

MONODZUKURI

Global Survey

*2006 edition:
Italian results*



May the 20th, 2007

JMAC | europe |
JMA Consultants Europe Milano SpA

Forward

This report contains results from the *Monodzukuri Global Survey (Edition 2006)*, an international research intended to record the current state of operations within manufacturing industries, promoted by JMA Consultant Inc. and conducted in Italy by JMAC Europe Milano S.p.A. in partnership with the Management Engineering Department of Milan's University Polytechnic and Oracle Italia.

Of the former partners, JMAC has a long background of experiences and knowledge in operations management and other fields. Born in 1942 as JMA (Japan Management Association), it held a major role in the post-war reconstruction period as well as the following development of Nipponese industry. In 1980 was founded JMA Consultants Inc. (JMAC), a private equity society that in 1988 founded the actual JMAC Europe Milano S.p.A..

The "Dipartimento di Ingegneria Gestionale" of Milan's Polytechnic carries on research activities in management, economy, industrial engineering and held the PHD in "Ingegneria Gestionale".

Together with MIP (the business school of Milan's Polytechnic), it is part of "School of management", which held the multiple activities of research and teaching in management field of Milan's Polytechnic.

Let us get down to the specific findings of the *Monodzukuri Global Survey*.

This research follows suit from the 2003 edition, which was conducted only within the boundaries of Japan. Considering the great success the initiative was actually met with, for the 2006 edition, it had been decided to expand the area of investigation and analysis well beyond Japan, thus including also Italy, China, South Korea and the United States.

In order to understand the goals of the *Monodzukuri Global Survey*, the first step to undertake is to analyse the term Monodzukuri itself. To do this it is essential to grasp the exact meaning Japanese people actually attribute to this word. It is not so simple to define it though, due to the great semantic complexity of ideograms. First of all, it has to be said that in Japanese writing there is a tendency to associate two or more ideographic signs to achieve meaning. Therefore, using only two or three characters a whole concept can be expressed. Such synthesis can seldom be achieved using Latin characters. Furthermore, having a range of more than 20.000 characters available, there is ample scope for innumerable associations to be made, which will correspond to emerging ways of living and innovative human actions accordingly. Often, associations can be the outcome of creative thinking, of differing degrees in personal sensitivity, of individual genius or, quite simply, due to the whim of the speaker.

The specific case of the term "*Monozukuri*" can be thought as emblematic of such concise expressiveness. It consists of two phonemes. The first one is 物 "*mono*", which means: thing, object, a physical or material asset. The second ideographic character is read "*tsukuri*", which due to its assonance often becomes "*zukuri*". But,

whilst the pronunciation of this second phoneme is clear and it is shared by all, the same cannot be said for the way in which it can be written. This can take different forms:

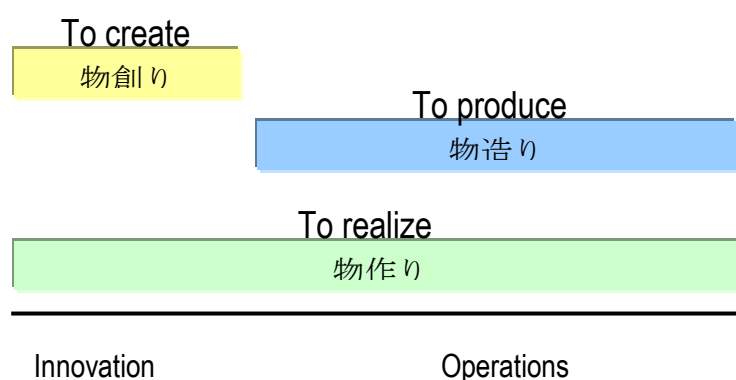
作り or 造り or even 創り.

The first meaning related to the former ideographic symbol is *doing*, intended as *elaborating, building or organizing something and bringing it to completion by grouping together several elements*. When related to a company, one could say it represents the most executive slant of constructive doing, and that it refers specifically to clear-cut operations.

The second way of writing and interpreting semantically the phoneme “*tsukur*” is probably the most frequently used one. Broadly speaking, it still refers to the verb *doing*, but the emphasis is placed on *realization* which implies *doing something from beginning to end*. Embedding it into the industrial context it would signify: *from design to production*. To put it simply: *thought...done*. Within the company context the verb is referred less to *productive and organizational doing* (typical of production) rather than *having ideas and re-organizing things accordingly*. Briefly speaking, it emphasizes *realizability* more than *realization*.

To some people these expressive possibilities were not enough...which is why on the world wide web, in editorial publications and in academic literature, one can find yet another interpretation of *doing* referred principally to contexts where it can stand for *creating, thinking up something which may lend itself to proposal and realization*.

Graphical explanation of the term “monodzukuri”



Is there something significant these interpretations could convey, or should they be taken as mere whimsical spotting of minimal differences?

First of all the compounded term suggests it can be applied to one or more dimensions together, depending on the time period, the context and expressive sensibility, referred to.

An important consideration is that the term may be used, on one hand, to describe the range of activities which pertain to the realm of doing things and, on the other hand, the degree of accuracy which may be achieved within the same realms according to a usefulness criteria.

What about the *Monozukuri* yonder?...Someone has already provided a response to *Monozukuri* 物造り with another *Monozukuri* 者造り or, yet again, *Hitozukuri* 人造り. Careful though: combining them together brings one already yonder...now one is talking about *realizing people*.

May one end this forward by thanking all those who have participated to the survey by patiently filling in the questionnaires sent to them.

One is most grateful to all those people who worked or contributed in some way to the realization of the questionnaire and the subsequent report produced on the basis of results. Amongst everyone, a special thank you to: Fabio Salomone, Giulio Contini, Daniele Giani, Carlo Magni (members of JMAC Europe Milano S.p.A.); and also Federico Caniato (PhD.), Professor Raffaella Cagliano, Professor Gianluca Spina (academics at the University of Milan's Polytechnic); finally, least but not last, Livio Signorelli (member of Oracle Italia).

Milan, 2nd April 2007

JMAC Europe Milano S.p.A.

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1 Executive Summary

Monodzukuri Global Survey is a research promoted to investigate which are the most important critical aspects in operations management actually faced by Italian companies, which will be in the next three years and which actions will be taken to solve these aspects.

The research shown that there are 4 principal aspects of interest:

Cost control: identified as the most important critical aspect in operations management both actually and for the next three years, is undoubtedly a classical operations management theme. A continue control of its cost is a necessary pre-requirement to compete on the market.

Quality: a great attention to quality is the thing that mostly differentiate “high performer” (the companies that obtained the best results in the last three years) from the rest of the sample, and especially from “low performer”. Quality seems to be a direct factor of company success.

Flexibility: actually flexibility is, with cost control, the most important critical aspect for Italian companies, although in the next three years the importance given to this theme will diminish. This trend is probably due to the improvement actions that has been taken in the last years to improve this performance, as the increase of production’s planning frequency, the use of “pull” techniques, setup times reductions, the application of lean production etc.

Research and development: the lack of cooperation between R&D and the other functions that are part of Operations is probably the most unexpected finding of the survey. Research is seen by Italian companies as something apart from productive system, and so it usually work in total autonomy. This lead to a number of problems as longer development times for new products, higher development costs, higher productive costs and lower quality levels, especially for new products

Finally, the research shows that Italian companies have already planned structured and complete plans to solve these problems, using complex techniques of Japanese derivation as lean production, TPM (Total Productive Maintenance) kaizen etc. together with investments in information technology to enhance their ability of data gathering and analysis.

2 Introduction

2.1 Purpose of MONODZUKURI Global Survey

The purposes of *Monodzukuri Global Survey* are 4:

1. Study the actual situation of Monodzukuri in manufacturing companies
2. Understand the main critical aspects that these companies have to face nowadays
3. Understand which actions will be done in the next three years to solve the critical aspects analyzed in point 2
4. Understand which will be the main critical aspects that companies will have to face in the next three years

Two subgroups of companies have been identified in the sample: high performer and low performer. The companies in the groups has been selected analysing the following indicators: total revenues, EBIT, EBITDA, EVA, ROS, ROI and ROE.

A comparison between these two clusters will allow us to understand the most important differences between the companies who are achieving the best results and the ones that are facing a difficult period.

2.2 Survey details

In the survey, the following aspects have been analysed:

1. Performance indicators used to evaluate Operations results
2. Changes in QCD (quality/cost/delivery) levels
3. Scope of Operations-Monodzukuri
4. Main critical aspects of Operations-Monodzukuri
5. Improvement plans and actions planned for the next three years to solve these critical aspects

2.3 Methodological aspects

The method chosen to conduce the research is the survey.

Object of the research are manufacturing companies with more than 80 employees.

The method used is a questionnaire. The questionnaire comes from the Japanese version, integrated in some aspects to fit the Italian industrial context.

Research data:

Data collection period: September 2006 – March 2007

Number of postings: ~600

Number of responses: 51

Response rate: ~8,5%

3 Sample overview

In this first section of this report some general information about the sample will be given.

This first analysis will be about industry sector of the responding companies, their number of employees and their growth/profitability.

3.1 Industry sectors

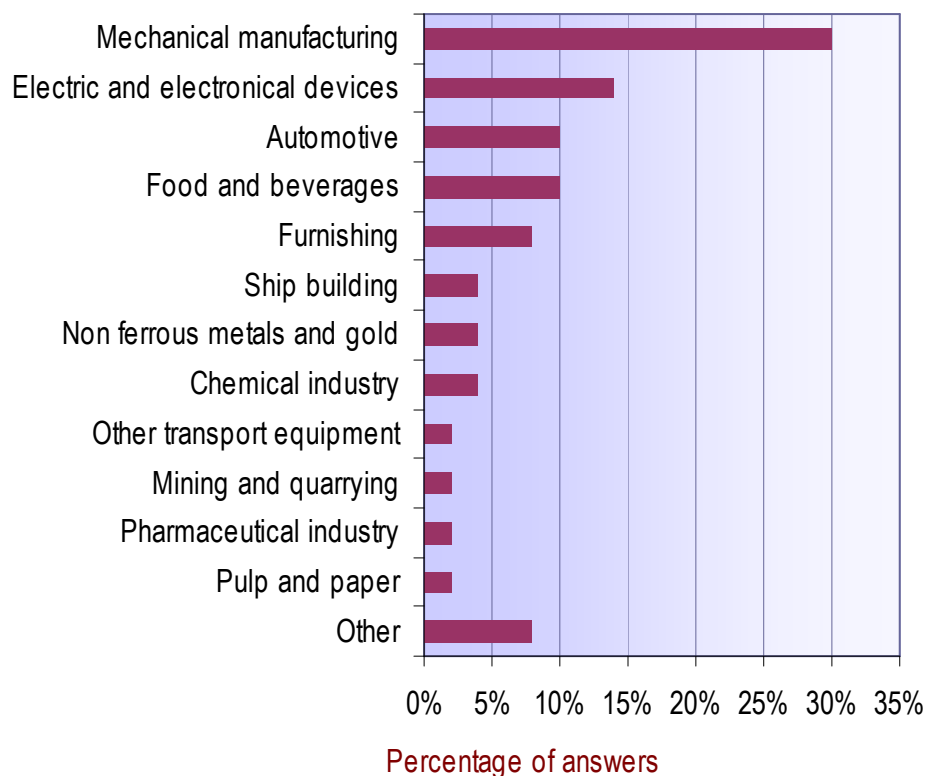


Diagram 1: industry sectors

Diagram 1 shows the industry sectors of the companies of the sample¹.

The first 5 sectors (mechanical manufacturing, electric and electrical devices, automotive, food and beverages and furnishing) make up 72% of total responses.

¹ All the companies answered this question.

3.2 Number of employees

Diagram 2 shows the number of employees of the companies of our sample².

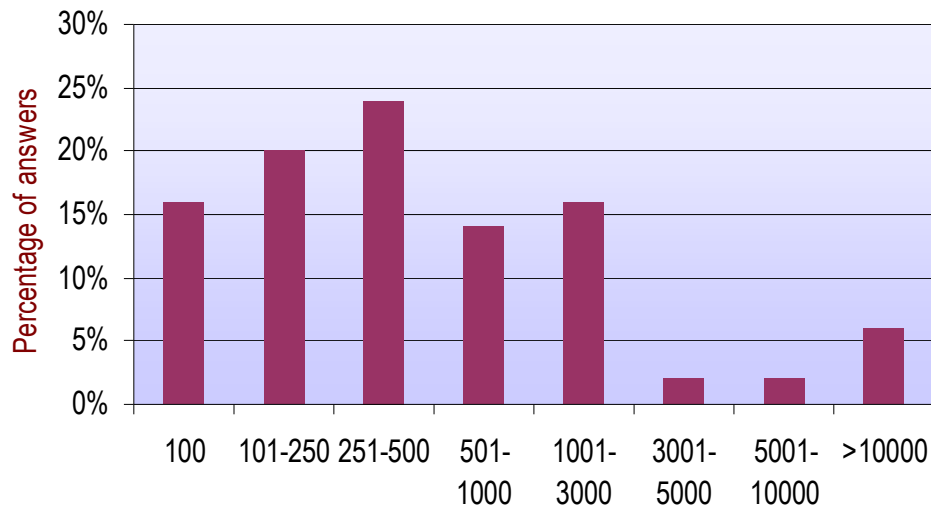


Diagram 2: number of employees

Regarding the number of employees:

- 60% of answering companies have between 100 and 500 employees
- 26% of answering companies have more than 1000 employees
- The mean number of employees of the sample is 1396 (847 not counting the companies with more than 10.000 employees)

² The classes in which we divided the answers don't have the same width, but are defined to simplify the classification. 50 companies answered this question

3.3 Turnover growth and profitability

In this part of the report the answers about turnover growth and profitability during last year will be analysed.

Diagram 3 shows turnover growth³.

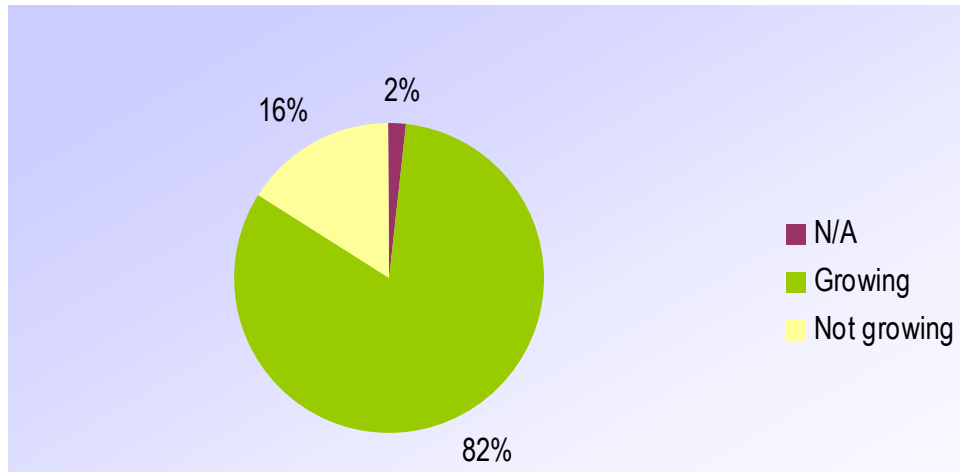


Diagram 3: turnover growth

Diagram 3 shows that most of the companies (82%) registered a growth of turnover during last year. This data does not match with the mean data of Italian industry, which, in 2005, had to face a very difficult period.

The causes of this divergence can be three:

- Low response rate from companies that are facing a difficult period
- The companies interviewed are probably best in class, or, at least, very competitive in their own sectors
- High performer naturally want to confront themselves with other companies

³ 50 companies answered this question.

Diagram 4 shows the profitability of the companies during 2005⁴.

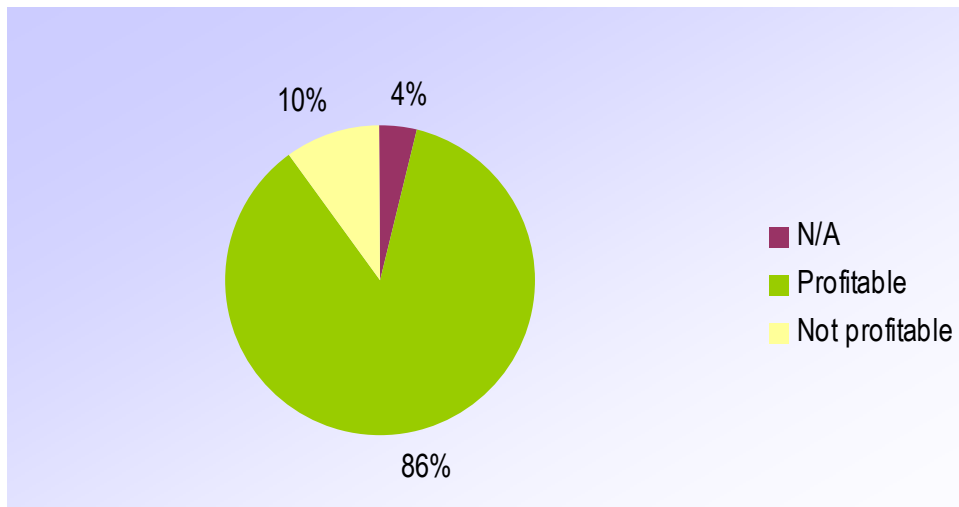


Diagram 4: profitability

As for the turnover, profitability shows that the companies of the sample had much better result than Italian mean companies: 86% of the companies declare to be profitable.

Finally, Diagram 5 shows a compared analysis of the two data⁵

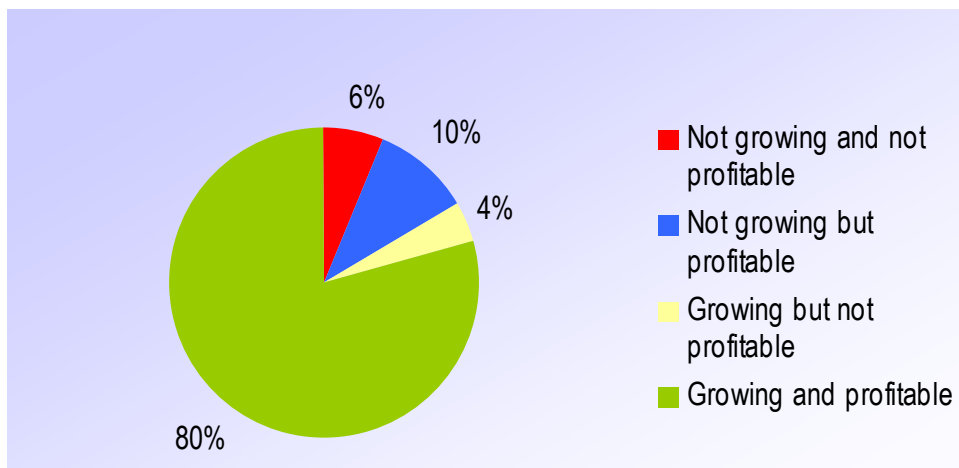


Diagram 5: comparison between turnover growth and profitability

Diagram 5 shows that 80% of the companies are in the best situation: turnover is growing and the company is profitable.

10% of the companies are profitable, even if the turnover is not growing.

⁴ 49 companies answered this question

⁵ 49 responding companies

The situation of the companies with turnover growing but not profitable (4%) is a little harder: even if they are growing, they are not able to create value. Anyway, turnover growth could mean that they are about to exceed the crisis, and it could lead them to reach the break even point and become profitable again.

Only 6% of the companies are in the worst situation: turnover is not growing and they are not profitable.

This preliminary analysis of the sample shows that it is probably a representation of the most competitive companies, and not a representation of Italian mean companies.

This particular feature of the sample does not diminish the significance of the research, but increase it because allows to show the features of an “elite” panel of companies, that can be used as an example of what the most competitive companies are doing (and what they plan to do) to solve the most critical aspects in operations management.

4 Survey results

In this part of the report we'll analyze in a detailed way the results of our research, showing in a complete way the answers given to all the questions of the questionnaire.

4.1 Performance indicators

Diagram 6 shows the most important performance indicators used in the last three years to evaluate operations results⁶.

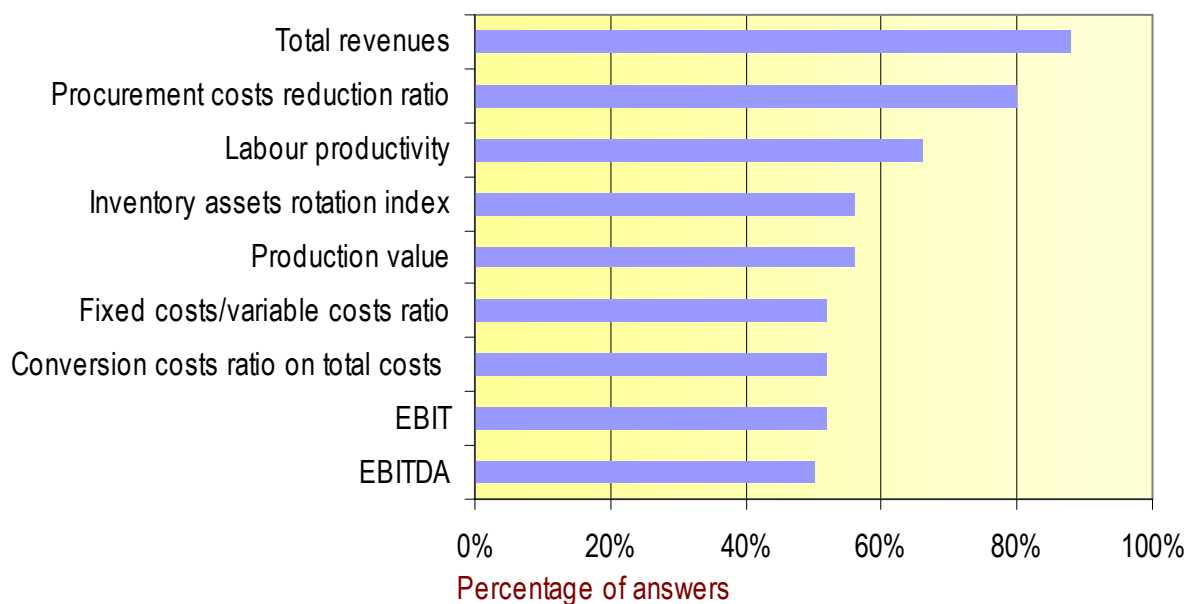


Diagram 6: most important performance indicators used in the last 3 years

As the diagram shows, the most important indicator used by companies to evaluate operations performances is total revenues, marked by 88% of the sample. The great importance given to revenues could mean that the main objective of companies is growth.

On the other hand, the importance given to revenues could mean that companies are very close to break even point: a worsening in revenues could lead them under break even point, making them not profitable. In this scenario, total revenues could be used as an indirect measure of profitability.

There are also 4 productive indicators in the panel:

- 2 indicators about cost structure: “fix cost/variable cost ratio” and “conversion cost ratio on total costs”

⁶ The diagram only reports the performance indicators marked as “high relevance” by at least 50% of answering companies.

All the companies answered this question.

- Labour productivity (which is more “operative” than the 2 indicators listed above)
- Inventory assets rotation index, which measures the reduction of circulating capital. The high importance given to this indicator is probably due to the fact that many of the companies of the sample recently started (or are planning to start in the next 3 years) programs of lean production, which, as can be seen in paragraph 3.6.1 of this report, is the improvement program marked by the highest number of companies of the sample

There are finally two marginality indicators in the panel (EBIT and EBITDA), another turnover indicator (total revenues) and a procurement indicator (procurement cost reduction ratio).

As said in the introduction, a subgroup of excellent companies and one of companies that are facing a difficult period have been identified. It is very interesting to compare the indicators used by the two groups to see if they evaluate the same performances or not. Diagram 7 shows the indicators used by high performer, low performer and by the whole sample.

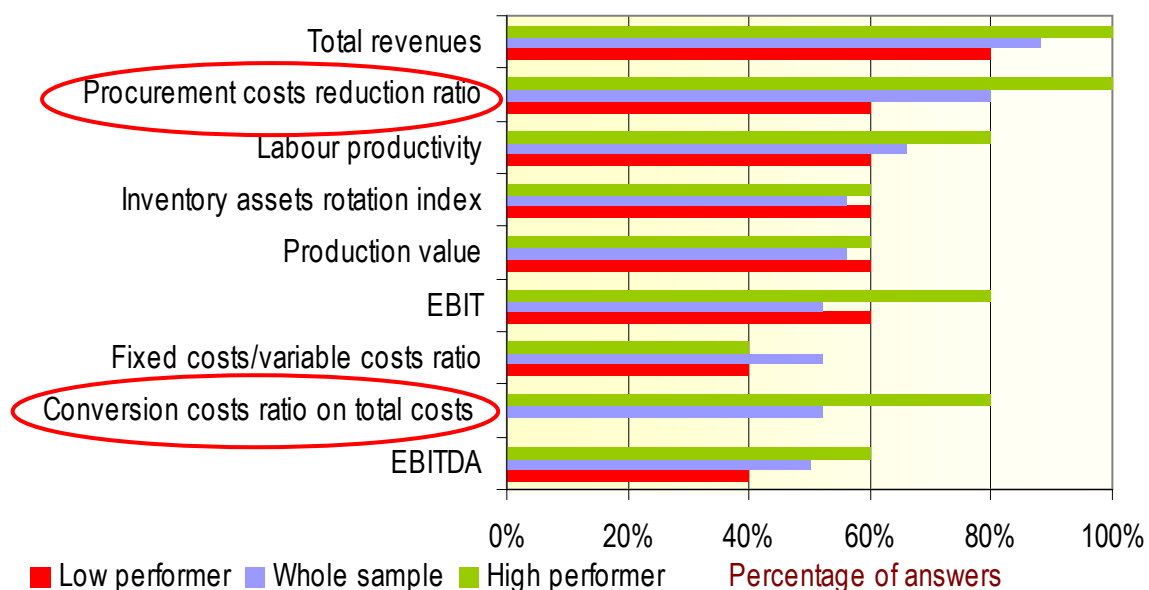


Diagram 7: most important performance indicators used, comparison between high and low performer

The three clusters use more or less the same indicators. Anyway, there are two relevant differences between high and low performer that should be analyzed: first of all “conversion cost ratio on total costs”, used by 80% of high performer and by no one of the low. The companies with worst performances do not control their cost structure, so they probably have difficulties in finding negative variations and, most of all, they can’t probably find the best areas where to focalize improvement actions.

The second difference is about “procurement costs reduction ratio”, marked by 100% of high performer and 60% of low.

Diagram 8 shows the course of the indicators we described above in the last three years⁷. The indicators are listed in the same order of Diagram 6.

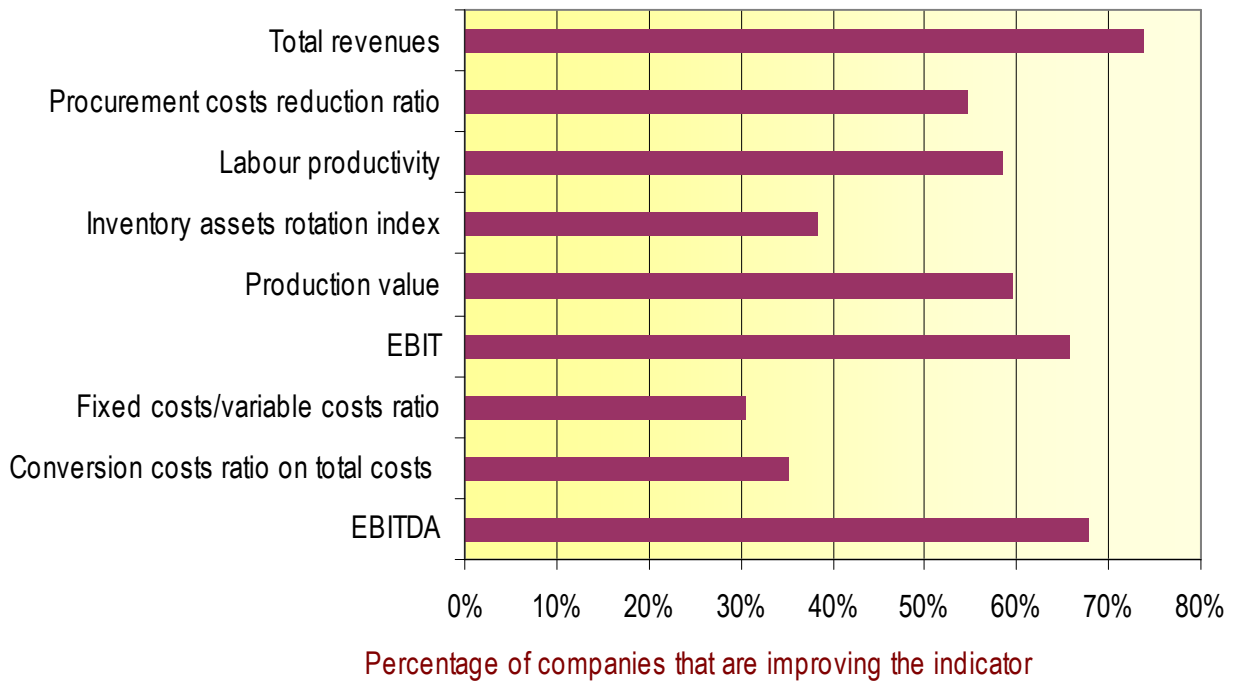


Diagram 8: course of most relevant indicators in the last three years

The diagram report the percentage of companies that, in the last three years, increased the indicator by at least 2%.

The best results has been achieved on total revenues, which has been improved by 74% of the sample (this data confirms the analysis of Paragraph 2.3 about turnover growth).

Very good results has been achieved on marginality too: EBIT and EBITDA have been increased by 65% and 67% of the sample. The analysis of these three results confirms the hypothesis made before: marginality is probably the main target of sample’s companies, and total revenues is used as an indirect measure of it.

Analysing the other indicators we can understand how this marginality is achieved: lowering procurement cost (55% of the companies) and improving labour productivity (59%) with a number of actions that we’ll study in paragraph 3.6.

⁷ Only the companies who marked the single indicator as relevant answered this question.

On the other hand only 30% of the companies was able to improve “fixed cost/variable cost ratio” and “conversion cost ratio on total costs”: this could mean that Italian companies have difficulties in making themselves flexible adapting their productive system to the new features of demand. This hypothesis will be confirmed in *paragraph 3.7*, where flexibility will be marked as the first critical aspect for operations by the companies of the sample.

It is useful to compare the main differences in the results obtained by high and low performer⁸.

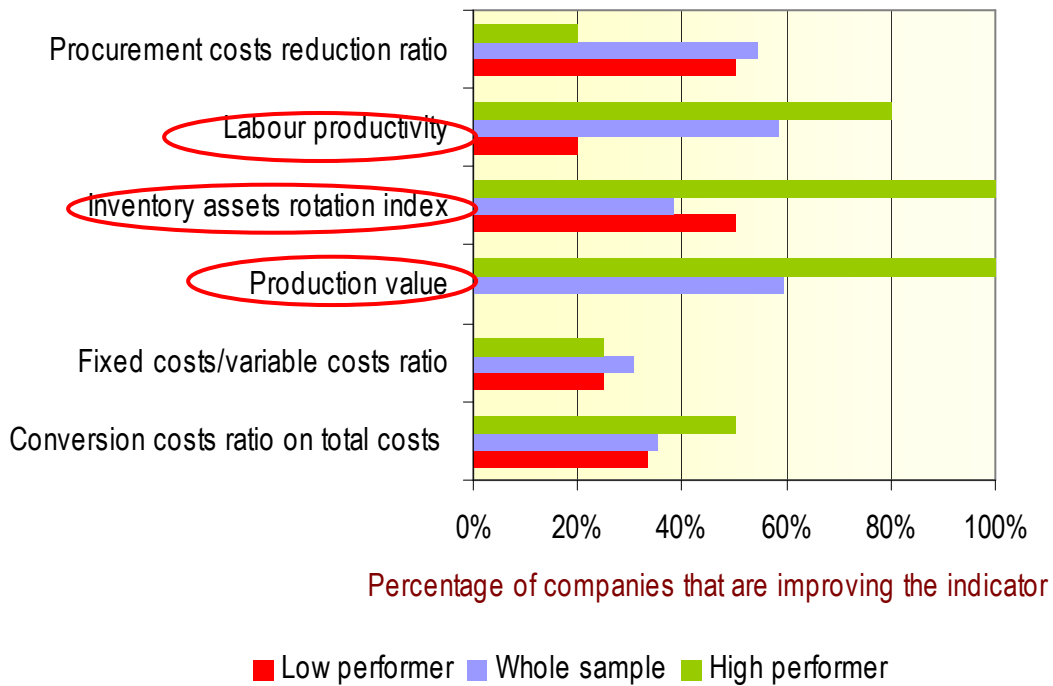


Diagram 9: course of most relevant indicators in the last three years, comparison high-low performer

Diagram 9 shows relevant differences between high and low performer.

First of all, all high performer are increasing production value, while no one of the “low” is increasing this indicator. This result is a direct consequence of the fact that all high performer are strongly increasing their total revenues, while low performer are facing a stationary or a decreasing situation.

The difference about labour productivity is much more interesting: the most competitive companies are implementing improvement plan aimed to increase efficiency (80% of them is increasing this indicator). Only 20% of low performer is improving this indicator.

The last difference is about inventory assets rotation index: all high performer are increasing this indicator, while only 50% of low and 38% of the whole sample are doing the same.

Finally, we can see that low performer have better result on “Procurement cost reduction ratio” than high performer: this is probably due to the fact that high performer have been working on this indicator for years,

⁸ In total revenues, EBIT and EBITDA are not included in this analysis because they were used to select the two clusters

and now have stable contracts with their supplier, while low performer are just beginning to work on suppliers relationship.

A second reason could be that purchasing offices of low performer companies are evaluated only on “procurement cost reduction ratio” (which becomes the most important goal for them), while high performer evaluate aspects like quality, punctuality of deliveries etc. too.

4.2 QCD levels

Diagram 10 shows the result achieved by the companies of the sample in QCD (quality/cost/delivery) performances in the last three years and the ones estimated for the next three years⁹.

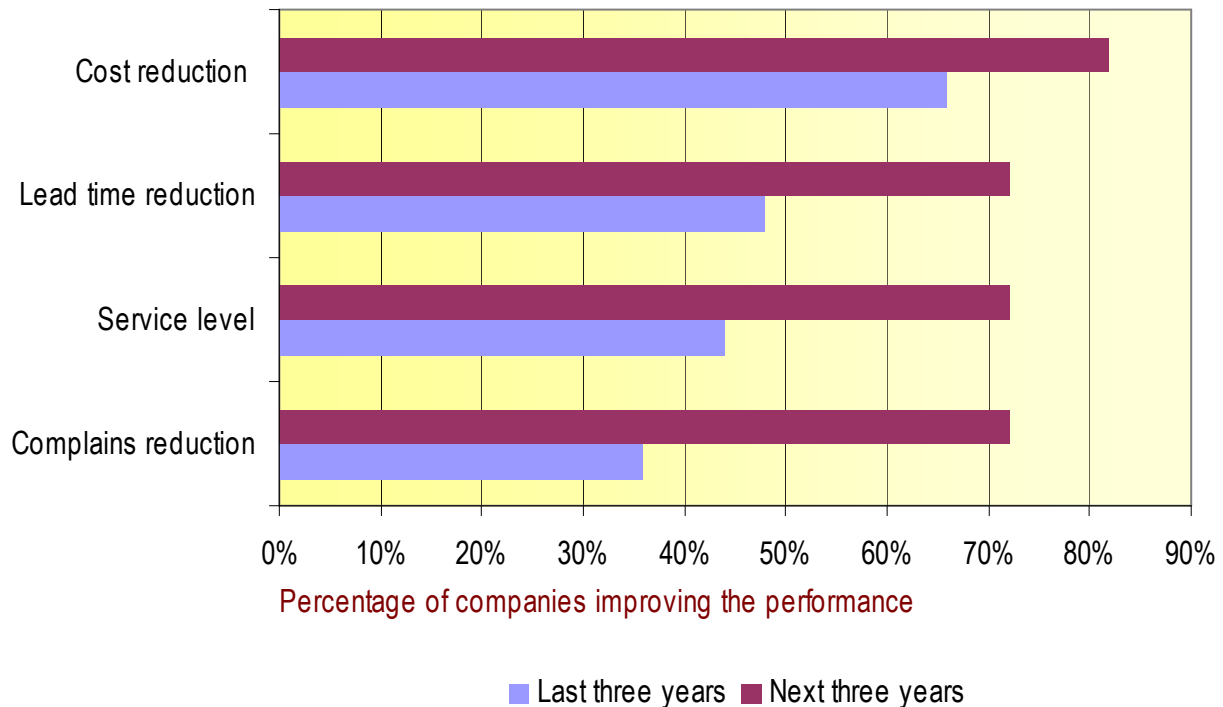


Diagram 10: improvement in QCD performances

This diagram shows the percentage of companies that improved the performance by at least 2%.

First of all lets analyse the results achieved in the last three years (represented by blue bars on the diagram).

The performance with the best result is cost reduction, which has been improved by 66% of the sample.

Quite good results has been achieved on the two delivery performances too: lead time has been reduced by 48% of the companies and service level has been improved by 44%.

Smaller results has been achieved in complains reduction: only 36% of the sample improved this performance in the last three years.

For the next three years cost reduction will remain the first improvement area, but major improvement are previewed for all the performances. There could be two reasons:

- “optimism effect”: companies probably overestimate the effect of the improvement actions they are going to start in next years
- companies feel the necessity to improve their performance in each area to be competitive.

⁹ All the companies answered this question.

It is very interesting to compare the results obtained by high performer with the ones of the “low”:

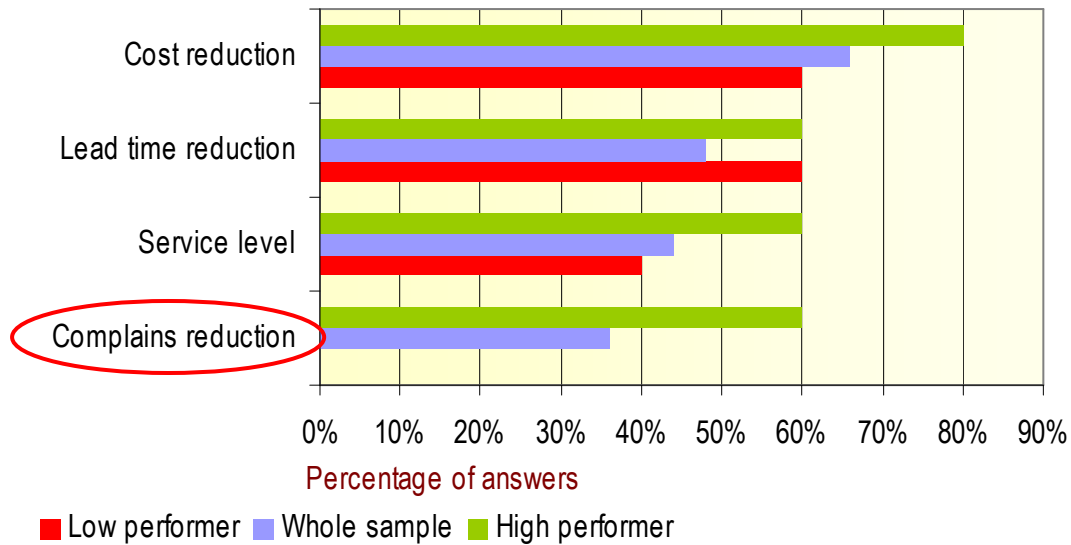


Diagram 11: improvement in QCD levels, comparison best-low performer, last 3 years

Both high and low performer focalised on cost reduction during the last three years, like the rest of the sample did.

The real difference is claim reduction: it has been improved by 60% of high performer, 36% of whole sample and no one of the low.

High performer can improve their performances in all fields, while low performer are obliged to “abandon” quality in order to reduce costs (because they have a strong trade off between these two performances).

This analysis is very important because it shows one of the biggest differences between high and low performer: quality. Quality is the first performance on which companies reduce investments when they are facing a difficult period because the effects of investments in quality can be seen on long term, while cost reduction and lead time reduction have short term effects.

4.3 Production scheduling

Diagram 12 shows production's planning frequency used by responding companies in the last three years, now and the one they will use in the next three years¹⁰.

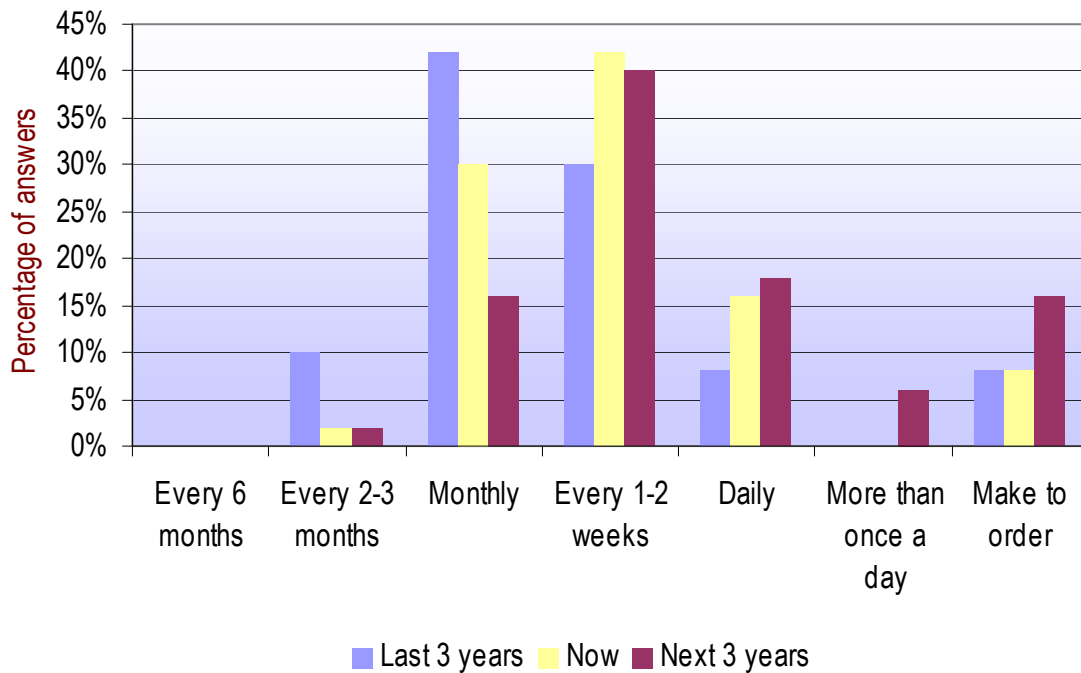


Diagram 12: production's planning frequency

A comparison between the actual situation and the one of the last three years shows a very strong trend that lead from a monthly frequency to a weekly or lower frequency. The course of the next three years confirm this trend: the percentage of companies with a monthly planning diminishes from the 42% of 2003 to the 16% of 2009.

Diagram 13, which combines data in two categories (excluding "make to order" choice), shows the described trend in an easier way:

¹⁰ All the companies answered this question

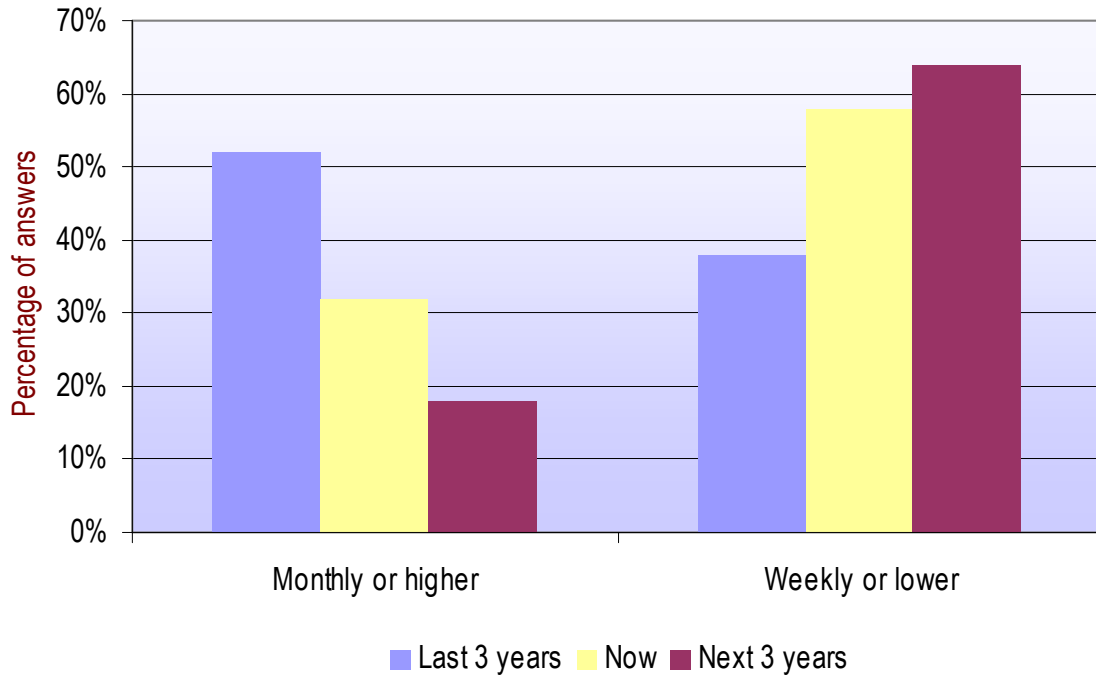


Diagram 13: production's planning frequency combined in two categories

In the last three years, the percentage of companies with a monthly or greater planning frequency diminished by 52% to 32%. In the next three years only 18% of the companies will continue to use this horizon. On the other hand, the percentage of companies with a weekly or lower planning frequency increased from 38% to 58% in the last three years, and will reach 64% in the next three years.

The reduction of production's planning frequency is one of the techniques that companies are using to increase their structural flexibility and make their productive system aligned with demand and capable of following its changes.

It is finally important to remark that reducing production's planning frequency isn't good in itself: there are certain sectors that did not change their features in the last years, and have very stable and expectable demands. In these sectors monthly production's planning is probably the best solution companies could make.

As for production's planning frequency, high and low performer show exactly the same trend shown by the sample, so a separate analysis about this performance wouldn't be interesting.

4.4 Scope of operations-Monodzukuri

As already said in the preface of this report, Japanese idea of Operations is wider than European one. This paragraph try to understand which functions are considered part of operations by Italian companies.

Diagram 14 shows the functions which directly respond to operations direction¹¹.

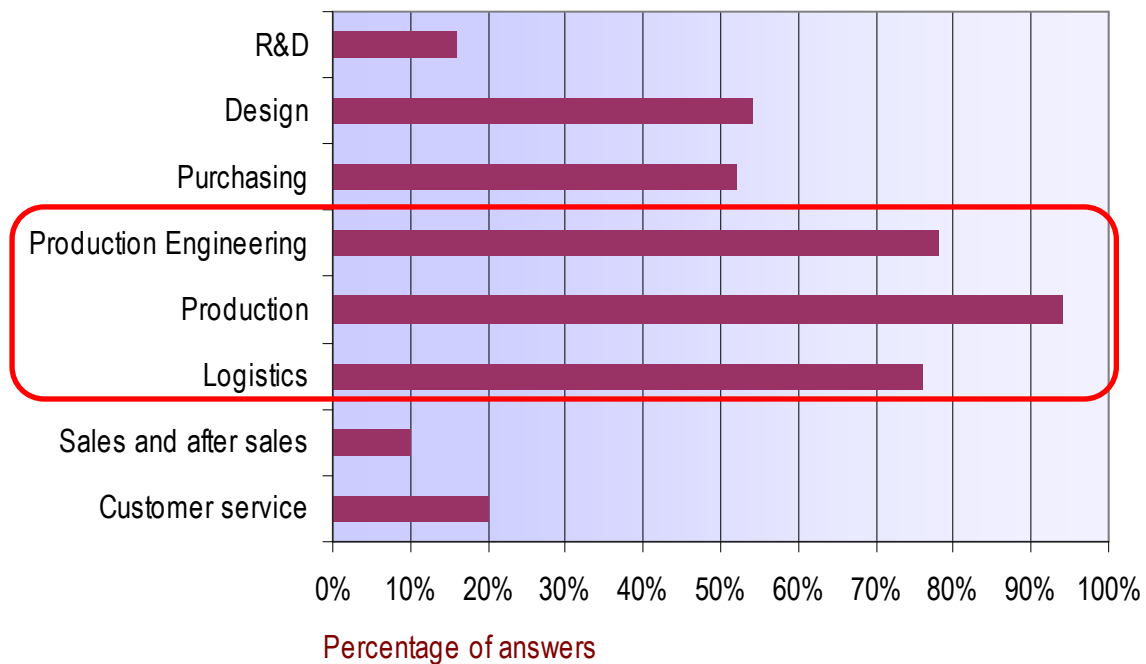


Diagram 14: functions which are part of operations-Monodzukuri

Diagram 14 confirms the hypothesis made: the heart of operations, for Italian companies, is represented by production (marked by 96% of the companies) placed side by side with industrial engineering (78%) and logistics (76%).

The 52% of companies considering purchasing as part of operations is compatible with the results of paragraph 3.1, where purchasing cost reduction was indicated as the second performance indicator to evaluate operations results.

Sales and customer service are rarely included in operations.

On the other hand, the situation of R&D is critical: only 16% of the companies marked it as part of operation. In markets where product life cycles are becoming shorter and shorter a complete cooperation between R&D and operations is a critical factor for company's success. Paragraph 3.7 will show that this lack of cooperation with R&D creates a lot of problems not only to R&D function, but to cost and quality too.

¹¹ All the companies of the sample answered this question

4.5 Industrial engineering and productive systems

Diagram 15 shows the course of industrial engineering investments in the last three years and the one expected for the next three years¹².

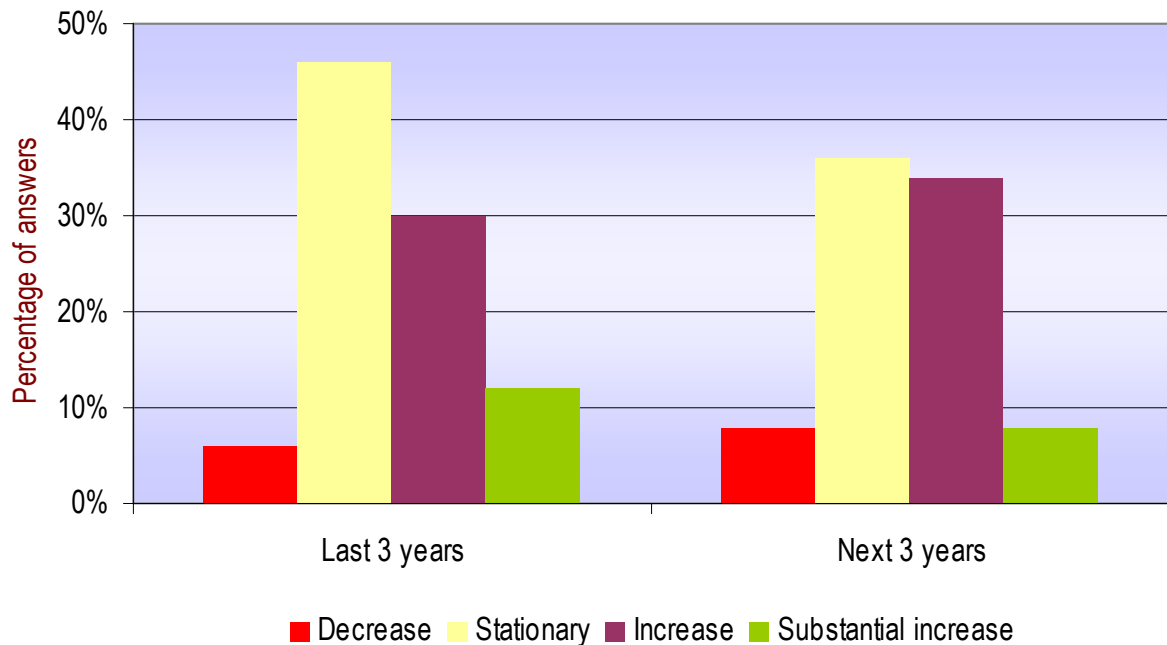


Diagram 15: course of industrial engineering investments

In the last three years, 46% of the companies had stationary investments in Industrial engineering, while 42% increased them. This 42% is composed by a 12% who substantially increased investments (increase >10% in the last three years) and by a 30% that increased investments between 2% and 10%.

Only 6% of companies decided to decrease investments.

As for the next three years, there's a great number of companies who did not answer the question (14% versus the 6% of the last three years). This is probably due to the fact that people do not know company strategies concerning industrial engineering: most of the companies who did not answer this question did not consider industrial engineering as part of operations.

Analysing the answers, the situation in the next three years is very similar to the one of the last three ones: the majority of the companies (70%) answered "stationary" or "increase", so the investment changes are comprised between -2% and +10%.

Lets now compare high performer investments with low performer ones:

¹² 47 responding companies for the last three years and 43 for the next three ones

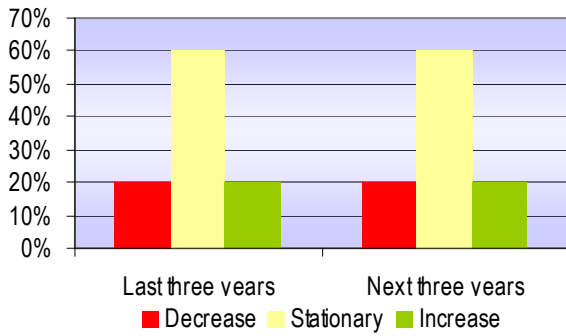


Diagram 16: I.E. investments, low performer

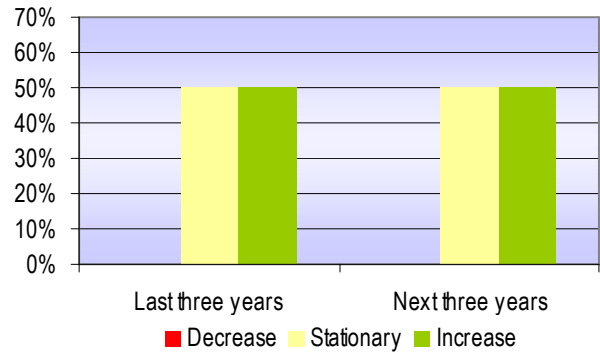


Diagram 17: I.E. investments, high performer

There is a different strategy between high and low performer: low performer have a conservative strategy both in the last three years and in the next three ones, while high performer can be divided in two groups. The first one have a conservative strategy too, while the second increase its investments in a very strong way.

Diagram 18 shows the course of investment in productive systems¹³.

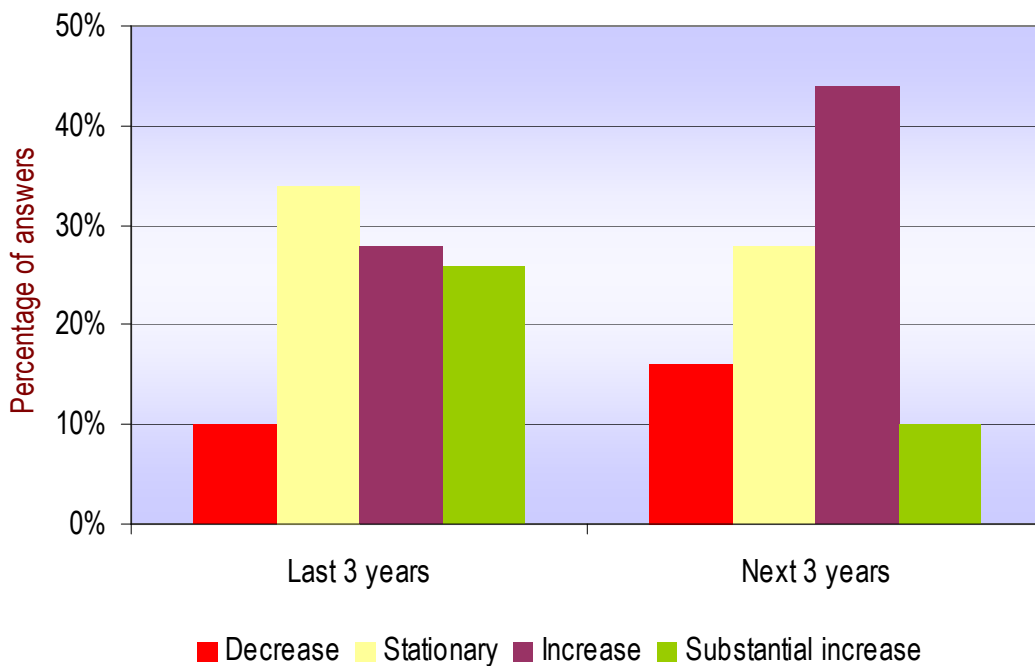


Diagram 18: course of investments in productive systems

In the last three years a very strong increase in productive systems has been registered: 54% of the companies decided to increase them, composed by a 26% of substantial increase (>10%) and 28% of normal increase.

¹³ The percentage of companies who did not answer this question is 2% for both the last three years and the next three ones

On the other hand, 10% of the sample decided to decrease investments, while 26% had stationary ones.

Analyzing the next three years situation, some differences can be seen: the increasing trend remains the same (54% of the companies are going to increase investments, as in the last three years), but this percentage is composed in a different way. Only 10% of the companies will substantially increase their investments in productive systems, while 44% plan to increase them between 2% and 10%.

The same trend can be seen in the companies that do not want to increase investments: the percentage of companies who will decrease investments grows from 10% to 16%.

This trend probably means that the companies that invested a lot of money in the last three years are now lowering a bit the increase because they want to wait and see the effect of the investments they made.

As for high and low performer:

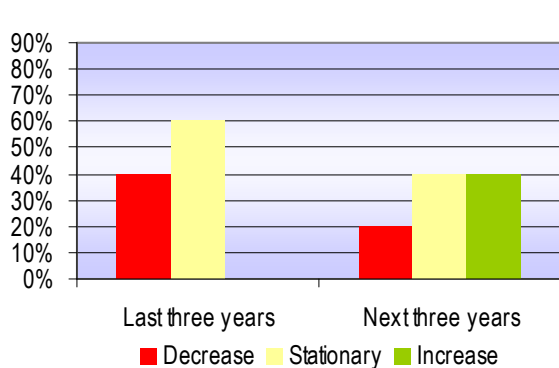


Diagram 19: low performer

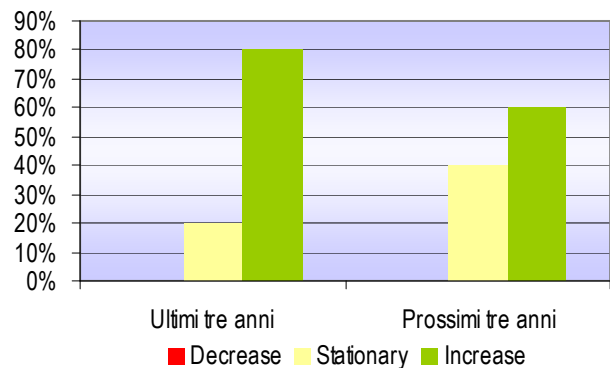


Diagram 20: high performer

In the last three years high and low performer had completely different strategies: low performer had stationary investments (60%), or decreased them (40%), while 80% of high performer increased their investments (60% strongly increase, 20% increase) and no one of them decreased.

In the next three years low performer will slightly increase their investments, while “high” will slightly decrease, probably because they want to see the results of the ones they did in the last three years.

4.6 Improvement programs

In this section of the report will be analysed the most important improvement programs that companies are going to implement in the next three years¹⁴.

The answers are grouped in three categories:

- **Management solutions:** cell production systems, job design, low cost automation, optimization, quality improvement techniques, maintenance, focused improvement, just in time and lean production
- **Technological solutions:** manufacturing technologies, tools design, equipment design, core technologies, basic technical, robotization, full automation
- **Information technology solutions:** IT solutions for new products, IT solutions for production management, IT solutions for maintenance management, IT solutions for production scheduling, IT solutions for product/process quality management

Diagram 21 shows the percentage of companies that are going to adopt at least one improvement solution in the different groups:

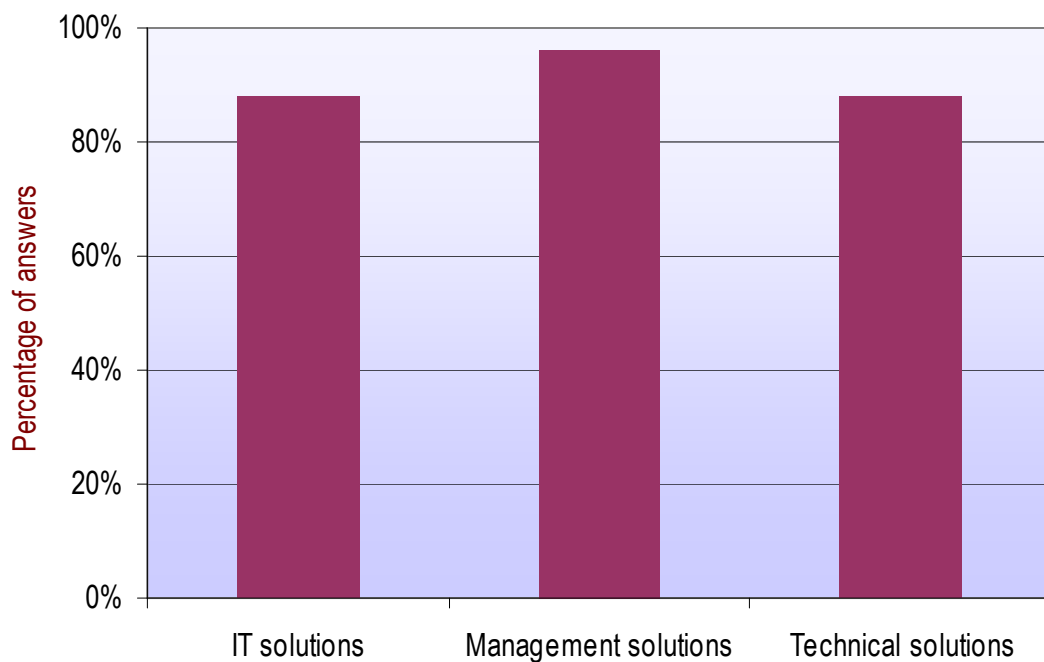


Diagram 21: companies who are going to adopt at least one improvement action in the groups

¹⁴ In the questionnaire the question was a unique list of alternatives, between which a multiple choice could be made (all the companies answered this question)

Diagram 21 shows that the majority of companies is going to adopt at least one improvement action in each group: 78% of the companies will have at least one solution in each area, 20% in two, 2% in only one and no one will not implement any solution.

Now all the three groups will be analysed to see which are the most popular actions.

4.6.1 Management solutions

Diagram 22 shows the ranking of management improvement actions.

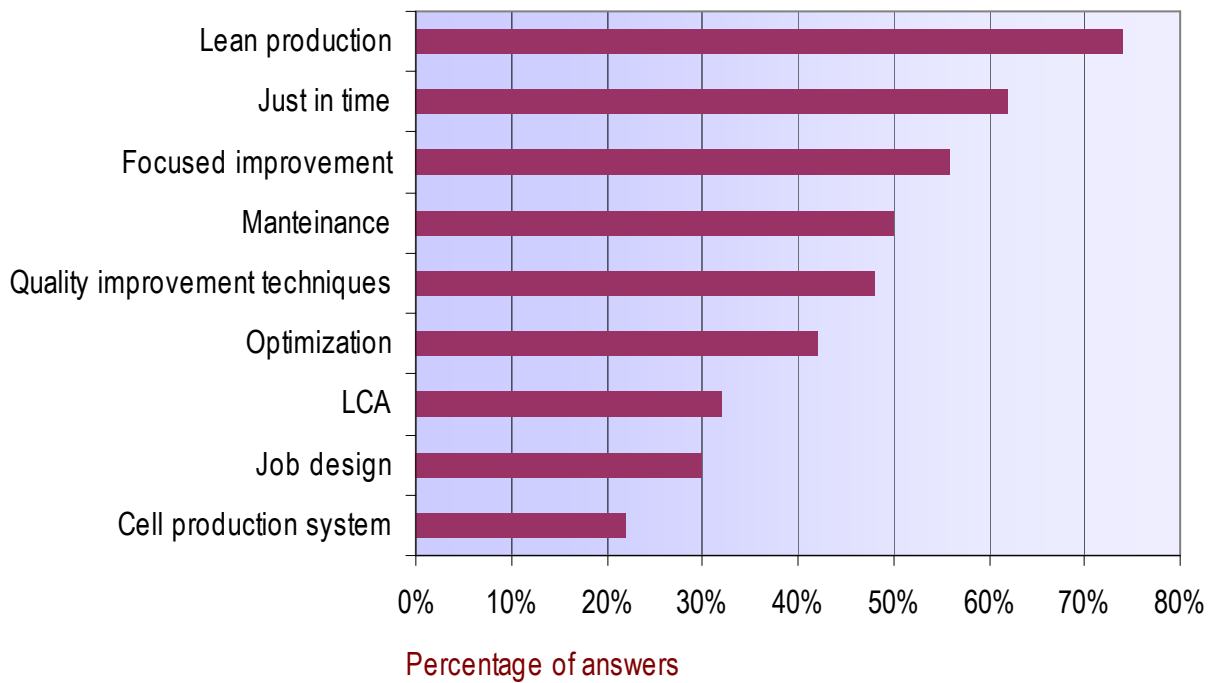


Diagram 22: *improvement programs, management solutions*

The diagram shows that Japanese methodologies (lean production, Toyota production system, kaizen, TPM) are facing a “second youth”. 74% of the companies will in fact adopt lean production techniques, 62% just in time and 56% focused improvement programs.

This analysis confirms that Italian companies are working to reduce the gap with Japanese and American ones in process optimization.

4.6.2 Technological solutions

Diagram 23 shows the ranking of technological solutions.

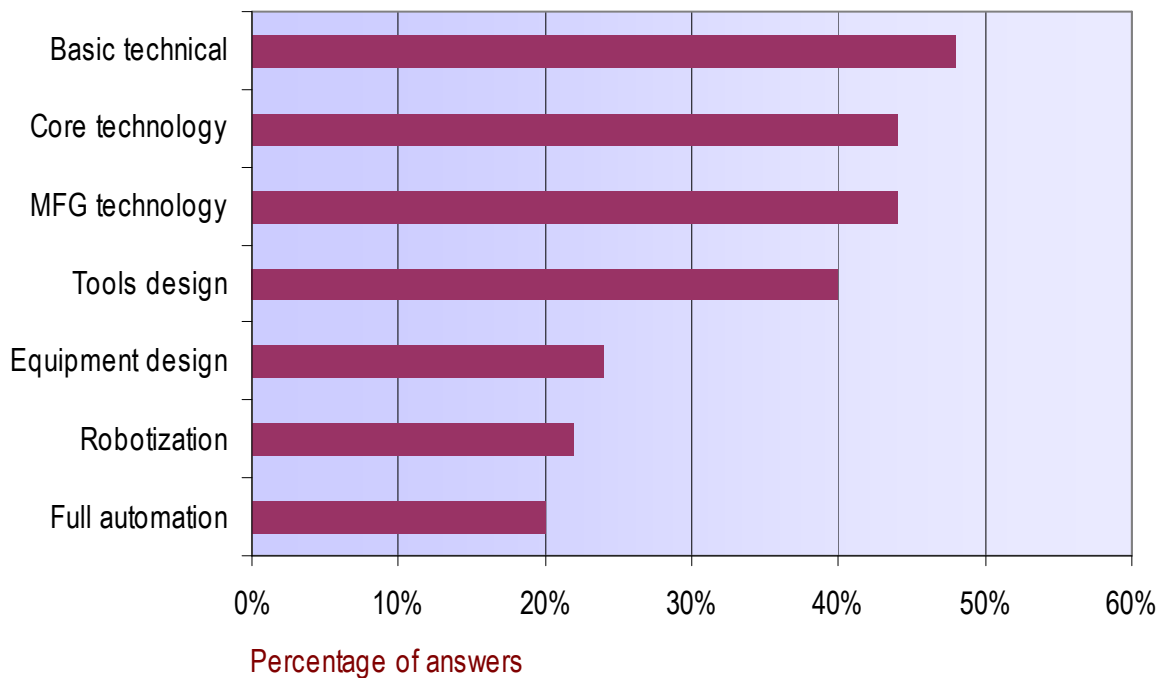


Diagram 23: improvement programs, technological solutions

The first thing that can be noticed analysing *Diagram 23* is that there is not one program with much more answers than the others: no one of the actions reported a percentage of answers greater than 50%.

On the other hand, it is very interesting to see which solutions have not been marked: full automation and robotization are in the last two positions, while they were very popular a couple of years ago.

In order to reduce production costs companies don't want to build completely automated plant that can work without people inside, but they are looking for solutions that can increase labour productivity.

4.6.3 IT solutions

Lets finally analyze the information technology solutions that companies will adopt in the next three years, that are represented in *Diagram 24*.

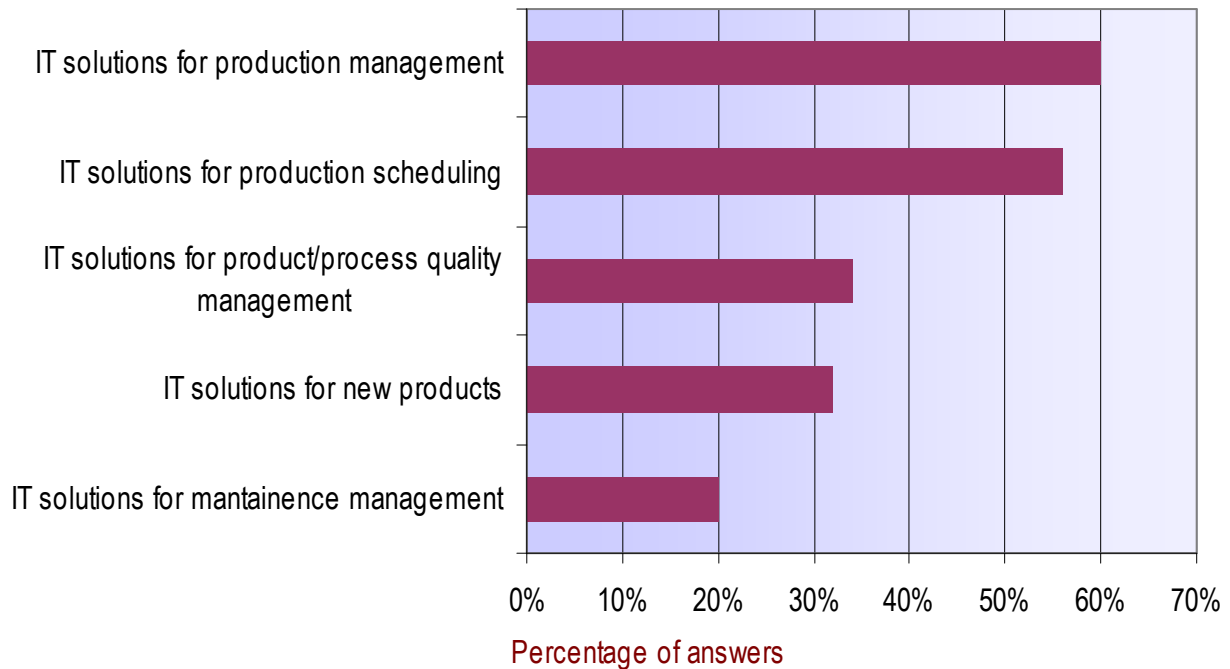


Diagram 24: improvement programs, IT solutions

The result given by *Diagram 24* is very interesting: the first two solutions are connected with production and scheduling management.

Paragraph 3.3 shown that, in the last three years, a great number of companies decided to increase the planning frequency from monthly to weekly, and in the next three years many others will follow this example.

In this scenario, the use of IT instruments becomes necessary, and Italian companies understood this and are moving in the right way.

4.7 Critical aspects in operations Monodzukuri

This chapter will analyse the most important critical aspects inside Operations Monodzukuri.

Diagram 25 shows the most important critical aspects faced by operations managers in the last three years¹⁵.

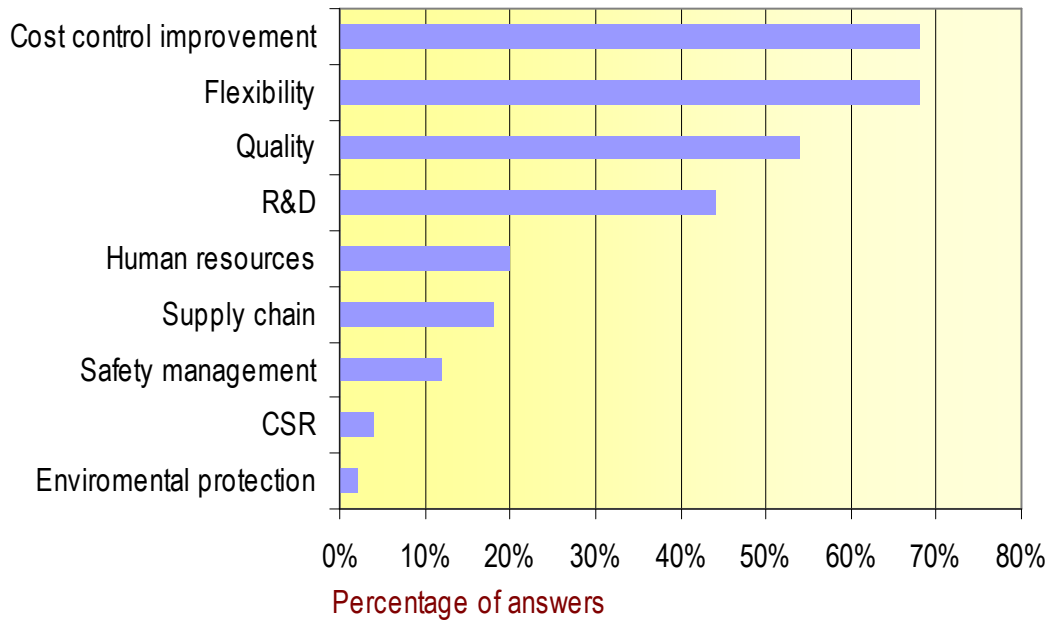


Diagram 25: critical aspects in operations Monodzukuri in the last three years

In the last three years, companies faced a “return to basics”: cost control (marked as critical by 68% of the companies), flexibility (68%) and quality (54%).

Great importance must be given to the 44% of R&D answers: this shows how, even if R&D is considered part of operations only by 16% of the companies (as we seen in *paragraph 3.4*), it is considered a critical aspect in operations.

Diagram 26 shows the critical aspects in operations for the next three years (the diagram reports the data of the last three years too, to make it easier to see differences)

¹⁵ The sum of percentages does not give 100 because each company could mark up to three critical aspects (in order of relevance)

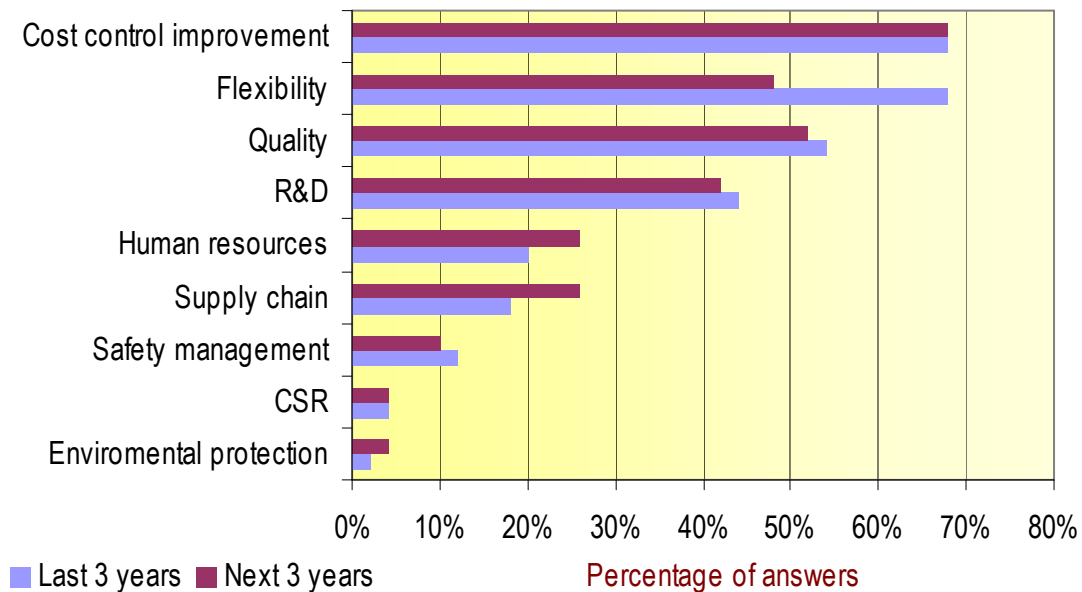


Diagram 26: critical aspects in operations Monodzukuri, next three years

In the next three years cost control will remain the first critical aspect in operations management, marked by 70% of the companies. The percentage of companies that marked quality changed from 54% to 52%.

The greatest difference is the one concerning flexibility: while in the last three years it was considered the first critical aspect side by side with cost control (marked by 68% of the sample), in the next three years will only be the fourth critical aspect, marked by 48% of the companies.

There could be many reasons for this difference: on the one hand the increase of production’s planning frequency and all the management investments seen in *chapter 3.6* increased companies flexibility. On the other hand the actual situation of economical re-growth could probably reduce the importance of this factor.

Human resources and supply chain management, which are usually considered “support” functions, increased their relevance by 6% and 8%.

The mediocre result of safety management was expected: even if it is a very “delicate” aspect (it has to be a “conditio sine qua non”), it can’t grant a competitive advantage to the companies.

Lets finally take a look at the critical factors of the next three years considering only the first choice made by each company.

As can be seen in *Diagram 27*, the result is quite amazing: 24% of the companies marked R&D as the first critical aspect in operations Monodzukuri, which result to be even more important than cost control and quality. Supply chain management obtains an interesting result too: the optimized management of network is becoming more and more important for companies success.

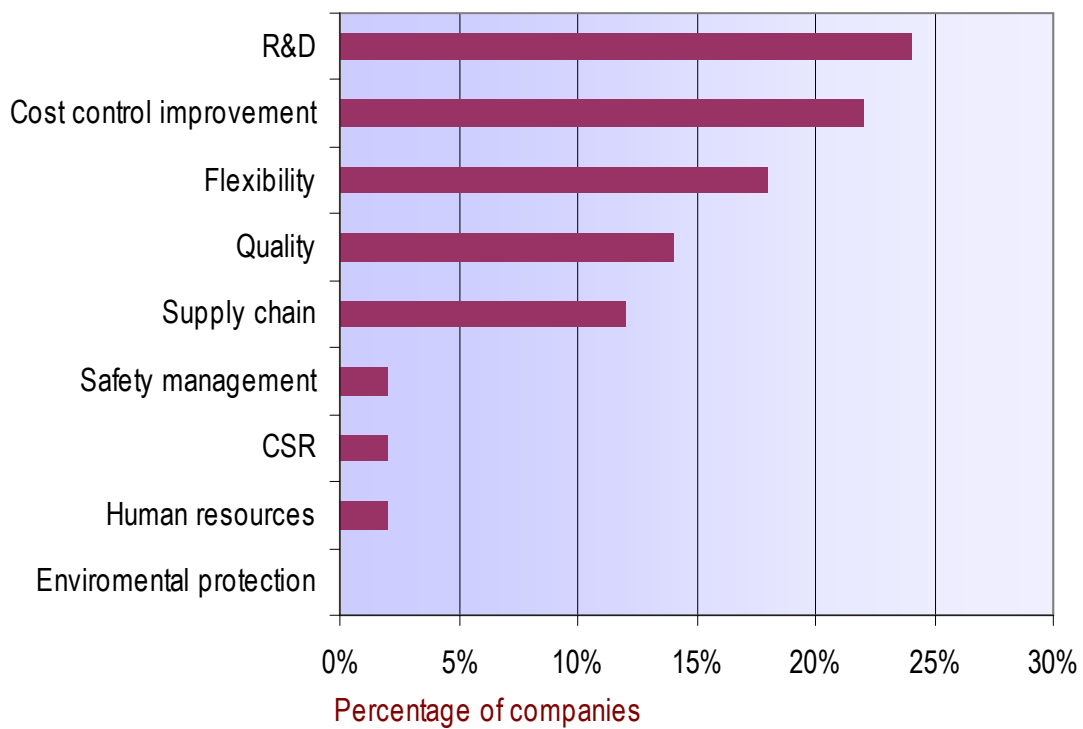


Diagram 27: critical aspects in operations Monodzukuri, next three years, first choice

In this paragraph of our report the most important critical aspects regarding operations management have been analysed.

In the next parts of the report we'll study the four most important critical aspects we found (cost control, flexibility, quality and R&D) to understand which are the reason why they had been chosen and the actions that companies are going to make to solve them.

4.7.1 Cost control

As seen in *chapter 3.7*, cost control is the most important critical aspect in operations Monodzukuri both in the last and in the next three years.

Diagram 28 shows the most important critical aspects inside cost control¹⁶.



Diagram 28: cost control, most important critical aspects

The first critical aspect in cost control is labour, materials and equipment productivity, marked by 75% of the companies. This is a typical “operation problem”, and a lot of the actions seen in *paragraphs 3.6.1* and *3.6.2* (as, for example, lean production, kaizen, TPM) aim to solve these productivity problems.

Even the second critical aspects is very interesting: 50% of the sample declared that their productive costs grow up when a new product is launched. This shows how the lack of cooperation between R&D and operations creates very serious problems.

At the third place there is the high labour cost, a problem shared by all the companies that works in occidental countries. This aspect becomes more critical when it goes side by side with an high level of rigidity, even if, in the last years, new kind of flexible contracts have been implemented.

¹⁶ Only the companies who marked cost control as critical aspect answered this question (40 companies). The sum of percentages does not give 100 because each company could choose up to three critical aspects.

Finally, fourth and fifth critical aspects are strongly linked with flexibility too: the mismatch between production system and demand characteristics dramatically reduce companies flexibility, and oblige them to face demand with high stock level (which increase total logistic costs).

We will now analyze the main actions that will be done to face the problems listed above:

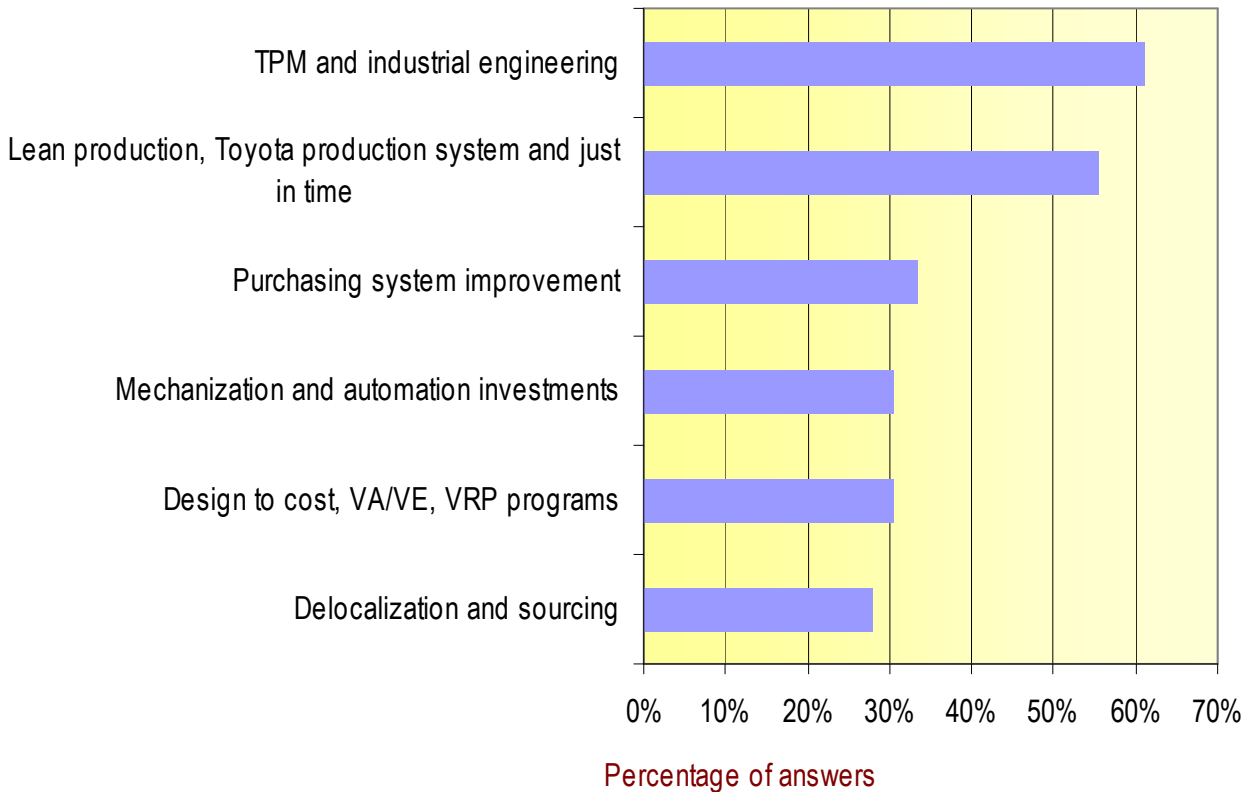


Diagram 29: cost control, main actions

The first two action confirm that lean production and Japanese techniques (from Toyota production system to industrial engineering focus) are really popular, as we saw in *paragraph 3.6.1*.

The companies of the sample want to improve their productivity adopting complex techniques in a structured way.

Finally, an analysis of the drivers that will be used to realise these improvement actions shows that the preferred ones are “using existing organization” and “using in house functional teams created ad hoc”.

By the way, looking only at the solutions which require a complex methodological approach (TPM and lean production), the percentage of companies that say that would use the help of consultancy companies grows up (22% for TPM and 31% for lean production). For these techniques a correct methodological approach is necessary to obtain good results and to maintain them.

4.7.2 Flexibility

Lets now analyse flexibility, which was the most important critical aspect side by side with cost control in the last three years but will decrease its relevance in the next three ones.

As done in the paragraph about cost control, the analysis will start with the most relevant critical aspects in flexibility, will continue with the improvement actions that will be done to solve these critical aspects and will finish with the driver that will be use to implement these actions.

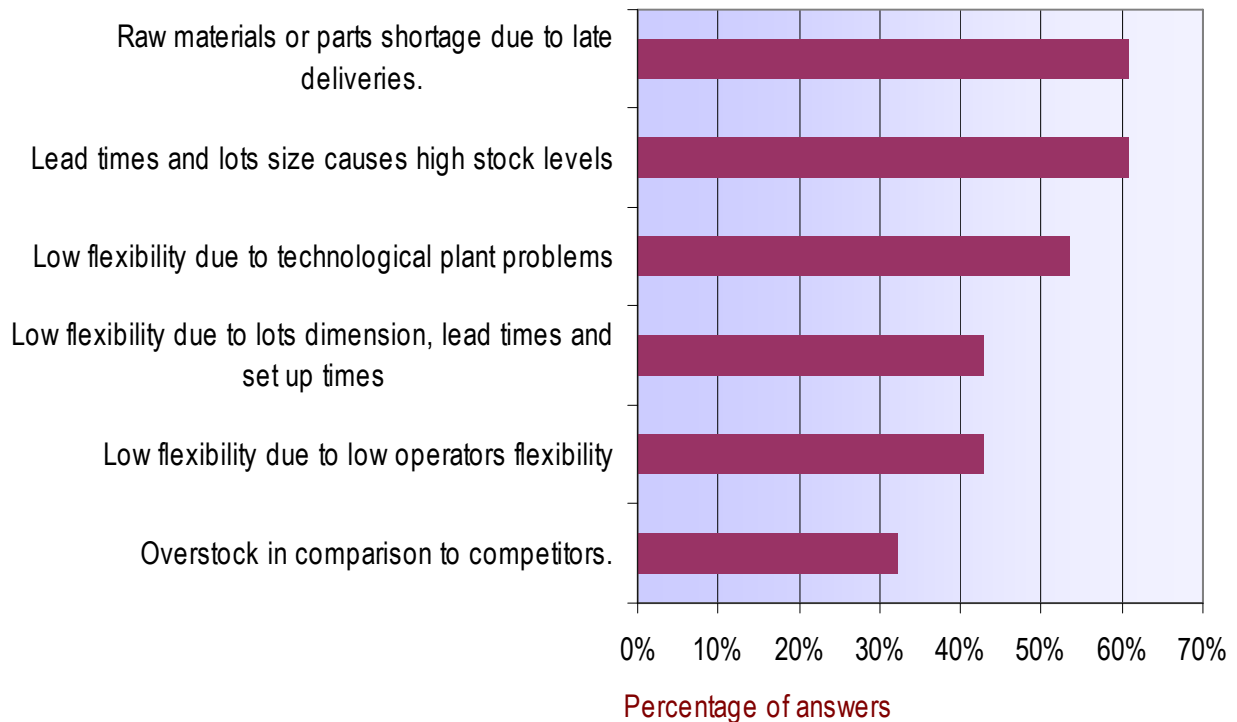


Diagram 30: flexibility, main critical aspects

Diagram 30 does not show a prevalent alternative: the answers are divided on all the alternatives proposed. Each company probably has his particular problems regarding flexibility, which depends from his internal features and from the features of his sector.

Diagram 31 shows the main actions that companies will do to solve the critical aspects listed above.

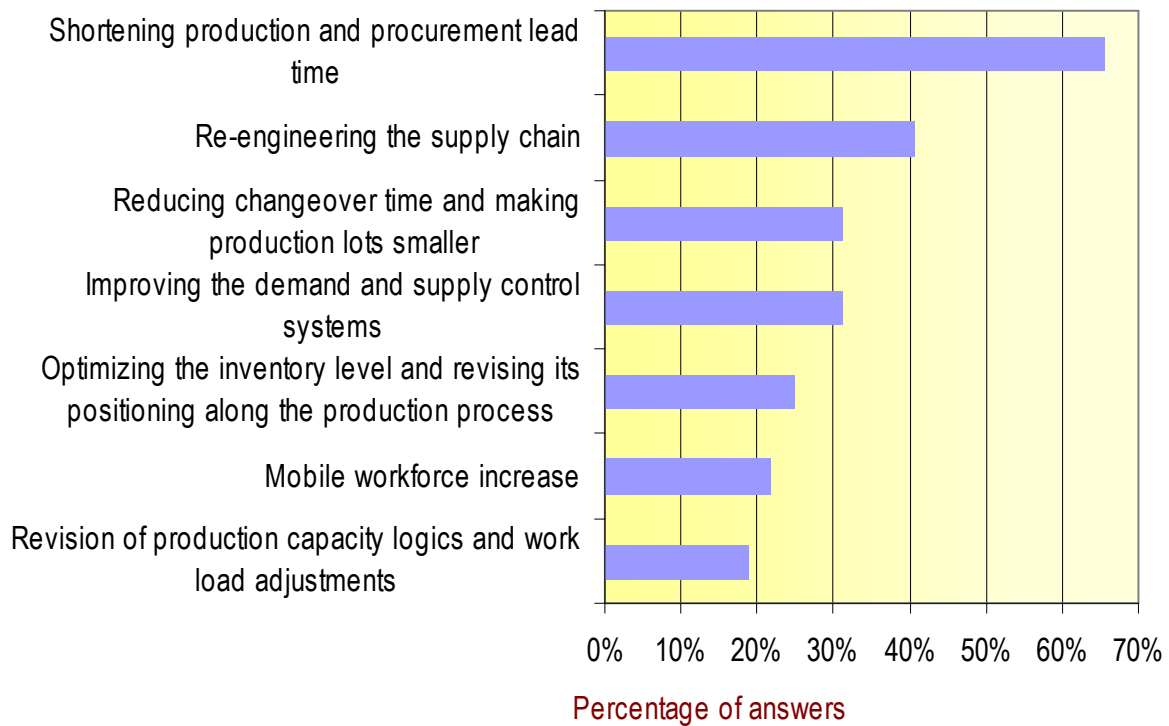


Diagram 31: flexibility, main actions

As for actions, there is a visible concentration of answers on “shortening production and procurement lead time” (65%).

The second action, re-engineering the supply chain (41%), confirms the growth of importance of supply chain management in operations.

For “shortening production and procurement lead times”, the preferred implementation driver is the use of internal inter functional teams (50%), followed by the use of existing organization (28%).

As for the supply chain re-engineering, which is a very actual subject of study, 30% of the companies wants to use the help of external consultancy society. This probably happens because many companies still don’t have internal competences on this subject, so they have to use external ones.

4.7.3 Quality

The analysis will now focus on quality, third critical aspect in the last three years and second in the next three ones.

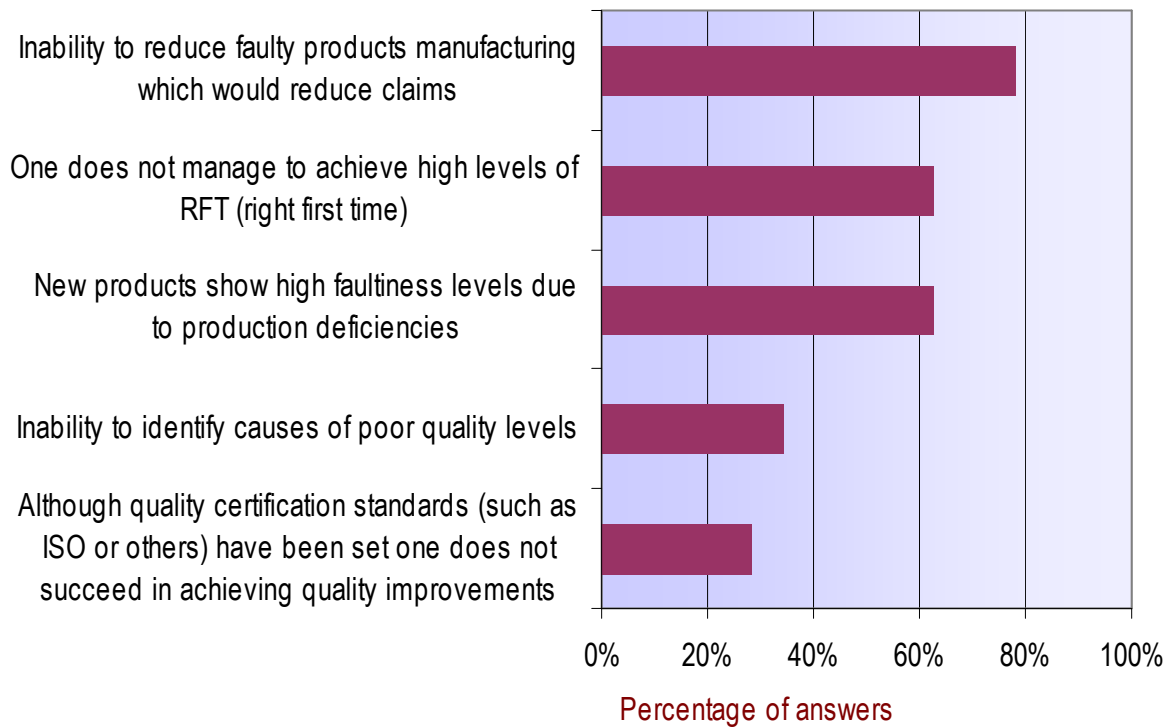


Diagram 32: quality, critical aspects

The first critical aspect, marked by 78% of the sample, is the inability to reduce claims. This result, that confirms what seen in *paragraph 3.2* about QCD levels where claim reduction was the performance with the lowest improvement level, is quite worrying because it does not only mean that companies can't reach sufficient quality standards, but also means that they are not even able to identify (with inspections) faulty products before they reach the final customer.

62% of the answers are about problems to produce RFT (right first time) and high faultiness levels in new products. This second critical aspect shows once again the problems generated by the lack of integration between R&D and operations.

Diagram 33 shows the actions that will be taken to solve the analysed critical factors.

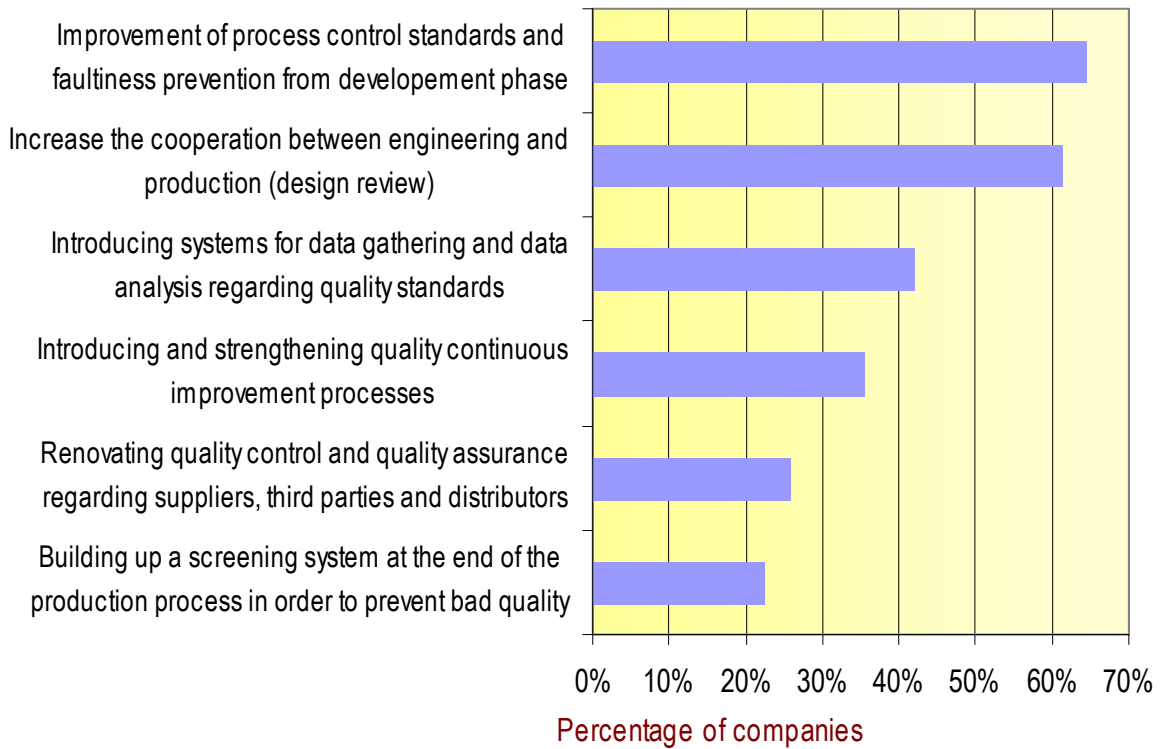


Diagram 33: quality, main actions

The first two actions show that companies know that the lack of integration between operations and R&D creates a lot of problems to quality: both of them, in fact, are aimed to increased this cooperation.

The third action is an IT one, aimed to improve the systems used to gather information about quality.

As for the implementation drivers, all the companies will implement the first two actions with internal resources. Consultancy is, on the other hand, necessary for the IT solution: 56% of the companies who selected that action will use external resources.

4.7.4 R&D

The last analysis will be on R&D, that was already identified as a cause of some of the greatest problem both in cost control and in quality control.

Diagram 34 shows the most important critical aspects regarding R&D

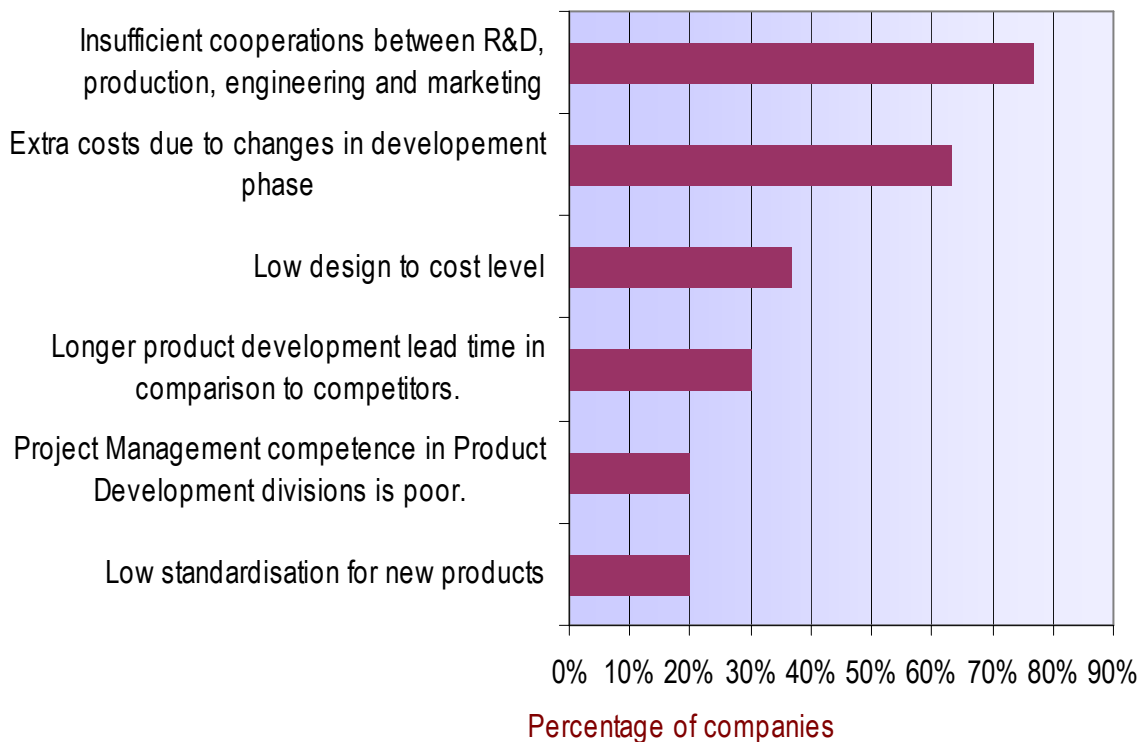


Diagram 34: R&D, main critical aspects

The diagram shows that the main critical aspect concerning R&D is the lack of cooperation with the rest of operations: 76% of the companies have this problem, and 64% have “extra cost during new product development because of changes in development phase” (which is a consequence of the lack of cooperation). A correlation analysis between this two critical aspect shows a very strong correlation (0,518).

The other critical aspects are marked by a lower number of companies: only 36% of the them have problems caused by the low level of design to cost, and 30% have longer development time if compared with competitors.

As for the actions:

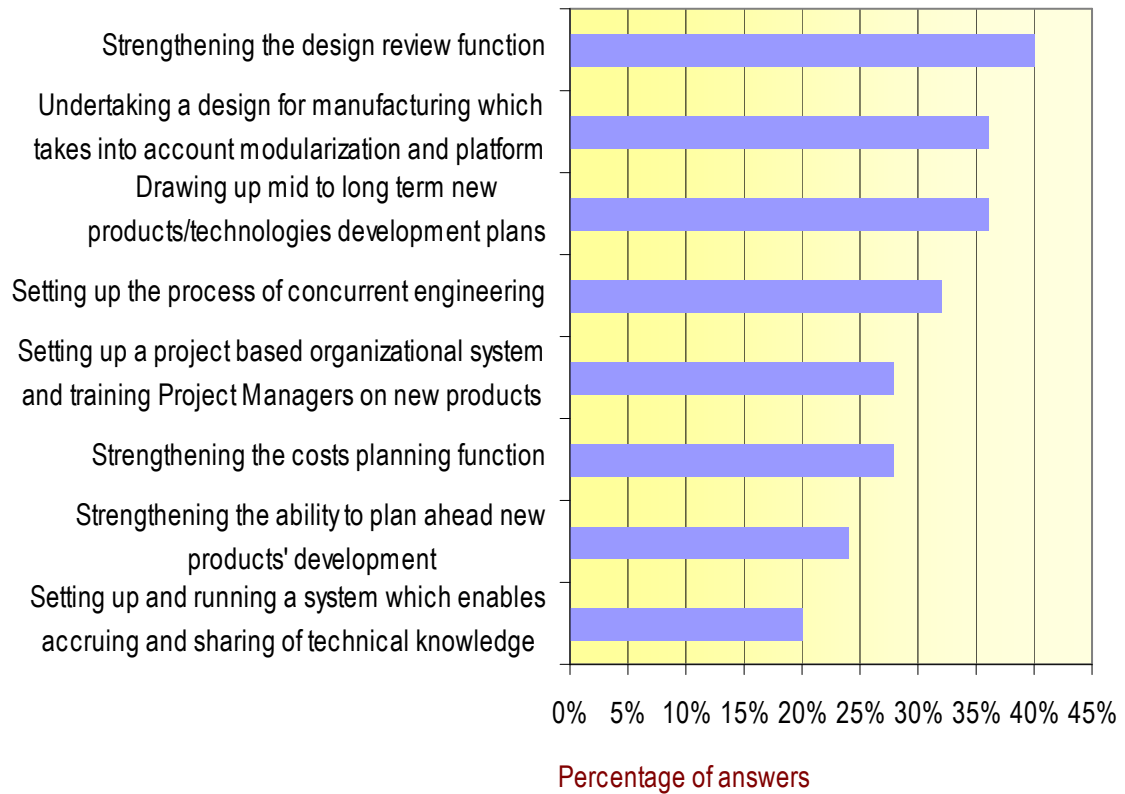


Diagram 35: R&D, main actions

The answers are divided on all the possible choices.

The first one is strengthening the design review function (40%), followed by modularization (36%) and adoption of long time strategies (36%).

4.7.5 Other critical aspects

This paragraph will be about the other critical aspects: supply chain management, human resources, corporate social responsibility, safety management and environmental protection.

The analysis will not be as complete as the ones done for the other critical aspects because we don't have enough answers to do a statistically relevant analysis. We will only give some general indication that we can deduce from the data we have.

Lets start with supply chain management, which is a very actual subject of study and has been marked by 26% of the companies. The first critical aspect in this area is the lack of coordination of the supplier, followed by the lack of coordination of new product development at local level.

Between the actions, the most important is improving the IT system used to manage information. Only with a fast, correct and integrated management of information companies could manage a world wide network of customers and suppliers

As for human resources, *paragraph 3.7* shown that 26% of the companies mark them as a critical aspect, while only 2% mark them as first critical aspect. This probably means that human resources management is very important for company success, but, probably, it is not considered a direct success factor.

The first critical aspects in this field is transferring know how from expert worker to new ones, followed by weakness of middle management.

The actions are strictly related with critical aspects: the first one is training and tutor support for the new resources (made by the operators with greatest experience), while the second is the creation of work places that encourages knowledge transfer.

Speaking about safety management, the little number of answers in this field is probably not due to a lack of interest in this theme, but is due to the fact that it is probably taken for granted, especially by the biggest companies.

There is not a great interest, on the other hand, for corporate social responsibility and environmental protection. This themes are not considered as needed for company's success, so they are considered less important than the "classical" themes we discussed in the paragraphs above.

5 Conclusions

This chapter will try to summarize the main findings of *Monodzukuri global survey*.

First of all there is a “**return to basics**” of Italian companies: cost control, quality and flexibility.

As for **cost control**, in the last three years cost reduction was the performance with the best results achieved by companies (66% of them improved it), and cost control will be the first critical aspect in operation in the next three years.

The second theme is **flexibility**: it was the first critical aspect in the last three years for the companies of the sample, which had to match their productive system with a demand getting more and more variable and difficult to forecast.

Companies faced this problem in many ways: first of all, they decided to reduce their production planning horizon from monthly to weekly, so that it can react faster to market changes.

A second way to face flexibility problems was found in lean production and Toyota production systems, which are based on the idea that production must be pulled by demand.

We finally saw a growing interest in procurement: companies pay a great attention on procurement costs, but they are starting to look at other aspects too, as punctuality and integration with suppliers (a very important theme for supply chain management too).

On the other hand, it has been harder for companies to change their fix structure: in *paragraph 3.1* we showed that only 30% of the companies was able to improve its fix costs/variable costs ratio, and only 35% improved the conversion cost ratio on total costs.

The sum of these solutions granted to the companies quite good results in the last three years in flexibility field: in *paragraph 3.2* we saw that 48% of the companies improved their lead time and 44% their service level. If companies want to obtain the results estimated for the next three years, they have to continue with the improvement actions they already began, learning the methodologies they are using and adapting them to their situation.

The third theme is **integration between R&D and operations**. Research and development functions are seen as something apart from operations, respond to different directors and don't cooperate with production, industrial engineering and sales in a sufficient way during the new product development.

This situation creates a lot of problems: development times become longer because of changes and rework during development phase. These problems, that could be found (and solved) in earlier phase of development if all the functions are involved in the process, are usually found too late, and this makes costs and development time grow up.

Moreover, when new products start to be produced, production cost grows up and quality standard are very low. This situation could be avoided in design phase with a correct cooperation of all the function and with the use of techniques like variety reduction and so on.

It is finally important to say that companies decided to face the problems listed above with **very structured improvement action**, that use complex methodologies (lean production, TPS etc.) and innovative technologies (systems for production scheduling, customer relationship management systems and so on).

We would finally like to thank once again all the people and companies who decided to use their own time to cooperate with us and gave us an essential help for the realization of the research.