STUDY OF BUSINESS CASES

COMEXI

Towards sustainable printing

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COMEXI GROUP

Towards sustainable printing

INTRODUCTION

On 21st May 2015 at the 18th European Forum on Eco-innovation, the chairman of COMEXI Group, Manel Xifra Pagés, was presented with the EMAS award[1] granted by the European Commission for effective eco-innovations supporting improvements in environmental performance, for the development of sustainable offset printing technology. In its deliberation, the jury assessed the innovative capacity of **Comexi Group** for promoting technologies capable of reducing or eliminating the use of solvents in the flexible packaging conversion industry. The CI8 was the first variable format press with central impression drum in the world, especially designed to print on plastic film. A solution that responded to the main challenges facing the flexible packaging printing sector: reducing environmental impact, increasing energy efficiency, high print quality and production flexibility, offering very competitive production of small print runs of flexible packaging with delivery times much lower than those possible with the printing technologies used to date in the sector, gravure and flexo.

> "This award is a great recognition for the company's crucial commitment to transform the flexible packaging sector into a sustainable industry in line with our mission: "to lead the change in the flexible packaging conversion industry towards a clean industrial environment, with no atmospheric emissions and with the lowest environmental impact possible."

After 60 years of business, Comexi Group had established itself as a family-run company with a global vision thanks to its sales network, subsidiaries and the signing of strategic partnerships for market development. Positioned in the medium-high segment of the equipment goods market, its clientèle was primarily formed by family-run, medium-sized companies (< 250 million Euros in turnover). Its presence, however, was not as great as that of the large corporations.

The flexible packaging industry faced a drop in margins with significant pressure on prices, in a context in which print runs were decreasing. End clients, manufacturers of *FMCG*[2], products, demanded higher quality, fast delivery, and customisation, all at competitive prices. These demands were a real challenge for converters using traditional technologies.

Moreover, recent movements in the concentration of the converter sector and the arrival of new technologies such as digital printing, etc. meant that a critical mass was to be reached to become one of

1. The EMAS Register is a voluntary tool designed by the European Commission for the listing and public recognition of companies and organisations with an environmental management system implemented that enables them to assess, manage and improve their environmental impact, ensuring excellent performance in this area.

2. Abbreviation of *fast moving consumer goods*.

the “chosen few” as suppliers in the sector for the 2020 time frame.

On his way home after the event, Manel Xifra Pagés reflected on the targets set for the forthcoming 5 years, aimed at doubling the sales figure through increased penetration in the segment of the top 20 converters, improving turnover in services and positioning offset technology in the sector.

Market selection was another matter to consider. Europe, its natural market, was the market lest expected to grow compared with Asia-Pacific forecasts. As a dominant technology in that market, had the moment come to assert support for gravure?

Lastly, the arrival of new printing technologies, digital printing, could undermine the strategy of supplying equipment that uses different analogue printing technologies. Would its support for sustainability suffice in order to compete? What market share would the new digital technologies have in 2020?

FLEXIBLE PACKAGING

Around 60% of the films used in the food sector corresponded to those obtained from combining two or more layers of single materials. Obtaining multi-layer structures led to increased applications using plastic materials for food packaging. When the structure was formed by thermoplastic materials alone, with no printing between the layers, the co-extrusion technique was used[3]. Another process for obtaining

complex, multi-layer films consisted of lamination technology using adhesives[4] to combine substrates of different natures,

3. Combined extrusion process using various polymeric materials. Extrusion involves moulding plastic using a continuous flow with pressure and drive to pass it through a mould responsible for giving it the required shape, once the polymers have melted or are in a visco-elastic state.

4. The lamination process uses a wide range of adhesives specific to each type of substrate, although the most commonly used are those based on polyurethane resins. At present, the most widespread lamination technique is based on solventless technology, reducing emissions from volatile organic compounds (VOCs) and improving the energy performance of water-based adhesives, which require higher oven-drying temperatures and do not allow for high production speeds. Source: http://www.interempresas.net/Plastico/Articulos/50451-Procesado-de-films-multicapa-para-aplicacion-de-embalaje-flexible.html

for example thermoplastic films with paper or aluminium foil[5], or when printing or metallisation was applied to the inside of the multi-layer substrate.

The production process of the converter

The raw material used by converters was rolls of flexible virgin film that, in the case of some operators, was produced in-house. The film was printed according to the client's specifications, using presses based either on flexo or gravure. Offset and digital were arriving on the scene as alternatives to the two existing technologies in the sector to date (see Appendix 1).

Then, depending on the product to be packaged, the printed film could be slit directly or was subject to a laminating process to obtain a complex, multi-layer film. The final stage in all cases involved slitting, which depended on the characteristics of the packaging machine (several packages were normally printed widthways to save on costs). The resulting rolls were delivered to the end client for use in the packaging process (see Appendix 2).

The added value of the sector from an industrial viewpoint lay in three basic processes: manufacture of the complex resulting in the plastic film, printing of the film and slitting and handling to give the flexible packaging product (bag, pouch, label, blister, sleeve, etc.).

5. Complex laminates mostly consist of a structure of two layers of flexible film: one heat-sealable base layer of PE (polyethylene) or PP (polypropylene) (between 20 and 100 microns) plus a biaxially-oriented layer of adhesive BOPP, BOPA (polyamide) or BOPET (PE terephthalate) film (between 15 and 25 microns), which can include an aluminium coating. This type of coating is obtained using a continuous, high-vacuum metallisation process and provide an excellent barrier against gases and light.

HISTORY

Comexi (Construcciones mecánicas Xifra) was founded in 1954 by Manel Xifra Boada in Calle Taquígraf Martí in the Vista Alegre district of Girona as a production and maintenance workshop for the city's paper and textile industries.

> "One Sunday afternoon while strolling along the Rambla boulevard in Girona, my father invited his future partner, Joan Viñas, who was then a client of the metal company he worked for, to start a mechanical workshop that would not only serve Joan's company but would also manufacture machines to produce the paper bags used in food shops. The business started in premises measuring barely 150 m2, with a lathe and a shaper, and a workforce formed by one foreman (Manel Boada, the founder's uncle), two operators and one secretary. A draughtsman and an accountant were appointed on an hourly basis after a few months. My father took care of the commercial and mechanical side."

The Group's second workshop in 1957 was located at Calle Balmes 1 in the Sta. Eugenia district of Girona, employing a workforce of 50 at the time.

Between 1956 and 1959, **Comexi** began to specialise in the building of machinery for the paper industry: gluing machines, embossers, spiral binders, etc. Alongsise this, Manel Xifra Boada developed the idea of creating printing presses to serve the up-and-coming plastic market.

The first printing press: CF 2/35

In the mid-50s, plastic was revolutionising homes. A large number of everyday products were adapted to the new material, as it was cheaper and easier to produce. This phenomenon was especially significant in terms of product packaging, especially food, which was no longer sold in bulk: from the grocer who despatched products behind a counter to the aisles of supermarkets and department stores. Bottling, packaging and labelling as a means of emphasising product attributes was a real market revolution.

> "Back then, plastic bags came with no kind of inscription. When the need arose to print them, the right devices weren't available. Clients came with the bags already made and we had to print them one by one using the Minerva press. It was terrible because the ink didn't dry either".

Manuel Xifra Boada and his colleagues took it upon themselves to design a printing press that made the job easier. "And so the CF 2/35 was created. A 35 cm-wide rotary press that printed in two colours, roll to roll, reaching speeds of 70 metres/minute. It first unwound the roll, passed through two ink pans where the print motif was located and then through a drying process that used infrared lights and hot air fans. The printed roll was used to make bags".

Between 1956 and 1982, 148 of the CF2/35 were sold (10% for export), thus starting the company's internationalisation process. The manufacture of printing presses first and then paper slitters created the need to develop a sales department, with Manel Xifra taking over the internationalisation of the company.

Project expansion and consolidation (1962-1978)

In 1962, **Comexi** took a qualitative leap in its development with the inauguration of the machining and assembly unit in Sant Narcís (3,000 m2), producing the first CF770 model flexo presses, Montserrat –conventional, 6-colour press for plastic printing (fertiliser sacks)-, Everest, with similar characteristics but for paper, BRUC 1600 –the first central drum, four-colour press- or the PUIGMAL, the top selling press in Comexi's history, a 4, 5 or 6-colour flexo press with a net printing width of 82 cm and a speed of 150m/minute. Up to 1997, 427 PUIGMAL presses were sold, 4% of which were for export.

In addition to the flexo presses, **Comexi** designed and built rewinders to manufacture small rolls for use in the automatic packaging machines (CCC 1966 slitter, KSC 1972 model). ARGOS was the first press made by Comexi that used gravure technology and was succeeded by MINAR, which was presented at the 1978 Interpack Trade Fair in Düsseldorf, 9 of these presses being sold between 1979 and 1982.

In 1970, **Comexi** reached a milestone it is career with 50% of its sales being for export. This meant that a department had to be created for foreign sales.

> "Attending trade fairs influenced and boosted **Comexi**'s internationalisation process, as did the trips made by my father and technical personnel to the clients' premises to install and start up the machinery purchased".

Technological and operational innovations (1978-1998)

In the early 80s, Comexi grew worldwide and diversified its work, which meant moving the machining centre to Carretera de Barcelona. It was here that it performed revolutionary work organisation known as Cellular Manufacturing (CM).

> "Stocks increased and parts became obsolete. Alongside this, clients asked us for products that, when it came down to it, we didn't have manufactured. We had a service and supply problem. We analysed the manufacturing system and found out that we had a push system that often caused downtimes, as the system was inflexible and made the introduction of new products difficult. We decided to turn the tables on the situation. We took a press and broke it down into its different components, grouping together similar parts and testing them on other presses.... We came to the conclusion that all Comexi products were made up of the same components. We made families of parts and worked out how to manufacture each group, generating multi-disciplinary teams. We then switched to a pull system in line with client requirements, which also streamlined the after-sales service".

The technological innovations came along with computers and numeric control. "It was a personal commitment by Manel Xifra Boada, who saw it as a source of competitiveness. The first addition was a routing machine (1976) and the first PC arrived following an agreement with IBM in 1983".

In 1980, **Comexi** took over a foundry known as FUNGISA in order to control the entire production process. In 1984, it presented the first 8-colour, central drum press (a world first) and two years later formed Comexi America (sales and service). In 1992, it constituted ENVIROXI to manufacture peripheral parts for the converter industry.

Creation and consolidation of the Comexi Group (1999- 2014)

The main milestones of this period were: inauguration of the Comexi facilities in Riudellots (1999), the Comexi do Brasil plant (2002), creation of the Comexi Group (2003), the founding of PROSLIT (2004) and Nexus Comexi (2006) and the establishing of a strategic partnership with ACOM (2005), which was later taken over by Comexi so that it could once again offer gravure technology, something that Comexi had abandoned in 1984.

On 22nd May 2005, the founder Manel Xifra Boada passed away and Manel Xifra Pagés took over as Chairman of the Board and CEO. That same year, what was formerly the Advisory Board became the Board of Directors.

Product launches continued with the FP-2210, the first 10-colour, central drum flexo press, the FB-2108 as successor to the former, and the F1 series of sleeved flexo presses.

The high-performance OPTIMA range joined the line of NEXUS laminators in 2008 to produce complex 2 and 3-layer films. The Comexi product range also included the EIKON (2004), COMPACK and E-TURRET winders.

CHALLENGES OF THE FUTURE FLEXIBLE PACKAGING SECTOR

Over the past two years, the packaging industry has experienced an annual growth rate of 3%. For 2016 the market is expected to amount to 820 billion Dollars. Flexible packaging accounted for 22% of this market, standing at 73,825 million Dollars at 2013 end. For 2018, it is predicted to stand at around 100,000 million Dollars, with compound annual growth rate (CAGR) of 5.1%.

The USA led the market with a 27% share. Europe, with a 22% share, was the most demanding market from a competitive viewpoint. At 2013 end, sales amounted to 12.3 billion Euros (+1.3%). Growth was concentrated in Eastern countries, especially Russia and Poland, with a situation of stagnation in the West. Germany, France and Great Britain accounted for an accumulated share of 50%. Major growth was expected in so-called emerging countries, where the power of an expanding middle class continued to pull on the MFCG market (see Appendix 3).

The major players in the sector were Amcor Ltd (Australia), Sealed Air Corporation (United States) and Bemis Company Inc. (United States). The aim of these major players was to expand into the Asia-Pacific region to make the most of the boom in demand for flexible packaging in this area. China and India led this trend (see Appendix 4).

Operators were immersed in a process of mergers and acquisitions, although the market remained fragmented (top 20 held a 40% share). The last sector operation was the takeover of the operator Constantia by the Wendel investment fund, announced in January 2015. This was second in terms of world significance following the takeover of Alcan by the world-leading operator from Australia, Amcor Ltd, which had just completed the process to take over the Chinese operator Chinese Packaging Company. Sonoco announced the signing of an agreement in 2015 to purchase a majority stake in Graffo Paranaense de Embalagens S/A. These transactions also included the launch of new operators such as NOVOLEX, as a result of the merger among Helix Poly, Duro Bag Manufacturing Co. and Packaging Dynamics Corp.

The converters sector faced a scenario that was characterised by an increase in material prices due to fluctuations in crude prices (raw material accounted for 60% of the total product cost), energy costs and labour. Other conditioning factors were marked by compliance with increasingly restrictive regulations regarding plastic materials for use with food and issues relating to environmental aspects. Converters had to implement recovery systems to recycle remains from offcuts and rejections (between 10 and 20% of production).

The question was that the inks used in flexo or gravure coloured the reprocessed material, limiting its reuse for the original application. Hence, its reuse was relegated to low added-value products, as the resulting pellets were very dark in colour due to the mixture of inks present, making its reuse to extrude transparent films impossible. Furthermore, the inks and adhesives based on organic compounds could decompose

and generate gases, which meant that the resulting material had worse mechanical properties.

Manel Xifra Pagès was convinced that flexible packaging would hold a good position in a sustainable society: “The so-called “packaging paradox” should be considered: its absence could have a far greater impact on the environment than its production and disposal, even in cases of over-packaging. Flexible packaging is the packaging solution that uses least raw material and energy in its production, it has the smallest carbon footprint and, in many cases, provides more value in terms of preservation and functionality. Solutions to the environmental problem that currently exists regarding the end of its life cycle and what to do with the packaging once used are bound to be developed. Improvements such as the elimination of solvent-based inks and adhesives, which involve the emission of VOCs (Volatile Organic Compounds) into the atmosphere, or CO2 in the case of VOCs being incinerated, are a great move forwards”.

A relevant factor for converters was the investment made in machinery, installations and adaptation to environmental regulations. Sector sources estimated that the average annual investment stood at between 8-10% of turnover. Improvements in productivity involved the automation of processes and the inclusion of machines that allowed for short print runs and faster plate changes. Along these lines, recent advances in flexo quality together with cheaper costs in short print runs made this technique the most attractive alternative. Despite this, gravure remained

the benchmark for top quality work and in certain geographic areas, such as the Asia-Pacific region (see Appendix 5).

Competition

Comexi had to compete with operators such as the Swiss Bobst or the German Windmöller & Hölscher. Bobst, a supplier of equipment and services for packing and packaging manufacturers in the compact cardboard, corrugated cardboard and flexible materials sector, was present in over 50 countries and had 11 production centres in 8 countries, a workforce of 4,800 and a turnover of 1.3 billion Swiss Francs (2014). Of this turnover, around 325 million was from the flexible packaging sector. W&H ended the year with a turnover of more than 700 million Euros, with a product range that included extrusion machines and sack production and filling equipment, completing the production processes of some segments of the conversion industry.

Alongside these giants, Comexi competed with other manufacturers that it exceeded in terms of size, which generally specialised in some kind of technology involving either printing or machinery for the different conversion processes (slitting, lamination, etc.) (see Appendix 6). The latest movements in the sector pointed towards what is still an early stage in the process of mergers and acquisitions. The last movement in the sector was the consolidation of Bobst as a majority stakeholder in the operator Nuova Gidue[6].

6.http://media.bobst.com/usin/releases/detail/article/1431506040-bobst-group-reinforces-its-position-in-the-converting-industry-by-taking-a-majority-stake-in-nuova-gidue-srl/#.Va6PaPntmko

Future trends

Sector sources pointed to four major future trends for the flexible packaging sector (see Appendix 7).

"Green packaging": minimising environmental impact throughout its life cycle by implementing global sustainability formulas to save raw materials and energy in manufacturing processes to reduce the weight of packaging, to recycle and reuse.

"***Smart packaging***": Research into active and smart packaging to include different functions, thanks to the application of technologies (RFID, NFC, etc.) that guarantee traceability throughout the supply chain, strengthening security and anti-falsification or assisting consumers in the purchasing process by providing interactive information.

Convenient, ready-to-use and accessible packaging: Individual microwaveable packaging, kits, etc. Fast and easy to use, with barely no preparation depending on consumer requirements, with special attention paid to the elderly, a group gaining increasing significance in the market.

Personalised: The different consumer profiles (singles, couples, families, etc.) require packaging that meets their needs and this involves a major increase in SKUs and the subsequent reduction in print runs. Therefore, packaging machinery producers are working on making the production processes for packages of different sizes and design more optimised and flexible. The need for message personalisation has also increased. Examples of these are the Heineken or Coca-Cola campaigns.

Along these lines, the new impact-less digital printing methods, such as xerography (laser) or inkjet printing, stood out as a solution for shorter, more efficient print runs, frequent changes and higher levels of personalisation. HP, the main supplier of this technology, predicted that the evolution of these printing technologies in flexible packaging would be similar to that experienced with labels. However, neither the speed was satisfactory nor the profitability was sufficient at that time for the print runs required in the flexible packaging sector, plus the fact that the technology was not advanced enough for many of the sector's applications.

In 2012, HP presented the Indigo 20000 - a special printer designed to print on flexible packaging substrates, with a maximum web width of 76 cm, a print speed of up to 42 m/min in colour mode and accepting substrates of a thickness of 10 to 250 microns. One of the first companies to install it was the converter Innovative Label Solutions (EE. UU.), using it for its stand-up and triple-seal bags and enabling it to offer new food and beverage packaging applications and new capacities in terms of promotional and event marketing. Significant advances are expected that will revolutionise the production of packaging through improved costs, flexibility and efficiency, such as inkjet heads built into production and filling lines.

That same year, Landa Corporation announced the presentation of the Nanography™, a new category in digital printing. The Landa Nanographic Printing™ process was a technique that, according to its creator Benny Landa[7] , "will change the rules of the game for the main commercial printing, packaging and publication markets, offering the versatility of digital with the qualities and speed of offset printing". The system was based on Landa NanoInk, formed by particles of pigments that are tenths of a nanometre in size, with an extremely powerful light absorbency and that, according to its developers, provided "unprecedented image quality".

In terms of sustainability, the incorporation of solventless inks thanks to the electron-beam curing process was a true revolution for flexible packaging, this technology being suitable for the printing of food packaging. Given that there are not solvents in their formula, EB inks do not require hot air drying systems or the recovery/incineration of the volatile components of these solvents, both processes that involved a very large part of total energy consumption in the conventional printing process using solvents, as well as eliminating the risk of explosion in an industrial environment. Lastly, EB inks had excellent rub-resistance and chemical-resistance properties. Comexi led the research in this field thanks to its partnership with SunChemical (ink producer) and ESI (specialist in *Electron Beam* equipment).

As a producer of equipment goods, Comexi had to be aware of everything relating to the so-called 'Smart Factory' or Industry 4.0, in which all of its processes were connected and interacted with each other. The key elements to consider included the development of software, data analysis and storage systems and the incorporation of sensors and electronics to interacting parts.

7. Known as the father of commercial digital printing, he started the digital printing revolution in 1993 with the launch of the emblematic digital press, the Indigo.

COMEXI GROUP BUSINESS MODEL

> "Family-run companies with export aspirations, their own product, a leadership capacity and professionalised are companies of the future". Manel Xifra Boada, founder of Comexi."

Comexi Group ended 2014 with a turnover of 121 million Euros and a workforce of over 490 employees. **Comexi Group** was the parent company of an industrial holding company formed by five companies. In 2009, the group decided to combine all of the different companies located in Riudellots that dealt in machinery manufacturing: Comexi, Nexus Comexi, Enviroxi, Proslit Equipment, with all of these activities operating under the resulting company Comexi Group Industries. Furthermore, Comexi Group incorporated Neopack, also in Riudellots, which dealt in the development and sale of offset printers, Comexi do Brasil, which produced equipment primarily for the local market, Comexi Converting Solutions, an Italian subsidiary that produced gravure presses, and Comexi Northamerica, the sales and service office for the USA. The Xifra family owned 100% of the capital.

Product range: global solution to converters

Comexi Group tried to meet the needs of its clients, flexible packaging converters, during its production process by offering three main product types: printing presses (in all technologies available except digital), laminators and slitters. Despite this, flexo presses made up its core business, accounting for over 50% of sales.

Comexi Group sold its products under six brands:

- **Comexi Flexo**: specialising in flexo presses, with over 50 years of experience, which placed it at the forefront worldwide.

- **Comexi Offset**: offset printing presses for flexible packaging. This was the result of combining the benefits of the variable format of offset technology with the central drum of the flexo press.

- **Comexi Acom**: The offer of the design, manufacture and sale of gravure presses was channelled through its subsidiary COMEXI CONVERTING SOLUTIONS Srl in Italy.

- **Comexi Nexus**: dealing in the production of solvent-based and solventless adhesive lamination solutions. An agreement had just been signed with HP, the laminator having been selected for the digital printing presses for flexible material.

- **Comexi Proslit**: production of plastic film, paper and aluminium roll slitting and rewinding systems. Since the first slitting machine in the 60s, Comexi had continued to evolve and adapt to meet the need for improvements in slitting productivity and quality requested by the market.

- **Comexi Enviroxi**: This covered production from systems for improving productivity (roll unloaders for non-stop work to anilox cleaners or sleeve storage) to make better use of the space and time available between changes, including fast ink cleaning and solvent recovery systems. All prepared to meet with existing regulations on the matter in the EU and USA.

The second side of the "global solution to converters" was defined in the additional range of services: spare parts, technical assistance, maintenance, consulting and training.

> "So, for example, Maheso (frozen food manufacturer) changed packaging from cardboard to flexible packaging in its range of pop nuggets, thanks to the combined work of Inplacsa, a converter specialising in flexible packaging, Maheso itself and us. By maintaining the same technology - offset – but changing the printing medium, they have been able to ensure the brand image thanks to optimal image resolution".

In May 2015, **Comexi** announced the creation of Comexi Servicios Técnicos that, in the words of Manel Xifra Pagés, sought to

> "Expand company growth worldwide, improve local client support, reinforced company services through the increased availability of engineering and spare parts advising, and develop preventing programmes in six regions: Northern America, Central America (Mexico), South America, Europe, Asia and Russia".

The group provided a 24-hour customer service using field technicians from the different Offices or the local agent under the watchful eye of a service manager, or remotely in some cases from the central offices in Riudellots. Furthermore, in 2015 **Comexi** launched a new product, the annual operational maintenance programme, with two visits a year to the client's premises in order to: ensure correct compliance with the machine's preventive maintenance programme, check the general condition of the machine, detect any problem that could affect machine performance and correct any worn parts.

Innovative drive

The flexo printing environment, **Comexi'**s core business, had historically been characterised as constantly evolving. There was a huge gap between the first prototypes that left the factory and the latest models. During the initial decades, the demand for equipment evolved gradually, reaching its peak with the launch of the Puigmal model.

Comexi's "disruptive innovation" process started in the 80s with the launch of the first 8-colour, central drum printing press, truly a world first. In addition to the success of this model, the 90s saw the launch of another 8-colour flexo press for fast changes with a sleeve system. Later came the first 10-colour, central drum model with a width of 1,270 millimetres. The latest innovations to have been launched include equipment for the introduction of low-cost holograms and special effects on flexible packaging, the integration of laser technology in slitters for micro-perforation, easy-to-open, coding and other applications, and the offset printing press that won it the EMAS award.

The flagships in terms of innovation include the Comexi Group Research Center and the Manel Xifra Boada Technology Centre. The R&D Center has a permanent area for the research and development of new products. The facilities include a large inventory of machines, including a flexo press prepared to print using *Solvent Base, Water Base, Water Base EB* and *WetFlex* inks and lamination on EB line. It also has a multi-

bed laminator and a state-of-the-art slitter-rewinder. In its support for a collaborative, innovative environment, the Comexi Group Research Center is open to participation by clients, partners and co-suppliers.

As well as this initiative, the Manel Xifra Boada Technology Centre seeks to become a benchmark in the flexible packaging sector as a driving force of knowledge. Inaugurated in August 2013, it stands on 2,200 m2 and involved an investment of 10 million Euros in machinery, which are also used for tests and displays for clients. The Centre focuses its activity on training and consulting, academic activities and the development of innovation. To date it has trained more than 500 professionals from 31 countries worldwide in courses focusing on flexo printing, lamination, maintenance, colour, machine operations and other processes involved in flexible packaging conversion. The courses are given in Spanish, English, French and Russian.

> "Henkel Adhesives Technologies, a leading company in the manufacture of adhesives, sealants and functional coatings, chose us as a partner for the opening of the Henkel Flexible Packaging Academy in Mumbai (India), thanks to our experience in the development of solvent-based and solventless laminators. The academy has a Comexi NEXUS Dual laminator ready for the practical training sessions".

Through these spaces devote to different sides of innovation, Comexi Group seeks to become a key player in flexible packaging innovation and devotes 4% of its turnover to this area. It has an innovation management system that includes the approval of an annual innovation programme.

> "The capacity to innovate and develop technology that must meet and even anticipate market needs is crucial in the design and manufacture of machinery. Innovation is our most important value."

Globalised company

> "Comexi Group was established with its feet set in Girona and its eyes looking out towards the world. Our internationalisation process has therefore been a natural process that was conceptualised when my parents travelled around Europe by car to attend the main trade fairs in the sector".

The gradual growth of international orders and the increase in exports are supported by the presence of Comexi Group offices in 5 countries, as well as sales representatives in another 65. Furthermore, the Group has industrial plants in Italy and Brazil. By the end of 2014, Comexi had sold between 97% and 98% of its production abroad, with equipment in more than 100 countries, primarily in Europe and America. Both continents accounted for more than 75% of sales.

In the short term, an increase in demand has been seen in Eastern European countries, especially Russia. However, political instability (trading veto) has delayed progress that is to be offset by reinforcing its presence in the United States (see Appendix 8). Along these lines, in May 2015 Comexi announced the reorganisation of the sales and technical team in the US, together with the installation of a new spare parts warehouse in Charlotte,

thus strengthening the after-sales service of Comexi North America.

Lastly, the creation in 2010 of the Italian subsidiary COMEXI CONVERTING SOLUTIONS in order to take over and continue with the business of the company ACOM, gravure printing machinery, was the support of Comexi Group for the ASIA-PACIFIC market.

Organisational culture

"I am a great defender of family-run business, provided it is humane, fair and is willing to get ready to successfully face its future". Manel Xifra Boada, founder of Comexi.

Comexi Group is defined as "a company with a long-term vision and goals, profitable and financially stable, basing the creation of value on technology, innovation and customer service, with a high level of excellence in its strategic decisions and their application, as well as in its day-to-day management and results".

Comexi has a workforce of 490 employees, 400 at the central offices and 90 spread around the different subsidiaries. One of the future issues of Comexi involves dealing with its internal structure (see Appendix 9).

Market positioning, sales structure

Around 80% of **Comexi Group** clients are medium-sized, family-run companies with which it has established a relationship of trust. However, difficulties are greater in terms of access to large corporations.

> "The way of accessing a lot of clients and especially large corporations was through differentiation. Our support for technology has guaranteed "tactical" products that have had a pull-on effect for other products on the converter's line".

Comexi has a sales structure with two management teams, a Sales Management that works with medium-sized clients in the geographic areas where it has greatest presence and a New Business Management that also deals with large corporations. It is structured into geographic areas and with just one key account manager at the central offices, heading a total of 13 area managers and 8 assistants. It has offices in the United States and Brazil, and delegates in Italy and Germany. It operates the remaining markets through around forty representatives. This geographic structure provides it with proximity to clients, strengthening the relationships of loyalty established but keeping them way from the decision-making centres of the large corporations.

> "We believe the time has come to adopt a more proactive attitude with the top 20. We must have greater presence in their headquarters, have first-hand knowledge of their investment plans and anticipate the response to their future needs, establishing close cooperative ties".

Support for sustainability: eComexi

Commitment towards the environment and sustainability is one of the elements that differentiates Comexi from its competition. In fact, the Group has proposed leading the change in the printing sector of the flexible packaging industry "towards a cleaner industrial environment with no atmospheric emissions and with the lowest impact possible".

Aware of the importance of reducing greenhouse gases and suitably managing the impact of the carbon footprint on the industrial environment, Comexi Group is concentrating its efforts on obtaining solventless printing solutions under the eComexi logo.

Two different ink technologies could be used for the solventless printing of food packaging: water-based inks that use this element as a solvent or electron beam inks.

Comexi Group offers flexo presses to print with water-based inks, which is the dominant technology in paper printing and that is moving slowly forwards in plastic film printing, where there are greater difficulties given the non-absorbent medium.

Insofar as electron beam inks, Comexi has been involved in R&D for over 10 years, initially for flexo printing and then for offset, which adapts much better to the characteristics of this technology thanks to the high viscosity of the inks. Through this, Comexi offers a radical change in printing technology: a system that is completely free of solvents and volatile organic compounds with a higher print quality and with no additional costs to the process.

The great investment for the future of eComexi, using the results of its R&D into solventless technologies, is the CI-18, a pioneering offset printing press that provides a reduction in delivery times thanks to a flexible pre-offset printing system that allows for the plates to be engraved alongside the machine itself. The low cost of offset plates means that the design and language can be changed more easily and promotional campaigns can even be added without additional printing costs. It also means a reduction in minimum print runs, 1,000-15,000 metres with the subsequent reduction in printed material in stock for the buyer of packaging material.

Offset technology dominates the field of graphic arts in general, but barely exists in the flexible packaging sector given the need to easily modify the packaging length in each job, which was infeasible with the offset printing equipment existing to date and the poor adhesion of the oil-based inks used in this printing technology on plastic film. These two limitations have been overcome with the advances in mechatronics and with the development of electron beam ink technology.

Comexi Group is vice president of the CEQUIP Cluster (equipment manufacturers). Their active participation in the cluster has enabled them to gain market intelligence in their sector, establish networks with key industry players, and participate in industry-changing projects. Among others, the MiDeProMi Project (Management Improvement in the Development of industrial Mechatronic Products) which was led by the Cluster. This consisted of introducing a project management methodology incorporating Mechatronics right from the project definition stage, in order to re-focus traditional methodology on how to create the structure of a machine. The fundamental aim of the project was to reduce the development time for new projects.

Comexi started this development in 2008, presenting the prototype at the sector's world-leading trade fair DRUPA in 2012 and submitting the first two beta prototypes

two years later to an Austrian converter and a Spanish converter, and it already has 8 machines to be delivered at the start of 2016. The entire sector is watching with great interest and there is a long waiting list of clients interested in testing this new technology with their jobs and materials on the equipment installed at the Manel Xifra Boada Technology Centre.

LEVERAGE FOR FUTURE GROWTH

Th great strategic challenge for Comexi over the past decade has been to become a global solutions provider for flexible packaging converters. Thanks to its support for innovation and environmental sustainability, it has been able to compete successfully. However, recent merger and acquisition movements in the sector among both converters and equipment goods suppliers are of concern to Manel Xifra Pagés and is team.

> "Our aim has been to grow, gain critical mass to become one of the "chosen few" for the 2020 time frame".

What factors should be considered to implement a key account management strategy successfully? An initial stage involves the selection of key clients and their segmentation, depending on the level of development of the commercial relationship, establishing improvement targets for each type (see Appendix 10). Could the support for a key account management strategy be made compatible with an alternative for geographic markets?

Comexi Servicios was created to try to meet the need of increasing turnover in services.

> "We have an opportunity for improvement, to turn the service into a business unit. A good service is paid for and, what's more, it ensures client loyalty".

The reorganisation of the US subsidiary should be sufficient to confidently attack this demanding market, access to which was possible thanks to the innovations. All without neglecting other markets (Asia Pacific, Latin America), which are vectors of the future growth of flexible packaging. The dominant technology in Asia Pacific is gravure, which to date has evolved only slightly in comparison and in which a significant role could be played through its brand ACOM.

Furthermore, although the sector is following the same premises as before the crisis and digital printing is currently implemented in only a few converters, its use restricted to niches of very short print runs on new materials, in view of the more than likely exponential mid to long-term growth of digital technology, the sales rate of the new CI8 offset printing press should be secured in order to ensure this technology is "well positioned" beforehand in the market. The "digital strategy" of the company must also be defined.

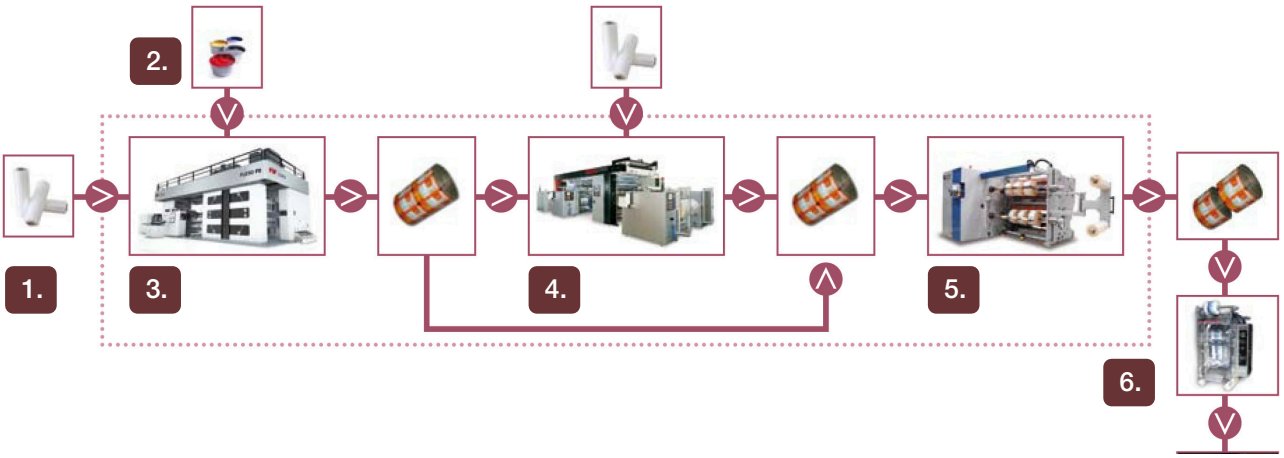
Manel Xifra Pagés believes becoming the global solution for converters, offering the different technologies requested by the flexible packaging converter, remains appropriate. The level of demand of the sector would require significant investments in R&D+i. He could not avoid asking himself whether its positioning was suitable, whether this was the right strategy for reaching the desired critical mass and whether efforts should focus on maximising results.

ANNEX 1 · Flexible packaging printing technologies

FLEXO	Relief printing system. The ink is deposited on the plate that, in turn, presses the printable substrate directly. Non-oily inks (alcohol or water-based) for very fast drying (very flexible printing process). The flexible plates adapt easily to unequal surfaces, making it ideal for printing on materials such as plastic film, corrugated cardboard and other types of packaging without applying a lot of pressure. **Disadvantages:** It does not offer the level of precision and quality of gravure or offset lithography. The cost of the plates is higher than in offset lithography, but they withstand long print runs and are much cheaper than those used in gravure.
GRAVURE	Derived from artistic engraving. The plate used is indirectly read. Unlike the other techniques, the plates are engraved directly on the cylinder. At present, the gravure process is carried out using high-precision laser machines. The plate carrier cylinders are made of metal, chrome-plated copper (to increase their durability) with an aluminium or steel core. For long print runs, this was the most profitable and highest quality printing system, allowing for very precise details and a very bright colour to be reproduced at high speeds. The wear resistance of the plates means that the quality of the print run remains very constant despite its high volume. **Disadvantages:** Engraving the plates (cylinders) is very expensive in terms of both material and machinery. Therefore, gravure is not recommended for short print runs. The inks used, which are based on solvents such as toluene, are more highly pollutant than those of other types of printing, although research into recovery systems is beginning to improve this aspect.
OFFSET	An indirect version of lithography that was discovered in 1904 by Ira W. Rubel. When the plate prints the image on a rubber surface and the paper touches it, the image that the rubber reproduces on the paper is of higher quality. This is the procedure par excellence in commercial printing, especially for labels. Preparation processes are fast and simply and, together with the low price of the plate, make offset a cheap, fast system particularly for medium-length print runs. **Disadvantages:** High initial investment cost. Technology not overly introduced into the flexible packaging sector.
DIGITAL	The cost for short print runs is low, no plate is required, it is versatile, changes can be made to the printed form during the print run (variable input data). **Disadvantages:** High cost and low production capacity for usual print runs on flexible packaging (lower print speed and associated costs: consumables, maintenance), print quality lower than gravure. New technology in the flexible packaging sector.

Source: **http://www.gusgsm.com** and Comexi Group

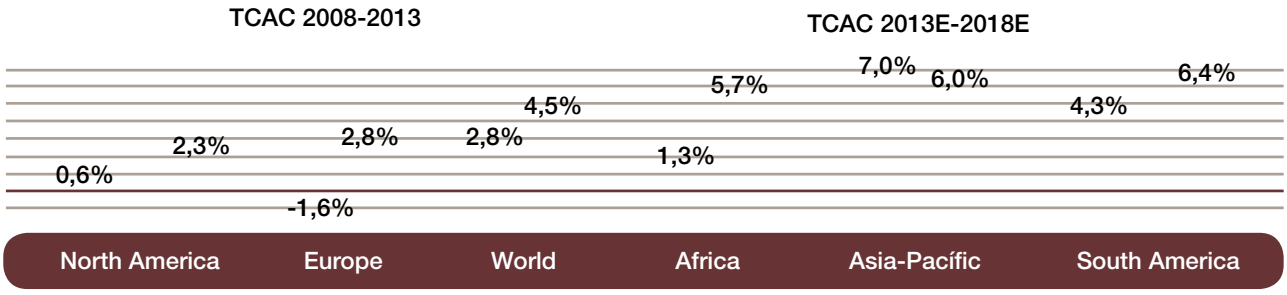
ANNEX 2 · The production process of the converter



1. Layer of plastic film
2. Inks
3. Printing press
4. Laminator
5. Slitter
6. Converter client packager (“Brand owner”)

ANNEX 3 · Flexible packaging sector

	Market share (%)	Weighting of the population (%)	Consumption per capita ($)
Europe	21	10	22,67
North America	27	5	61,19
Developed countries total	48	15	35,10
Central and South America	6	9	7,77
Asia-Pacific	41	60	7,54
Africa-Middle East	5	16	3,4
Emerging countries total	52	85	6,77

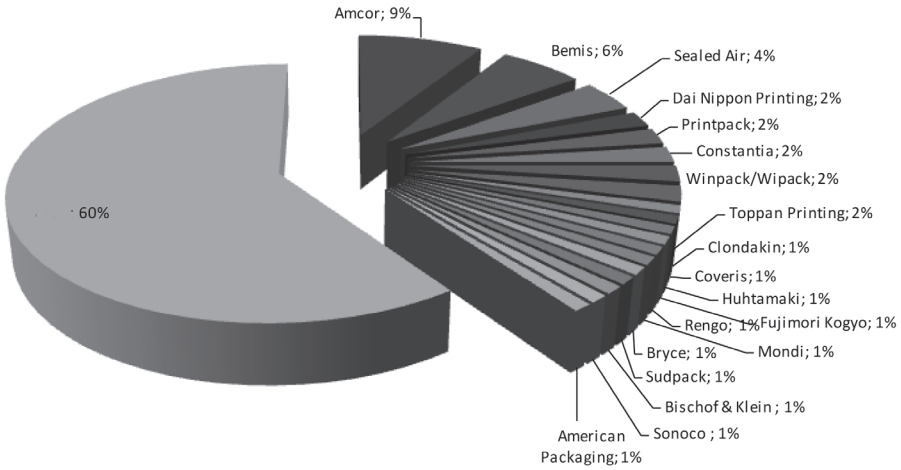


	2006	2016	TCAC 2006-2011 (%)	2016 (previsió)	TCAC 2006-2011 (%)
Food	11.581	13.365	2,9	16.665	4,5
Beverages	625	731	3,2	928	4,9
Pet food	412	461	2,3	549	3,6
Cosmetics/Personal hygiene	751	850	2,5	1.128	5,8
Pharmaceutical	1.178	1.362	3	1.776	5,5
Tobacco	593	636	1,4	664	0,2
Others Non-Food	592	664	2,3	797	3,7
TOTAL	**15.733**	**18.070**	**2,8**	**22.487**	**4,5**

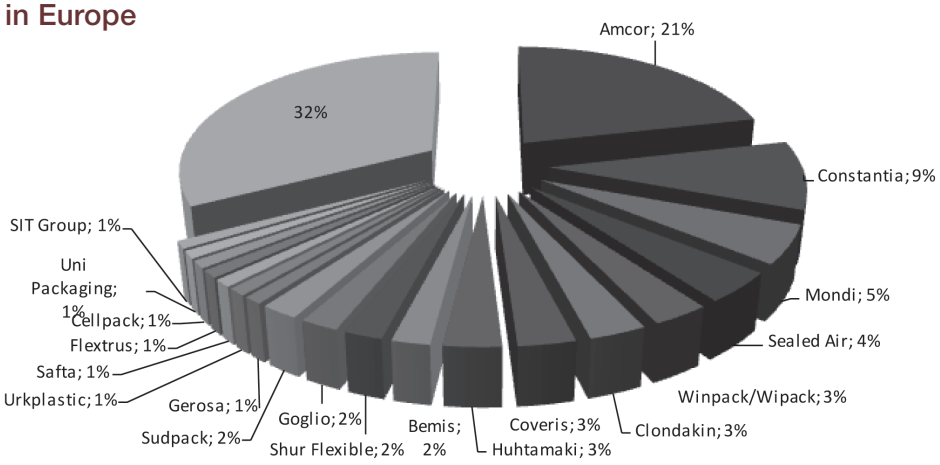
Source: Comexi Group, http://www.pci-mag.com/, http://www.techpack.com/wp/wp-content/uploads/2014/10/2014-10-06-Presentacion-de-Roadshow.pdf; https://www.flexpack.org/

ANNEX 4 · Flexible packaging converter sector

World market distribution



Situation in Europe



Sector concentration

Consolidation in the packaging industry

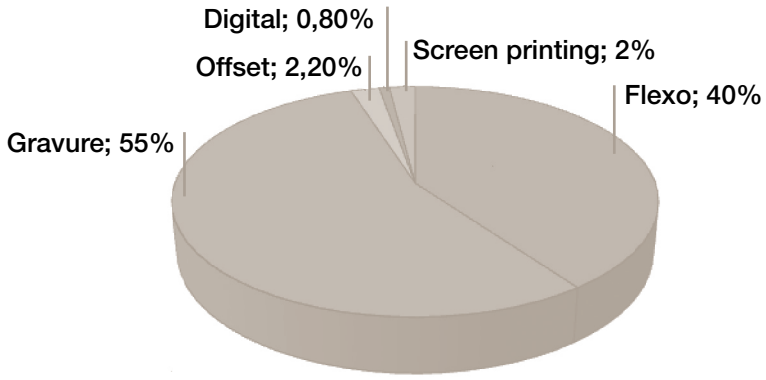
Segment	1980	2013
Glass	19 operators	3 leaders: 90% market share
Cans	25 operators	3 leaders: 80% market share
Paper	Fragmented	5 leaders: 74% market share
Flexible Packaging	**Fragmented**	**4 leaders: 21% market share**

Source: Comexi Group, http://www.pci-mag.com/, http://www.techpack.com/wp/wp-content/uploads/2014/10/2014-10-06-Presentacion-de-Roadshow.pdf

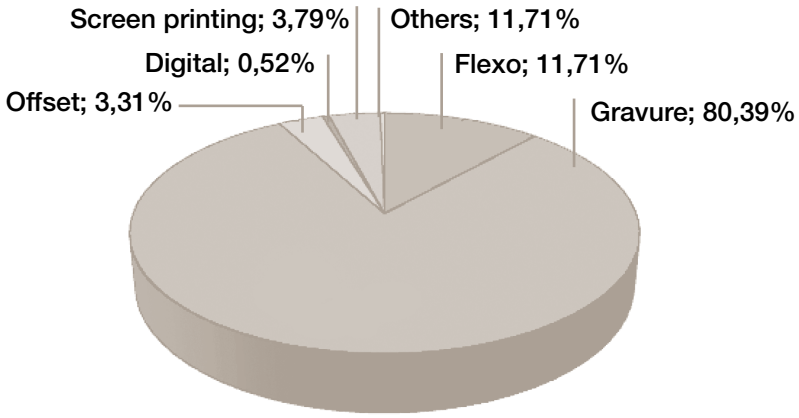
ANNEX 5

Comparison of printing technologies in flexible packaging

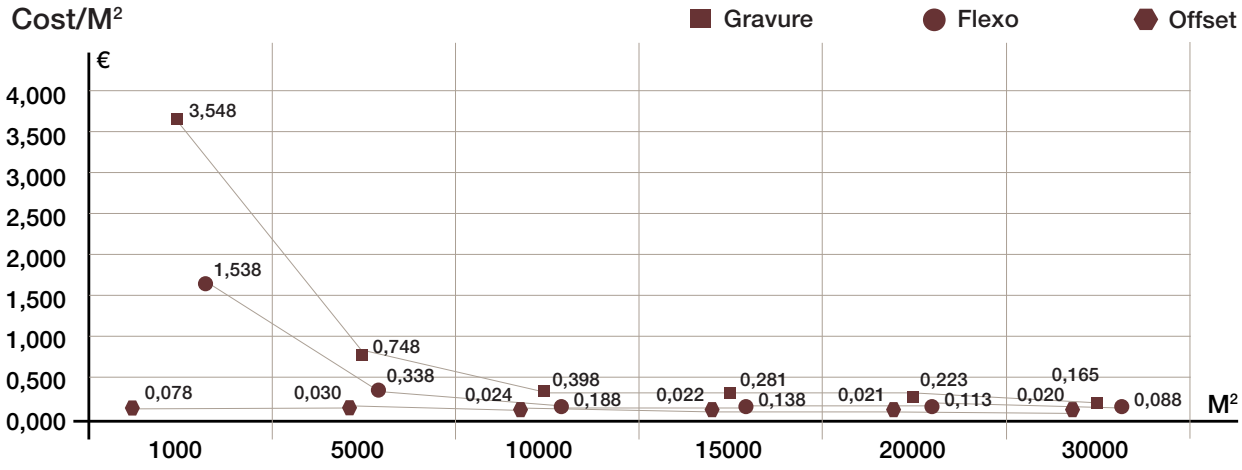
Situation of the global market distributed by technology



Situation of the Asia-Pacific region



Cost comparison



	GRAVURE	FLEXO	OFFSET
WIDTH	1.000mm	1.000mm	680mm
QUALITY	78/80 l/cm	48/54 l/cm	80/120 l/cm
INK COST (at same optical density)	a 8 gr/m^2 6 €/kg x 0,008 kg/m **0,048c/m^2** Liquid ink enters 100 82% evaporates	a 5 gr/m^2 6 €/kg x 0,005 kg/m **0,038c/m^2** Liquid ink enters 100 78% evaporates	a 1,2 gr/m^2 15 €/kg x 0,0012 kg/m **0,018c/m^2** Solid UV/EB ink enters 100 100 remains *(measurable optical density)*
PLATE COST	Set of Rollers at 3.500€	Set of Plates at 1.500€	Set of Plates at 60€
at 1.000m^2	3,5 €/m^2	1,5 €/m^2	0,06 €/m^2
at 5.000m^2	0,7 €/m^2	0,3 €/m^2	0,01 €/m^2
at 10.000m^2	0,35 €/m^2	0,15 €/m^2	0,006 €/m^2
at 15.000m^2	0,23 €/m^2	0,10 €/m^2	0,004 €/m^2
at 20.000m^2	0,18 €/m^2	0,08 €/m^2	0,003 €/m^2
at 30.000m^2	0,12 €/m^2	0,05 €/m^2	0,002 €/m^2
REPLACEMENT TIME			
Replacement of mechanical parts (beds, doctor blades, cleaning, etc.)	40 min	35 min	15 min
Register Setting	5 min	5 min	5 min
Colour Setting	20/60 min	20/60 min	5 min
TOTAL	**65/100 min**	**60/100 min**	**25/30 min**
WASTE	1.000 / 2.000m^2	1.000 / 1.500m^2	300m a 1000 / 150 m^2 a 520
LABOUR PER SHIFT			
PERIPHERALS	2	2	1
Approx. INVESTMENT	3 M€	2 M€	2,3 M€
ENVIRONMENT (i Incineration / Recov.)	0,6 M€	0,2 M€	EB
TOTAL	3,6 M€	2,2 M€	2,3 / 2,5 M€
PRODUCTION	300 m/min	300 m/min	300 m/min
	18.000m^2 / h	18.000m^2 / h	18.000m^2 / h a 520 9.000m^2 / h

Source: Comexi Group, **http://media.firabcn.es/content/S011015/docs/ponencias/quera_jordi.pdf**

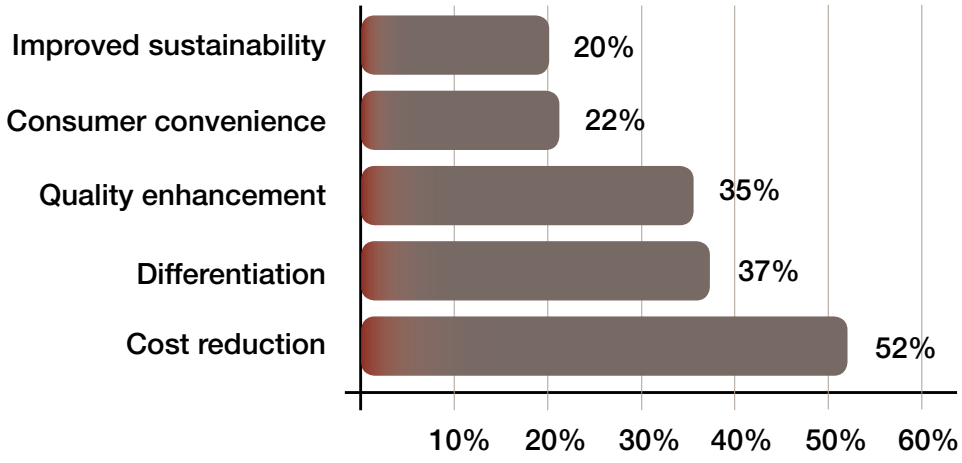
ANNEX 6 · Comexi Group competition matrix

FLEXO PRINTING (COMEXI FLEXO)	✔ WINDMÖLLER & HÖLSCHER (GERMANY) ✔ UTECO (ITALY) ✔ BOBST (GERMANY) ✔ KBA – FLEXOTECNICA (ITALY) ✔ BIELLONI (ITALY) ✔ SOMA (CZECH REPUBLIC) ✔ PCMC (EUA) ✔ LOCALS (BRAZIL)
GRAVURE (COMEXI ACOM)	✔ CERUTTI (ITALY) ✔ DCM (FRANCE) ✔ GIAVE (ESPANYA) ✔ UTECO (ITALY) ✔ BOST (ITALY, CHINA) ✔ WINDMÖLLER & HÖLSCHER (GERMANY) ✔ ORIENT (JAPAN) ✔ FUJI (JAPAN) ✔ LOCALS (CHINA, KOREA, TAIWAN, INDIA)
OFFSET (COMEXI OFFSET)	✔ GOSS (EUA) ✔ DG SERVICE (HOLLAND) ✔ OMET (ITALY)
DIGITAL (COMEXI COMEXI DOES NOT DEAL IN THIS)	✔ HP INDIGO (ISRAEL)
LAMINATION (COMEXI NEXUS)	✔ NORDMECANICCA (ITALY, CHINA) ✔ BOBST (ITALY) ✔ SOMA (CZECH REPUBLIC) ✔ TECNOLAMI (ITALY) ✔ DCM (FRANCE) ✔ LOCALS (BRAZIL, CHINA, INDIA, TAIWAN)
SLITTING (COMEXI PROSLIT)	✔ J KAMPF (GERMANY) ✔ SOMA (CZECH REPUBLIC) ✔ EUROMAC (ITALY) ✔ ATLAS/TITAN (UK) ✔ BIMEC (ITALY) ✔ DCM (FRANCE) ✔ DEACRO (CANADA) ✔ LOCALS (BRAZIL,CHINA, INDIA, TAIWAN)

Source: Comexi Group

ANNEX 7 · *Drivers* for packaging innovation

Top *drivers* for packaging innovation



Source: https://ricoheuropebusinessdriver.wordpress.com/2012/11/06/can-commercial-printers-take-advantage-of-the-latest-trends-in-packaging/

ANNEX 8 · Top 15 converters, North America

2015	2014	2014 SALES (in millions of $)	COMPANY	NO. OF PLANTS	NO. OF EMPLOYEES
1	1	5.400	SEALED AIR CORP.	107	16.200
2	2	4.300	BEMIS COMPANY INC.	32	10.000
3	3	2.450	SIGMA PLASTICS GROUP	41	5.000
4	4	2.340	BERRY PLASTICS CORP.	70	2.125
5	5	1.968	COVERIS	16	2.500
6	8	1.860	NOVOLEX	35	5.100
7	6	1.400	PRINTPACK INC.	21	3.800
8	7	787	WINPACK LTD.	6	1.750
9	23	750	MONDI NORTH AMERICA	19	430
10	12	600	HOOD PACKAGING CORPORATION	20	1.900
11	13	400	SONOCO PRODUCTS COMPANY	10	860
12	15	377	AMERICAN PACKAGING CORPORATION	3	650
13	14	375	BRYCE CORPORATION	4	800
14	16	360	AMPAC HOLDINGS LLC	8	1.100
15	17	336	PREGIS LLC	14	786

Source: **http://www.flexpackmag.com/topics/2661-top-25-converters**

ANNEX 9 · Comexi Group organisational chart

Source: Comexi Group

ANNEX 10 · KAM *(Key Account Management)* proposal

Selection and segmentation of clients

K1	Priority segment, where Comexi group is not considered in the purchase of printing machinery. **Objective: Increase brand awareness, start business.**
K2	We have sold printing equipment over the past 5 years. We might or might not be leading suppliers. **Objective: Increase and maintain business**.
K3	Comexi was considered a printing press supplier but it has been more than 5 years since the last purchase. **Objective: Increase brand awareness, restart business.**
K4	Remaining Major Accounts. Minimum level of attention in the plan. **Objective: monitoring so as not to lose opportunities.** Sales team: Area managers. Outside priority attention of KAM.

Source: Comexi Group

ACCIÓ
Passeig de Gràcia, 129
08008 Barcelona

Front office
Tel. 93 476 72 06
info.accio@gencat.cat

Our Foreign Offices

ACCRA BEIJING BERLIN BOGOTA BOSTON BRUSSELS BUENOS AIRES CASABLANCA COPENHAGEN DUBAI HONG KONG ISTANBUL JOHANNESBURG LIMA LONDON MEXICO CITY MIAMI MILAN MONTREAL MOSCOW MUMBAI NEW YORK PANAMA PARIS SANTIAGO DE CHILE SÃO PAULO SEOUL SHANGAI SILICON VALLEY SINGAPORE STUTTGART SYDNEY TEL AVIV TOKYO WARSAW WASHINGTON DC

Catalonia Offices

Comarques Centrals
tel. 93 693 02 09
manresa.accio@gencat.cat

Girona
tel. 93 872 97 59 91
girona.accio@gencat.cat

Lleida
tel. 973 24 33 55
lleida.accio@gencat.cat

Tarragona
tel. 977 25 17 17
tarragona.accio@gencat.cat

Terres de l'Ebre
tel. 977 44 93 33
terresebre.accio@gencat.cat

Alt Penedès, Garraf i Maresme
tel. 934 76 72 51
altpenedesgarrafmaresme.accio@gencat.cat

ACCIÓ Generalitat de Catalunya Government of Catalonia

With the collaboration of: IESE Business School University of Navarra