My Boat" of the More magazine (April 2018). / 2019). The data obtained from oral surveys at trade fairs in 2018/2019 were also used to create the article. year, as follows: "Nautics 2018" and "Nautics 2019" in Zagreb, "Croatia Boat Show" in Split ", " Days of Small Shipbuilding "in Podstrana and Marina Kastela, " Rijeka Boat Show "and" Biograd Boat Show ".

¹ Prester, J. (2010.) doc. dr.sc. „Menadžment inovacija" Sinergija Zagreb, str. 32.-37.

² Hrvatska gospodarska komora, (2013.) <http://www.hgk.hr>

A written survey was then conducted at fairs in Rijeka ("Rijeka Boat Show", 2019) and Biograd na Moru ("Biograd Boat Show", 2019).

At the same time, all web portals and websites of companies and crafts of small shipbuilding industry from the catalog of other nautical magazines, as well as available news information were used. Electronically accessible databases were also searched as additional information material in creating the current picture of the innovative potential of small shipbuilding in Croatia.

The methodology of secondary research has included a comprehensive study of relevant scientific literature related to theoretical aspects of innovation, innovation potential, innovation in production in general. As the survey made it possible to collect data from all composite small shipbuilding organizations, the survey method was chosen because of rational costs.

The following research methods were used in the analysis of the obtained research results: descriptive, induction, deduction, analysis, synthesis, statistical, generalization and comparison methods

3 Innovative capacity of the company

SMEs have two options when it comes to innovation. The first is to work independently on innovation through its own R&D function, while the second option is to apply one or more innovation management practices that stand out: human resources management, teamwork, search for external sources and cooperation Radojica 2012³. Croatian companies are 44. Other institutions account for 2% of all R&D investment (IOMSP-2011), while in the EU-27 the same share was 61.5%. In Croatia, investment in private sector-funded R&D was 0.34% of GDP compared to 1.26% in EU-27. In Croatia, micro-enterprises represent only 1.1% of total R&D investment in the business sector, and small enterprises represent 6.6% more. In terms of innovation, Croatia ranked 68th, 51st and 60th in 2018, according to the Global Competitiveness Reports in 2018, by WEF at 74th position, by WB at 58th, and by IMD model at 61st position for 2019. position. Croatia is considered a "moderate innovator" by innovation results, and is generally 25th out

³ Radojica, F. (2012.), Inovacije i timski rad, Pomorski zbornik, Udruga za proučavanje i razvoj pomorstva Rijeka

of 34 European countries by innovation results, with 48% of all enterprises in Croatia classified as active in innovation, while the same figure for EU-27 is 51%. Here according to "CIS - EU Innovation Reviewer 2014-2016"⁴ of Title 4.7.1.3. of this work 43.40. The analysis of the Central Bureau of Statistics shows that the number of innovative companies is growing in the Croatian economy year by year. According to the latest survey by the method prescribed by the CIS browser, CBS has reached the figure of 43.40% of innovative organizations in the Republic of Croatia.

4 Composite production of small craft

In the last twenty years there has been rapid technological development at all levels, and in the area of small shipbuilding and the penetration of new materials such as kevlar and carbon fiber. However, the very process of manufacturing composite castings (fiber-reinforced polymers for the manufacture of vessels, commonly known as fiberglass - Biluš, K. 2019)⁵, still depends on the precise and careful human fabrication, the human hand. It is only in the last ten to fifteen years that new vacuum techniques have been used in the manufacture of vessels.

Otherwise, he writes about new visions in small shipbuilding: "New materials and techniques, at least in small shipbuilding, are always viewed either too liberally or too conservatively. The former are viewed with extreme optimism, and gladly accept these new materials even though they are before, they did not prove it in practice, but very often did not even test it properly, since they often profit sometimes, but many times until now, their experimentation has not paid off. , and now they are questioning why to change something that has been good for fifty years now and again. In part, they are right, but we need to be aware of the fact that we listened to them earlier, so that we would still all sail on wooden boats, because those same conservatives through history has been against steel, steam and plastic, as well as the entire industry, including small shipbuilding, in the last two decades. such a year he lives and works under incredible pressure. The public imperative has become the marketing of new products, new technologies, new design ... it doesn't matter if it's good or not, not even if there is any rational need for new ones, it just matters that

⁴ European commission (2014.) Overview of European innovation activities in marine energy technology , dostupno na: <https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/overview-european-innovation-activities-marine-energy-technology>

⁵ Biluš, K. (2019.), Usavršavanjem formi stakloplastičnih brodic na Jadranu, Burza naučike, broj 212

something is new. All those who do not respond in a timely manner fall out of the market game very quickly, so we must have an understanding for them as well. The hunger for news itself has forced small shipbuilders to embrace news from the chemical and raw materials industries, and implement them into their products without any thorough testing. "(Šuhov 2015)⁶.

Particularly composite small shipbuilding (fiberglass) in the last decade before the economic crisis, 2007/2008. In 2006, it recorded a significant increase in the production of small vessels in the interior of Croatia. The projects and products of several of our manufacturers are becoming more well known in the world market, and the placement is significantly increased after appearing at world famous nautical fairs, at which our shipbuilders receive high recognition for the quality of their products.

As a result, our small shipbuilding industry is becoming more and more known on the world market and becoming a growing and successful Croatian economic factor, and it must become our brand. The share of small shipbuilding in cooperation with our large and medium shipbuilding industry, as well as cooperation with foreign countries, should not be neglected. Of particular note is the fact that we have a distinctive traditional wooden shipbuilding industry, and especially replicas of old boats and sailing ships. In this way, our small shipbuilding industry directly and indirectly participates in our tourist recognition. From this period, fishing boats, passenger boats and the Hydrographic working ship VRZ - "V.Škorpik" from Šibenik, "Greiben" rescue boats, motor boats and sailboats originate. here in a newer, more modern version. Croatian independence was welcomed with 22 small shipyards and a number of craft workshops for the manufacture and repair of boats without any business association that until then protected the interests of small shipbuilding.

⁶ Piše: Šuhov, I. (2015.) Mala brodogradnja u RH, BN -Burza Nautike broj 166

4.1 Composite small shipbuilding from the Homeland War to the present

During the early 1990s, all small craft manufacturers failed except the Arause d.o.o., former RO "Drvoplastike" from Vodice, formed in 1987 by separation from RO "Autoremont". The old companies replaced the newly established small shipbuilding companies and trades, whose order of establishment by year for the entire shipbuilding industry from 1940 to 2010 is given in Table 1.

Table 1: Total organizations established by year of incorporation by 2010.

ESTABLISHED	Year	small shipbuilding industry composite-PnN		Classical				large shipbuilding		In total	
				wood		Median					
		O	%	O	%	O	%	O	%	O	%
1	do 1940. godine	-	0,00	-	-	1	3,45	5	83,3	6	3,47
2	do 1955. godine	1	1,03	-	-	4	13,80	1	16,7	6	3,47
3	do 1989. godine	12	12,37	9	21,92	4	13,80	-	-	2	14,45
4	1989. godine	-	-	-	-	-	-	-	-	-	-
5	1990. godine	7	7,22	1	2,44	1	3,45	-	-	9	5,20
6	1991. godine	1	1,03	1	2,44	1	3,45	-	-	3	1,74
7	1992. godine	5	5,15	4	9,76	3	10,30	-	-	12	6,94
8	1993. godine	3	3,09	-	-	1	3,45	-	-	4	2,31
9	1994. godine	2	2,06	2	4,86	1	3,45	-	-	5	2,89
10	1995. godine	2	2,06	-	-	-	-	-	-	2	1,16
11	1996. godine	3	3,09	3	7,29	-	-	-	-	6	3,47

Table 1: Total organizations established by year of incorporation by 2010. (continued)

12	1997. godine	-	0,00	-	-	1	3,45	-	-	1	0,58
13	1998. godine	2	2,06	3	7,29	-	-	-	-	5	2,89
14	1999. godine	2	2,06	1	2,44	-	-	-	-	3	1,74
15	2000. godine	2	2,06	3	7,29	2	6,9	-	-	7	4,05
16	2001. godine	6	6,19	1	2,44	-	-	-	-	7	4,05
17	2002. godine	5	5,15	3	7,29	2	6,9	-	-	10	5,78
18	2003. godine	6	6,19	4	9,76	1	3,45	-	-	11	6,36
19	2004. godine	5	5,15	2	4,86	1	3,45	-	-	8	4,62
20	2005. godine	11	11,34	-	-	1	3,45	-	-	12	6,94
21	2006. godine	9	9,28	2	4,86	4	13,80	-	-	15	8,67
22	2007. godine	5	5,15	1	2,44	-	-	-	-	6	3,47
23	2008. godine	2	2,06	1	2,44	1	3,45	-	-	4	2,31
24	2009. godine	3	3,09	-	-	-	-	-	-	3	1,74
25	2010. godine	3	3,09	-	-	-	-	-	-	3	1,74
	IN TOTAL	97	100	41	100	29	100	6	100	173	100

Source: (Zanze 2012)⁷

New composite manufacturers are founded in part by buying entire failed companies or by purchasing only a portion of failed companies. New ones are created in very difficult conditions. War drove tourists away, the standard dropped and demand for boats came down to a rare supply of fiberglass hull, a KIT vessel. Digression to a small wooden shipbuilding industry must be pronounced because it survived at that time on the construction of smaller vessels and on the repair of larger wooden ships, but even in these conditions new companies were established. In addition to maintaining the constant quality of existing production, it is also adopting the production of new vessels with quality and design that stand side by side with world-renowned manufacturers.

Table 1 shows that there are 97 organizations 7 of them with pneumatic vessels, so that in this table, 90 are originally from the domain of composite production. In 2018, 73 small shipbuilding organizations were registered, which means that more organizations disappeared in the crisis.

⁷ Josip Zanze - Magistarski rad autora 2012. str 85. tablica 14., Knjižnica Ekonomski fakultet Split

The economic crisis brought the composite small shipbuilding industry, together with the excise duties introduced at the time, to low branches, as 33.33% of them remained active in their lives, from all those active until then.

After the take-off in the late 1990s and until the economic crisis of 2007/8, KMBH had, together with organizations producing inflatable vessels PnN 97 manufacturers, and with medium and wooden shipbuilding, 167 organizations. The 2010 surveys talk about 237 basic models, almost 350 were written at the time, and it started with only 27.

In the recent period, there are 73 organizations whose model number has grown to 307. We can say that the Croatian composite small shipbuilding industry has approximately 450-500 molds for the production of as many types of ships.

In addition to boat manufacturers, Croatia also has designers offering interesting projects, ranging from motor boats and sailboats to mega-yachts, without neglecting even working ships of different uses, shapes and sizes. (Prester, J., Juric, M., 2019.)⁸

4.2 Contribution of science and education to the development of small shipbuilding in Croatia

The teaching, science and journalism (Grubišić) accompanying the MB was also reflected in the programs at the faculties. The Faculty of Mechanical Engineering and Naval Architecture (FSB) in Zagreb was introduced in 1991 as separate courses for the Construction and Construction of Small Ships and the Establishment and Equipment of Small Ships. At the Faculty of Maritime Studies in Split there was a study of Maritime Technology for Yachts and Marinas. Among the domestic literature stands out the digital textbook Design of Small Boats. In the highly professional field, several individuals are distinguished in the field of development of small shipbuilding, eg authors of multiple patents, researchers and carers of Croatian traditional shipbuilding. Within the FSB in Zagreb, there is also a non-profit organization Center for Innovation in Small Shipbuilding, which brings together designers, engineers and other experts to promote small shipbuilding, preserve the tradition of old ways of building ships and vessels and help develop innovative materials and technologies.

⁸ Prester, J., Juric, M. (2019.), Big data for product innovation in manufacturing: evidence from a large-scale survey, Tehnički glasnik, Vol. 13 No. 1, Sveučilište Sjever, Koprivnica

5 Research on the business performance of small composite shipbuilding in Croatia

Business performance research was conducted through a sample. Working on the structure of the research sample required the implementation of empirical research on the topic "Assessment of innovative capacity of shipbuilding organizations in the manufacture of composite ships". According to the research plan, organizations that need to be interviewed in the process of the survey themselves are registered companies and crafts (the most commonly used unifying noun of the organization will be used in the paper), who actively pursued their activity in 2017/2018. year. The main framework for all organizations was to have their registration under the NKD 2007⁹ in the Republic of Croatia as follows:

- 30. 1. Construction of ships and boats, or alone
- 30. 11. Construction of ships and floating structures, or
- 30. 12. Construction of boats and sports boats

The database and actual insight into the abundance of research organizations was created from business bases: Croatian Chambers of Commerce¹⁰ from contacts with the Croatian Chamber of Trades and Crafts, the Central Tax Administration Office, the Association of Small Shipbuilders, and from all leaflets and propaganda leaflets of Croatian fairs, on which small composites shipbuilders participate by displaying their products to the public. The database was also created from browsing Final Accounts through the available Public Announcement Browser¹¹ by FINA¹², through a personal survey by the author. Thus, a base of exactly 73 active organizations was created, of which nine are crafts and 61 companies, which in the work unites into a unique expression of the organization of composite small shipbuilding using the abbreviation OKMB, or only: composite small shipbuilding

⁹ Nacionalnoj klasifikaciji djelatnosti 2007. – NKD 2007. (narodne novine br. 58/07 i 72/07)

¹⁰ Hrvatska gospodarska komora, <http://www.hgk.hr>

¹¹ FINA, Javna objava malih tvrtki <https://www.fina.hr/javna-objava1>

¹² Financijska agencija djeluje od siječnja 2002. Nasljednica je Zavoda za platni promet (ZAP), odnosno Službe društvenog knjigovodstva (SDK), koji 1993. godine SDK prerasta u Zavod za platni promet (ZAP) do 2002. godine. Početkom 2002. godine, donošenjem Zakona o Financijskoj agenciji, Fina, kao institucija u vlasništvu države, nasljeđuje prava, obveze i imovinu Zavoda za platni promet.

with the abbreviation (KMB). , or even shorter, just a small shipbuilding company with the abbreviation (MB).

Based on this obtained database, it was possible to interview 40 composite small shipbuilding organizations.

5.1 Revenues and costs with radical and incremental innovation in composite small shipbuilding

This section will discuss the growth of revenues and costs with radical and incremental innovation according to the subjective views of the respondents expressed in the questionnaire. It will also show total revenue and expenses as well as market niches.

5.1.1 Income from radical and incremental innovation

The percentage of revenue growth due to radical innovation is shown in Chart 1. Revenue growth was obtained through a questionnaire and freely estimated by the examiner.

Of the total forty respondents, three organizations or 7.5% were found to have started business in 2018, so there are no results. Of the remaining 37, five or 12.5% had revenue growth below 5%, while thirty-two organizations or 80% had radical innovation revenue growth over 5%.

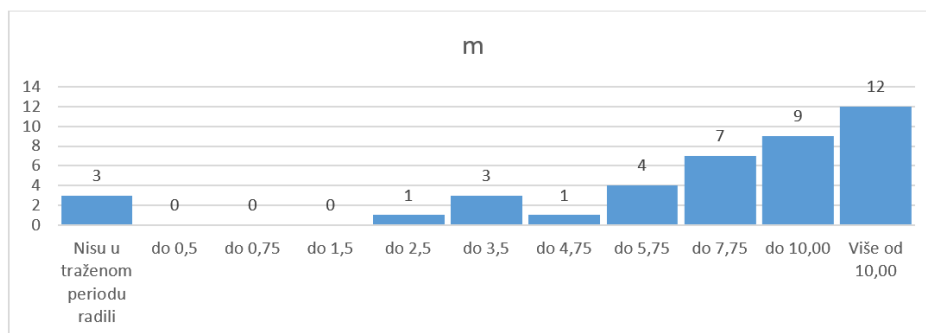


Figure 1: Revenue with RADICAL innovations by organizations.

Source: Author Survey and Processing.

Incremental revenue from incremental innovation is shown in Chart 2. Growth ranges from 3.5% to 10%.

The percentage growth rate for three or 7.5% of the organization was 0 because they did not do business at the time, 26 or 65% had revenue growth below 5% (from 2.5% to 5%), while 11 or 27 , 5% had revenue growth driven by incremental innovations above 5% (5-10%).

It is interesting to note here that all the smaller percentages obtained in order, at the individual level, are smaller than those shown in the revenue growth of Radical Innovation.

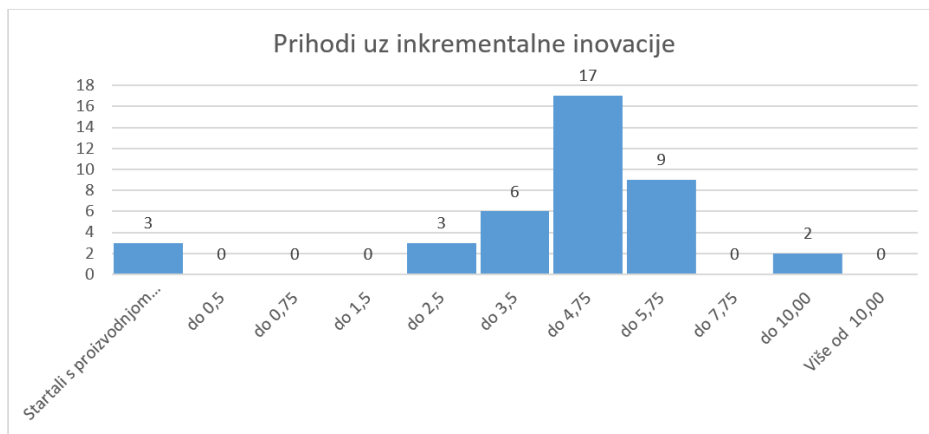


Figure 2: Revenue growth in% with INCREMENTAL innovations.

Source: Author Survey and Processing, 2014-2018 Organization Revenue Average.

The average revenue of an organization in 2014-2018 is shown in Table 2. The table shows that 4 organizations or 10% of them did not generate revenue in the observed period (one is at a standstill and three have not yet been established).

Five organizations that make up 12.5% had an average income below HRK 500 thousand, 6 of them or 15% had an average revenue below HRK 1 million, 2 organizations or 5% had a revenue slightly below 1.5 million, according to the survey 7 or 17.5% had revenue below HRK 2.5 million, 3 or 7.5% had income below HRK 3 million, 8 of them or 20% had income below HRK 5.5 million, 1 or a percentage

2.5% had revenue just below HRK 10 million, while 4 or organizations had revenue in excess of HRK 10 million.10%

Table 2: 2014-2018 Organization Revenue Average.

investigate d organizati on	The average revenue of an organization 2014. - 2018. year(3.4.)										
	0	<0, 5	<1, 0	<1, 5	<2, 5	<3, 0	<4, 0	<5, 5	<7, 5	<10, 0	>10, 0
IN	4	5	6	2	7	3	-	8	-	1	4
TOTAL (4 + 36)	10, 0	12,5	15, 0	5,0	17,5	7,5		20,0		2,50	10,0

Source: Research author

5.1.2 Costs of radical and incremental innovation

The percentage growth in costs with radical innovation is observed in Chart 3, ranging from 7.75% to more than 10%, given the free estimate of revenue growth. According to the results of the survey, as well as from the observation of the income from the graph 3, it is evident that three organizations or 7.5% (out of 40) did not report costs, 24 or 60% had higher income and costs than 10%, 24 or 60%. 17.50% had cost growth below 10%, while only 1 or 2.5% had cost growth below 7.75%.

This makes it clear that with RADICAL-BASIC innovation there is a higher cost. Seen at the individual survey discussion, almost all respondents rated their survey with higher cost growth than the revenue they generated. Of course, we are a small market and it takes many years for radical-type investments to return the same by selling products.

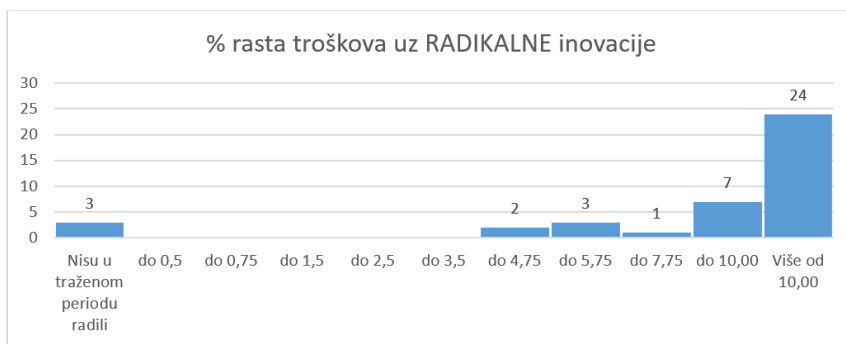


Figure 3: Costs with radical innovation.

Source: Author Survey and Processing.

COST INCREASE with INCREASING INNOVATION

Increase in costs with incremental innovations (answer to part of question 3.3.) Is visible in Chart 4. It ranges from, below 7.5% and up to more than 10%, given the growth of revenues according to their free estimate, which in the finality is:

- 3 3 or 7.50 % had no changes,
- 3 3 or 7.5 % had a cost increase below 7.75 %,
- 14 14 or 35 % had cost growth below 10 %,
- Velika and the vast majority of them 20 or 50 % had a cost increase of over 10 %.

Again at the individual level, looking at the answers, everyone who voted for higher revenue side growth in the survey on the question of cost growth had a rounded answer with a higher percentage, which it clearly states that with Incremental change, an even higher cost is in order. And these happen to small shipbuilders because of their small market where they market their product. Repeatedly, at the individual discussion of the survey, almost all respondents rated their survey with a higher increase in costs that the revenue side did not realize. Of course, we are a small market and even for INCREMENTAL type investments it takes several years to return the same by selling the product.

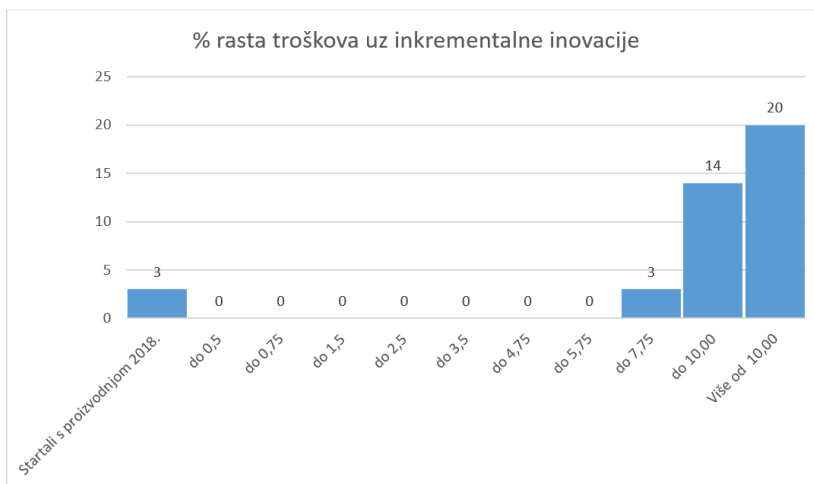


Figure 3: Increasing costs with INCREMENTAL innovation.

Source: Author Survey and Processing.

Prosjek Troškova i Izvoza u odnosu na prihod 2014. - 2018. godine prikazan je u tablici 3. Iako anketiranih 6 nije radilo u ovom cijelom promatranom periodu, pa se odgovor nije niti mogao od njih dobiti, 34 odgovora su na uzorak jaka statistička osnova zaključivanja u radu. On nam definitivno govori kako kompozitna mala brodogradnja - KMB izlazi iz krize jer su samo 4 organizacije pokazale gubitak u poslovanju.

- četiri organizacije ili 10% imale su trošak veći od 97 %,
- njih 16 ili 40 % poslovale su s Prihodom nešto ispod 100 %, dakle bile su pozitivne,

Ono što svakako nije dobro su relacije izvoza koji je kod anketiranih gotovo zanemariv.

Dvije organizacije tj. 5 % ostvaruju izvozom više od 50 % svoga prihoda,

- njih 5% ostvaruje izvozom prihod ispod 50 % njegove veličine,
- samo jedna organizacija ili 2,5 % izvozom ostvaruje dio prihoda ispod 10 %.

- kod 7 organizacije ili njih 17,5 %, izvozom se ostvari u Ukupnom prihodu do 25 % .

Table 3: Costs and Exports Average by Revenue 2014. - 2018.

investigated organizatio n	Average COSTS AND EXPORTS relative to revenue										
	Average % costs (3.5.)						Average % exports (3.6.)				
	0	< 90	> 90	> 97	< 100	> 100	< 5	<1 0	<25	<5 0	>5 0
IN TOTAL (6 + 34)	6	5	5	4	16	4		1	7	2	2
% IN TOTAL	17, 5	12, 5	12, 5	10, 0	40. 0	10, 0		2,5	17, 5	5,0	5,0

Source: Author research

6 Conclusion

In order to improve their business, small composite shipbuilding organizations should further increase their proactive position in the market. They should do this with more promotion about themselves, with more attendance at trade shows, with more joint action within their institutions, with the institutions of the state, which depend on their financial policy, which includes financing customers and thus production, that is, credit and tax policy within it, environmental policy.

All these organizations have so far been fully autonomous within all their merits, with which they have so far assumed all their complete risks for all their innovative solutions, for their projects, regarding their growing innovative competitive advantage in the market. There are no promotions in the market for the campaign, the presence on it of whatever form it is is small, and they should be bigger and more permanent, rather than waiting for the buyer of their products at their doorstep.

That is why it is absolutely necessary to know the demands of the market and the customers on it, to know their needs for an innovative product that will be produced using new technological processes within the composite small shipbuilding organizations.

Certainly, for the sake of greater business success, the Composite Small Shipbuilding Organization should:

Invest more in employee education, Strengthen innovative management, Innovative policy Innovative factors, Increase work on innovative culture within organizations. All this is needed to raise awareness of the importance of innovative capacity of organizations in order to increase the performance of the organization in terms of radical and incremental improvements. Organizations need to develop openness to ideas. Encourage knowledge sharing within composite small shipbuilding organizations.

Research to date has shown that the innovative capacity of organizations directly influences the increase of their competitive power in the market. The development of innovative capacities of organizations requires strategies based on knowledge, a

positive relationship between the government and the private sector, basic consumer knowledge, cooperation between organizations.

Globalization is affecting the composite small shipbuilding industry and seeking a focus on its capacity to create innovative and competitive ships. Certainly one of the possible measures to increase exports is to develop innovations that enhance technological development and increase product competitiveness and business success.

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