ARROWHEAD
BUSINESS AND INVESTMENT DECISIONS

Due Diligence and Valuation Report

ALTERNEXT

Arrowhead Code:	67-03-02
Coverage initiated:	04 September 2017
This document:	16 April 2018
Fair share value bracket-DCF:	€ 11.35 and € 14.01
Share price (16 Apr 18):	€ 8.90[i]

Company:	I.CERAM SA
Ticker:	ALICR
Headquarters:	Limoges, France
CEO	Andre Kerisit
CFO	Christophe Durivault
Website:	www.iceram.fr

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Market Data

52-Week Range:	€ 9.70– € 6.59[ii]
Average Daily Volume (3M Avg.):	1,628[iii]
Market Cap (16 April 2018):	€ 47.5 MM

Financial Forecast (in €) (FY Ending – Mar.)

€ '000	'18E	'19E	'20E	'21E	'22E	'23E
High NI	(953)	(624)	(344)	(21)	383	751
High EPS	(0.18)	(0.12)	(0.06)	(0.00)	0.07	0.14
Low NI	(1,025)	(710)	(444)	(156)	165	445
Low EPS	(0.19)	(0.13)	(0.08)	(0.03)	0.03	0.08

Company Overview: I.CERAM SA is a France-based company engaged in design and manufacture of a revolutionary loaded ceramics. The company has own laboratory and researchers developing a range of bone fillers. I.CERAM was founded in December 2005 by Andre Kerisit. The company relies on over 30 years of expertise in dialogue, advice and support for orthopedic surgeons. The company uses its unique industrial property in the world, coupled with its expertise and innovative manufacturing ideas to develop alumina bioceramic implants capable of addressing indications for the treatment of bone infections and bone metastases. The ceramic technology relies on more than 10 years of use and more than 6000 implants in several parts of the body. A member of the European Center for Ceramics, I.CERAM works with engineers from major universities such as Arts et Metiers or ENSCI (Higher National School of Industrial Ceramics) etc., with a single aim to improve patient comfort and to facilitate professional practices for orthopedic surgeons, neurosurgeons and thoracic surgeons. On December 19, 2014, I.CERAM entered a new stage in its development through its IPO on Alternext Paris.

FY 2017: The company generated a topline of € 1,479 k in FY 2017 down by 1.8% on YoY basis from € 1,506 k in FY 2016 which is primarily driven by higher discount rate of 10.5% in reimbursement rates applied to implants by social security.

Arrowhead is updating coverage on I.CERAM with a fair value bracket of € 11.35 in the low bracket and € 14.01 in the high bracket scenario using the Discounted Cash Flow (DCF) Valuation Method.

Key Highlights: (1) I.CERAM SA is a France-based company engaged in design and manufacture of joint implants; **(2)** In FY 2017, company generated 94.8% of its revenue from France only; **(3)** The company registered a topline decline of 1.8% from € 1,506 k in FY 2016 to € 1,479 k in FY 2107; **(4)** EBIT of the company declined further from € -1,716 k in FY 2016 to € -2,125 k because of higher operational expenses due to new recruitments; **(5)** Company's financial stability stayed strong with available cash stood at € 2,407 k and gearing ratio of -8.5% ; **(6)** I.CERAM has started the new division under Addidreams which is into 3D printing of medical devices for individual use in metal, plastic; **(7)** I.Ceram announced the implantation of an antibiotic loaded ceramic in a femur **(8)** On June 28, 2017, the ceramic company received the Etienne Marcel 2017 prize for its innovation strategy and its social commitment; **(9)** Professor Jacques Monteil and Dr. Isabelle Quelven Bertin joined the Scientific Committee of I.CERAM during Q1 2017; **(10)** On September 01, 2016, I.CERAM, appointed Dr. Eric Denes as the Director Scientist; **(11)** On October 19, 2015, I.CERAM announced the success of its capital increase on the Alternext market in Paris amounting to € 9 million;

Key Risks: Key risks include I.CERAM's dependency of major portion of revenue from the domestic market; risk associated with currency fluctuation and regulatory approval for medical devices.

Valuation and Assumptions[iv]: Given the due diligence and valuation estimates, Arrowhead believes that I.CERAM's fair share value lies in the € 11.35 to € 14.01 bracket calculated using the DCF method.

Table of Contents

1. Summary and Outlook

We are updating coverage on I.CERAM. The Company, headquartered in France, specialized in offering implants for various body parts, produced of metal, polymer and ceramic. The Company's fair value is € 11.35 in the low bracket scenario and € 14.01 in the high bracket scenario (DCF Valuation Method).

Key Highlights[v]:

1. I.CERAM SA is a France-based company engaged in design and manufacture of joint implants. It offers implants for various body parts, produced of metal, polymer and ceramic. The company has own laboratory and researchers developing a range of bone fillers. The company was founded in December 2005 by Andre Kerisit. The company relies on over 30 years of expertise in dialogue, advice and support for orthopedic surgeons.
2. The company registered a topline decline of 1.8% from € 1,479 k in FY 2017 down by 1.8% on YoY basis from € 1,506 k in FY 2016 which is primarily driven by higher discount rate of 10.5% in reimbursement rates applied to implants by social security.
3. EBIT of the company declined significantly by 23.8% from € -1,716 k in FY 2016 to € -2,125 k in FY 2017 because of higher operational expenses due to new recruitments.
4. I.CERAM's financial stability stood strong with an available cash flow of € 2,407 k at the end of FY 2017 and gearing ratio of -8.5%.
5. I.CERAM has started the new division under Addidreams which is into 3D printing of medical devices for individual use in Metal, plastic. The activity of ADDIDREAM started in August 2017, the 3D printers had been chosen and was in September. The project will start in the beginning of 2018. Further, the company objective is to become the European leader in the production of medical devices by 3D printing, offering tools of operations more ergonomic for the surgeon, and customized implants for the patient. The company is founded by the young entrepreneurs, Clement Muhle and William Allaine.
6. I.Ceram announced the implantation of an antibiotic loaded ceramic in a femur. This surgery was performed in July 2017 on a teenager, for the replacement of a localized bone infection due to a resistant Staphylococcus aureus (MRSA). After sternum implantations, the success of this new implantation confirms the I.Ceram know-how and the quality of its CERAMIL implants. This implantation offers the company a wide range of bone surgeries and confirms its leadership for bone replacement.
7. On June 28, 2017, the ceramic company received the Etienne Marcel 2017 prize for its innovation strategy and its social commitment. I.CERAM has displayed its involvement in the creation of two first world medical events in the last two years and a commitment to the association Nos Quartiers a du Talents and its willingness to contribute actively to both medical and social progress.
8. Professor Jacques Monteil and Dr. Isabelle Quelven Bertin joined the Scientific Committee of I.CERAM during Q1 2017. Both participated in the publication of more than 100 articles or French and international medical communications. Further, the company also confirmed that obtaining CE marking for his unloaded sternum implant is ongoing.
9. On November 02, 2016, I.CERAM announced the world's first implantation of a porous alumina ceramic loaded with gentamicin.

Key risks: Key risks include I.CERAM' dependency of major portion of revenue from the domestic market; risk associated with currency fluctuation and regulatory approval for medical devices.

2. Business Overview [vi]

I.CERAM SA is a France-based company engaged in design and manufacture of joint implants. It offers implants for various body parts, produced of metal, polymer and ceramic. The company has own laboratory and researchers developing a range of bone fillers. The company was founded in December 2005 by Andre Kerisit. The company relies on over 30 years of expertise in dialogue, advice and support for orthopedic surgeons.

In FY 2016, the company generated 94.8% of revenue from orthopedic implants - hip, ankle and osteosynthesis; 4.5% from orthopedic implants – ceramics; 0.6% from sternal implants (excluding antibiotics).

The company uses its unique industrial property in the world, coupled with its expertise and innovative manufacturing ideas to develop alumina bioceramic implants capable of addressing indications for the treatment of bone infections and bone metastases.

The company's focus on ensuring quality and rigor has helped it create a market for its products. Using the best industrial tools available, the company works toward creating products, in line with the knowledge and inputs received from the surgeons.

The marriage of different materials and ceramic treatments is one of the main features of the company. Thus, the clinical retreat, combined with the qualities of resistance in compression, osteocompatibility or even reduction of the friction of the ceramics are exploited in the design of the new implants of the company.

A member of the European Center for Ceramics, I.CERAM works with engineers from major universities such as Arts et Metiers, ENSCI, INSA, CESI, etc., with a single aim to improve patient comfort and to facilitate professional practices orthopedic surgeons.

On December 19, 2014, I.CERAM entered a new stage in its development through its IPO on Alternext Paris under the symbol ALICR. The company's IPO follows a private placement with qualified investors.

2.1 Geographic Locations and Partners [vi]

2.1.1 Geographic Locations

With respect to the global presence, I.CERAM, has a strong network of partners who strengthen the growth of the company in not only in France but also its development abroad. It is through this network that the company is now present in seven countries and is actively pursuing its international deployment. I.CERAM, international network consists of the following partners:

Exhibit 1: Geographic Locations	
International Partners	**Geography**
I.CERAM SRO	Czech Republic (Subsidiary Company)
I.CERAM PT	Portugal (Subsidiary company)
I.CERAM South Africa	South Africa
Lavender Medical	UK
Biotim	Italy
Urotec	Costa Rica

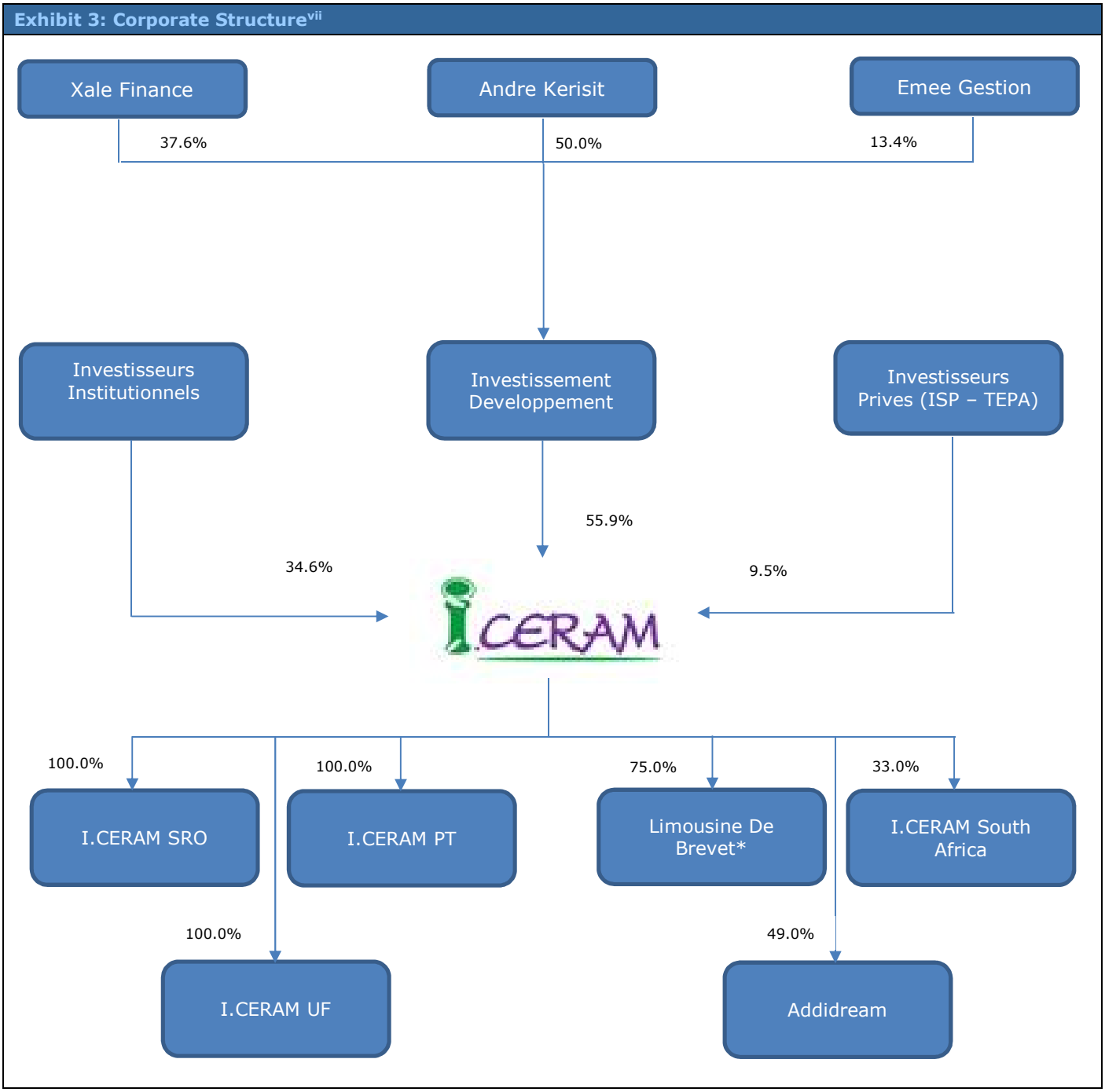
Belgafix	Belgium
CM Orthopaedic	Belgium
Distrauma Medical	Spain

2.1.2 Partners

Exhibit 2: I.CERAM also works with financials, institutional and social partners:

2.2 Corporate Structure

Exhibit 3: Corporate Structure[vii]



** I.CERAM holds 75% of the Limousine De Brevet; however, will acquire remaining 25% by end of 2017*

2.3 Company Milestones

Exhibit 4: I.CERAM Milestones[viii]	
Year	**Event**
2005	• Incorporated in December under the name I.CERAM SA
2014	• I.CERAM confirms its eligibility for PEA-PME in accordance with Decree No. 2014-283 of March 04, 2014 • Christophe Durivault appointed as the CFO of I.CERAM • I.CERAM continues its deployment in South America by signing an exclusive distribution contract for its implants in Costa Rica • I.CERAM raised € 2.7 million through private placement and got listed on Euronext Growth (Alternext) under the symbol ALICR
2015	• The CHU of Limoges and I.CERAM announced the realization of the first worldwide implantation of a porous alumina ceramic sternum CERAMIL designed and developed by I.CERAM • On October 19, 2015, I.CERAM announced the success of its capital increase on the Euronext Growth (Alternext) market in Paris amounting to € 9 million
2016	• I.CERAM announced the creation of its subsidiary PT ICERAM Portugal. The ICERAM PT company, a 100% subsidiary of I.CERAM will first undertake the development of scientific, technological and commercial partnerships throughout Portugal • I.CERAM announced the installation of the first CERAMIL sternal implant under the STOIC biomedical research protocol • In September, I.CERAM appointed DR. Eric Denes as the Director Scientist • I.CERAM continued to optimize its ceramic implants and announced that it has finalized the first phase of measurement of the release kinetics of its ceramic loaded with antibiotics • I.CERAM announced the implementation of its buy-back program of shares in December
2017	• Professor Jacques Monteil and Dr. Isabelle Quelven Bertin joined the Scientific Committee of I.CERAM during Q1 2017. Further, the company also confirmed obtaining CE marking for his unloaded sternum implant is ongoing • The company accelerates its research and development by signing of a collaboration agreement with CSPBAT the laboratory of the University of Paris 13 • I.CERAM confirms its eligibility for PEA-PME 1278 as of December 29, 2014 • On June 28, the ceramic company received the Etienne Marcel 2017 prize for its innovation strategy and its social commitment on a daily basis • In November, I.CERAM announced first antibiotic loaded ceramic implanted in femur for bone replacement • I.CERAM has started the new division under Addidreams which is into 3D printing of medical devices for individual use in Metal, plastic.

2.4 Business Model and Value Chain

A vertically integrated business model that protects know-how and stimulates innovation.

Exhibit 5: Business Model and Value Chain

Design	: Design surgeons : A Scientific Committee : 2 doctors and 5 engineers : 95% of turnover in R & D
Manufacturing	: Drilling / Ultrasonic Drilling : Conditioning : White room : External sterilization
Quality Certification	: Quality control over 100% of products
Infrastructure	: State-of-the-art machinery : Ceramic laboratory : 2 unique machines in Europe
Chain of distribution	: Inventory management : Shipping : Replenishment
Marketing	: Live Sales : 5 sales representatives in France (as of August 26, 2015) : International distribution agreements

2.5 Products and Services Offered [ix]

The Company offers eight primary products: Skull, Shoulder, Spine, Hip, femur and tibia, Ankle, Foot and Osteosynthesis.

2.5.1 Ceramic Implants

- **Sternal implant without antibiotics:** This product is intended to replace the whole sternum or its upper part when it is destroyed mainly by a metastasis. Indeed, sternum is part of the thoracic wall and thus part of the physiological respiratory system. It's easiness of use associated to a great biocompatibility make it a reliable device after metastasis or radio-induced osteosarcoma removal in order for the patient to retrieve its breath capability.
- **Sternal implant with antibiotics:** The loaded sternum was design to be used in a septic context. The purpose is the replace a destroyed sternum by infection. This type of destruction (mediastinitis or deep sternal wound infection and sternitis) can occur in about 2%, following a cardiac surgery which necessitates a sternotomy. The loaded antibiotic is released at the time the sternum is implanted, in order to protect implantation, i.e. to kill the bacteria that are in the surgical wound, for them not to colonize the device.
- **Femur implant with antibiotics:** This device was designed to simplify the management of chronic osteomyelitis. Usually, a 2 stage surgery is used: 1st step: cleaning the bone (removing all the dead and infected bone) and implantation of antibiotic loaded cement (which releases only about 10% of the antibiotic), 2nd step (about 6 weeks later): cement removal and bone grafting using iliac crest. This strategy requires 2 hospitalizations, 2 surgeries and a painful graft take. With the femur implant, the whole surgery is done in one step: bone cleaning, bone shaping using a dedicated tool to prepare the device implantation and the device impaction in the bone hole left by the cleaning step. With this technique, we use the strength of the ceramic to replace the missing/removed bone and 100% of the antibiotic loaded in released, ensuring very high local concentration to kill the bacteria left in the bone and wound. Moreover, only one surgery is needed, reducing the costs of the management and the risk of new infection during the second surgery.

2.5.2 Spine

2.5.2.1 Cervical Spine

- **Blocks of cervical corporectomy:** The corporectomy blocks are used in the case of spinal reconstruction neurosurgery for the treatment of tumor and traumatic pathologies by corporectomy. Bone rehabilitation is favored by its structure with open porosity and consolidation is effective from 3 to 6 months after implant placement
- **Half-anatomical cervical intersomatic cages:** The cervical intersomatic cages are designed for use in bone synthesis and are intended, by their geometry, for cervical spine surgery in order to obtain fusion of the intersomatic space. The total consolidation is effective 3 to 6 months after implant placement
- **Inclined cervical intersomatic cages:** The cervical intersomatic cages are designed for use in bone synthesis and are intended, by their geometry, for cervical spine surgery in order to obtain fusion of the intersomatic space. The total consolidation is effective 3 to 6 months after implant placement
- **Intersomatic cylinders:** The intersomatic cylinders are used in neurosurgery for the stabilization and fusion of intersomatic space using the Cloward technique. These nonabsorbable cylinders allow a consolidation 3 to 6 month after the installation
- **Cervical Plate:** The anterior cervical plates are used in cases of cervical arthrodesis. They are performed and malleable to adapt to the different profiles of the vertebral bodies

2.5.2.2 Lumbar Spine

- **Lumbar intersomatic cages:** The intersomatic cages, used in bone synthesis, are intended for lumbar spine surgery. These cages are particularly suitable for the treatment of spondilolysthesis. Thanks to their structure, the consolidation is effective from 3 to 6 months after the intervention

- **Birdie System:** The spinal system Birdie is a system of spinal arthrodesis. Used for long setups for pediatrics, or for short mounts in adult surgery, the innovation of this system resides in the spinal rod / implant connection. Indeed, this connection is ensured by a clip system ensuring a blockage that is efficient and reliable over time

2.5.3 Hip

2.5.3.1 Anti-dislocation cotyloid thrust: The anti-dislocation stop is implanted to stabilize the hip after dislocation. It attaches to the Charnley cotyle with 4 screws of diameter 3.5. The associated ancillary is composed of 5 test stops and the implants are delivered sterile

2.5.3.2 Cotyles

- **Charnley Cotton:** In the 1960s, Professor John Charnley of Manchester decided to use highly crosslinked polyethylene to create a wear-resistant acetabulum. Thanks to his work on the reduction of the wear of the acetabulum, the cement sealing of the components and the approaches, Charnley brings the right balance between three risks: wear, loosening and dislocation. It is all the fruit of the work of Pr. Charnley which is reinvested in this acetabulum
- **Cotton ISIS (Titanium / PE):** ISIS cotton is designed to ensure excellent primary stability thanks to its anti-rotation pins, and optimal secondary stability via its grooves and coating of hydroxyapatite. It is compatible with conventional polyethylene cores or 10° inclined
- **Cotton ISIS II (Titanium / Ceramic):** Evolution of ISIS, ISIS II ensures optimum stability thanks to its specially designed geometry for optimized integration. This acetabulum is essential for use with Biolox Forte or Delta ceramic inserts

2.5.3.3 Heads

- **Ceramic heads:** Ceramic heads Biolox Forte (Alumine) or Biolox Delta (Alumine + Zirconia). Ceramic heads are available in Ø28, Ø32 and Ø36; they adapt to all our hip stalks
- **Stainless steel heads:** Heads in stainless steel with diameters 22,22 mm and 28 mm

2.5.3.4 Rods

- **Lemovice (Anatomical / Inox):** The anatomical Lemovice stem to be cemented, used for hip arthroplasty, ensures optimal adaptation of the hip pivot to the femur in order to decrease femoral loosening. Thanks to its anatomical anteversion, wear due to head / acetabulum friction is considerably reduced, which limits the debris of polyethylene and significantly improves the longevity of the implant
- **Lemovice (Anatomical / Titanium):** The titanium Lemovice is the cementless version of the Lemovice in stainless steel. Like its counterpart to cement, it ensures optimal adaptation of the hip pivot to the femur in order to decrease femoral loosening. Its anatomical anteversion reduces wear due to head / acetabulum friction, thus limiting polyethylene debris and significantly improving longevity of the implant
- **SFAX (Anatomical / Inox):** The SFAX stem, used in hip arthroplasty, is designed to ensure a good metaphyseal filling and to obtain a homogeneous cement mantle; the distribution of the mechanical stresses is thus optimal. The homothetic progression of the length of the neck adapts perfectly to the anatomy of the patient
- **Tn'R Intermediate Femoral Stem:** The right stem Tn'R, indicated in the case of fractures of the neck of the femur in the elderly, is a lockable implant totally modular thanks to its 3 removable collars which, combined with the 3 heights of femoral heads allow 9 head heights. Its quadrangular shape with broken edges multiplies the contacts between the stem and the cortical bone, allowing perfect cortical support and optimal stability

2.5.4 TIBIA

- **Internal addition tibial osteotomy blocks:** Thanks to their geometry and their extreme resistance, these shims are intended to restore heights of 5 to 17 mm in the case of tibial osteotomies. They do not hinder the positioning of a knee prosthesis. Like the other porous ceramic implants of I.CERAM , the open porosity of the material promotes bone rehabitation and total consolidation is effective 3 to 6 months after the procedure
- **Diroderal corner of the tibial tuberosity:** The dihedral angle is intended for the removal of the anterior tibial tuberosity. This implant ensures the maintenance of the correction provided as well as the attachment of the bone tongue with the tibia. To do this, a hole is made in the implant for the installation of a screw of Ø5mm. The open porosity of the material promotes bone rehabitation and total consolidation is effective 3 to 6 months after implant placement

2.5.5 Ankle

- **Akile (Carbio / Ceramic):** The AKILE ankle prosthesis is a high-congruence tri-compartmental prosthesis with a trochleo-spherical astragalus dome, a spherical contact between the shoe and the tibial part, and an optional lockable keel. This prosthesis offers very good results on the wear of polyethylene thanks to the congruence of the friction parts and to its anti-wear Carbioceram ceramic coating in interface with the intermediate pad. In addition, the bone contact provided by an alumina coating makes it possible to cement the components of the implant to the bone or not

2.5.6 Foot

- **Calcaneum wedge:** The CERAMIL® calcaneum wedges are used in orthopedics to treat congenital flexible flat feet of adult patients. Their open porosity structure facilitates the bone ingrowth; the complete consolidation is effective between 3 and 6 months after the implant installation

2.5.7 Ostheosynthesis

- **Compression Screw Plate:** The C.S.P system is used in cases of femoral neck fractures. The system consists of a plate, a cephalic screw and a compression screw. It is designed for immediate support and positioning providing a secure fixation and total security
- **Ostheosynthesis Products**

2.6 Financial Overview [x]

The Group's consolidated revenue for 2017 amounted to € 1,479 k compared to € 1,506 k for FY 2016. However, revenues only account for a portion of commercial activity, as the commissions received for total knee prostheses sales were not considered. Integrating this sales revenue, 2017 total turnover increased to € 1,612 k, a 5.7% growth compared to 2016. Further, operating income of the company declined significantly by 23.8% from € -1,716 k in FY 2016 to € -2,125 k in FY 2017 because of higher operational expenses due to new recruitments. The net result after tax of the consolidated group stood at a loss of € 2,157 k at the end of 2017 relative to the negative net income of € 1,898 k for the FY 2016.

2.7 Shareholding Pattern

The Company had 5,340,702 shares of common stock issued and outstanding on April 16, 2018.

Exhibit 6: Shareholding Pattern (as on Apr 16, 2018) [xi]

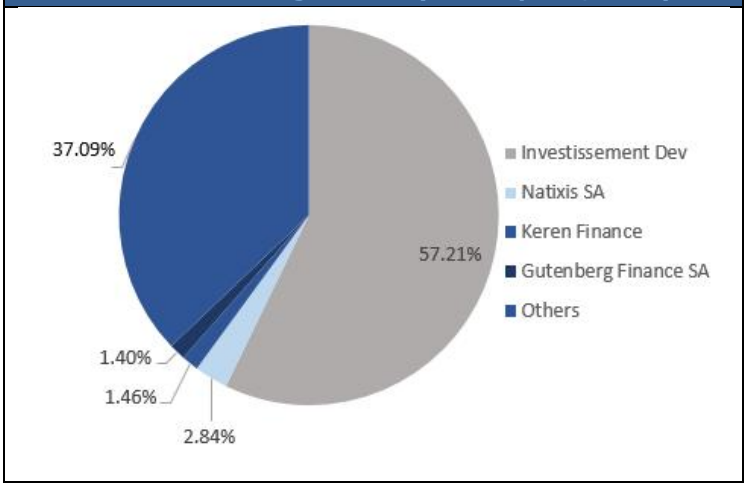


Exhibit 7: Shareholding Pattern [xi]

Shareholders	No. of Shares	% of total
Investissement Developpement	3,055,120	57.21%
Natixis SA	151,725	2.84%
Keren Finance	77,726	1.46%
Gutenberg Finance SA	75,064	1.40%
Others	1,981,067	37.09%
Total Shares Outstanding	**5,340,702**	**100.00%**

2.8 Listing and Contact Details

I.CERAM is listed on Euronext Growth (Alternext - NYSE-Euronext) in Paris (Ticker: ALICR, Date of Listing – December 19, 2014)

Company Contacts

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Contact No: +05 55 69 12 12
Fax: +05 55 35 06 50
Email Id: direction@iceram.fr

3. News [xii]

- **I.CERAM announced full year 2017 results:** The company registered a topline decline of 1.8% from € 1,506 k in FY 2017 to € 1,479 k in FY 2016 driven by higher discount rate of 10.5% in reimbursement rates applied to implants by social security. During the FY 2017, the Company incurred R&D expense which is equivalent to 116% of its turnover, allowing the development of new pieces in the Ceramil range, the upgrading of loading technologies and performance of tests to better understand in vitro release kinetics

- **I.CERAM acquired 49% stake in Addidream:** I.Ceram specialized in innovative orthopedic implants and ceramic implants, accelerates its development by acquiring a significant equity stake of 49% in Addidream, a startup located in France and specialized in ancillary and medical implant 3D printing

- **I.CERAM files for a patent:** I.Ceram validates its R&D work with the deposit of a patent on an implant offering durable protection against bacteria under a process to affix an antibiotic on the implant's surface.

- **Certification ISO 13485: 2012 renewed:** The company has obtained the renewal of its ISO 13485: 2012 certification COFRAC on the quality management of its Medical Devices and associated services. The renewal of this international standard, the prerequisite for obtaining the CE marking of all product, goes in-line into the I.CERAM development plan and attests to the requirement of its quality service

- **I.Ceram announced the implantation of an antibiotic loaded ceramic in a femur:** The company performed this surgery 2017 on a teenager, for the replacement of a localized bone infection due to a resistant Staphylococcus aureus (MRSA). After sternum implantations, the success of this new implantation confirms the I.Ceram know-how and the quality of its CERAMIL implants. This implantation offers the company a wide range of bone surgeries and confirms its leadership for bone replacement

- **I.CERAM received the Etienne Marcel 2017 prize:** On June 28, 2017, the ceramic company received the Etienne Marcel 2017 prize for its innovation strategy and its social commitment on a daily basis. I.CERAM has displayed its involvement in the creation of two first world medical events in the last two years and a commitment to the association Nos Quartiers a du Talents and its willingness to contribute actively to both medical and social progress.

- **I.CERAM confirms its eligibility for PEA-PME 1278 of December 29, 2014:** Establishing the eligibility of enterprises for PEA-SME requires less than 5,000 employees on the one hand, annual turnover of less than € 1 500 million or assets of less than € 2,000 million, on the other hand.

- **I.CERAM announced the appointment of two nuclear medicine physicians:** Professor Jacques Monteil and Dr. Isabelle Quelven Bertin joined the Scientific Committee of I.CERAM during Q1 2017. Both participated in the publication of more than 100 articles or French and international medical communications. They thus bring their experience in the field of imaging and the functional imaging used in the diagnostic. Further, the company also confirmed that obtaining CE marking for his unloaded sternum implant is ongoing.

- **I.CERAM signed a strategic cooperation agreement with CSPBAT:** The company accelerates its research and development by signing of a collaboration agreement with CSPBAT the laboratory of the University of Paris 13. The development agreement signed with the laboratory of biomaterials for health - chemistry, structures, properties of biomaterials and therapeutic agents, aims to develop, in addition to the loading technique developed by the company teams, the grafting of bioactive polymers to the surface of porous ceramics CERAMIL. The presence of polymers could help significantly accelerate bone growth within the matrix porous alumina.

- **I.CERAM announced the implementation of its buy-back program of shares:** The Governing Body decided on December 13, 2016 to partially implement the program redemption of shares. As a result, the company repurchased, on February 27, 2017, a 10,500 of its own shares, representing 0.19% of its share capital. These securities were acquired for a total price of € 72,828, or € 6,936 per share.

- **I.CERAM appointed DR. Eric Denes as the Director Scientist:** On September 01, 2016, the company appointed Dr. Eric Denes as the Director Scientist
- **I.CERAM raised capital close to € 9 million:** 1. On October 19, 2015, I.CERAM announced the success of its capital increase on the Alternext market in Paris amounting to € 9 million. The funds would be utilized to develop the business by strengthening of sales team and by creation of new international partnerships, financing of R&D

expenses and industrial investments. Further, the BODs of I.CERAM set the issue price of the new shares at € 6.80 per share and decided to implement the Extension Clause almost in its entirety. In total, the issue represents a capital increase of € 8,908,387 through the issuance of 1,310,057 new shares. The market capitalization of I.CERAM stands at € 36.3 million on the basis of a share capital of 5,340,702 shares, of which 43.8% is free float.

- **I.CERAM raised € 2.7 million through private placement:** On December 18, 2014, the company raised € 2.7 million through private placement by issuing 588,180 shares at a price of € 4.65 per share to group of qualified investors. Further, I.CERAM listed its shares on Alternext under the symbol ALICR.

- **I.CERAM first human implantation of a ceramic loaded with antibiotic**: On November 02, 2016, I.CERAM announced the world's first implantation of a porous alumina ceramic loaded with gentamicin.

- **Christophe Durivault appointed as the CFO of I.CERAM:** I.CERAM, appointed Christophe Durivault as the CFO on July 04, 2014

4. Management and Governance [xiii]

The Management and Governance team has vast experience in the high-tech implants for different joints of the human body and in managing operations and finance for multiple businesses. They also possess extensive background in investment matters.

Exhibit 8: Management and Governance

Name	Position	Past Experience
Andre Kerisit	CEO	• He founded I.CERAM in 2005 and has been the CEO of the company since beginning • He obtained the Regional Award of Good Practice and Participatory Management in September 2014 from the association of French quality performance limousine • He received a first Innovation Award at the Night of the Leaders in 2007. Also, he received Award of the creation of the company and the Innovation Development Award in 2009 and 2011 during the Night of Carnot and Turgot • From 1993 to 1998, he held the position of Sales Director at Crystal SA in Limoges, where he set up a sales team and was involved in the development of the first ceramic implant implanted in the knee • He started his professional career in orthopedics at the OMCI company in Quimper in 1985. He pursued his career as a salesman in the north-east of France to create a customer portfolio for the company
Christophe Durivault	CFO	• He joined I.CERAM in January 2014 as the Chief Financial Officer • He worked with the Limousin Expansion agency for business creators. Further, during his tenure with the organization, he set up a team of prospectors and coaches of innovative business creators and regional SMEs • He started his career as a decision-making developer in the UNILOG company and, between 2001 and 2003, worked on the implementation of IT tools for large industrial accounts • He is an engineer graduated from the Higher National School of Industrial Ceramics
Eric Denes, M.D	Scientific Director	• He joined I.Ceram in September 2016 • He is a Medical Doctor, specialized in Infectious Diseases • He has been the antibiotic referent in the Limoges Teaching Hospital for more than 15 years • He is a member of the multidisciplinary team for bone and joint infection in the Limoges Teaching Hospital • He still practices in the Limoges private clinic

Industry Overview

Orthopedic Implants Industry

Orthopedic implants are medical devices used to either replace a missing or a damaged bone or to enable functioning of a damaged bone or joint. These are surgically inserted into the body to treat the damaged bone or joint to stabilize the body posture. These implants are usually biocompatible and are made up of stainless steel or titanium, with a coating of plastic that acts as artificial cartilage.

Global Market Size

According to *The Orthopedic Implants Market Report by Allied Market Research*, the global orthopedic implants market was valued at € 40.3 B in 2016. Further, the industry is expected to grow at a CAGR of 6.8% to reach approximately € 63.7 B in 2023[xv].

Exhibit 9: Orthopedic Implants – Global Market (€ B)

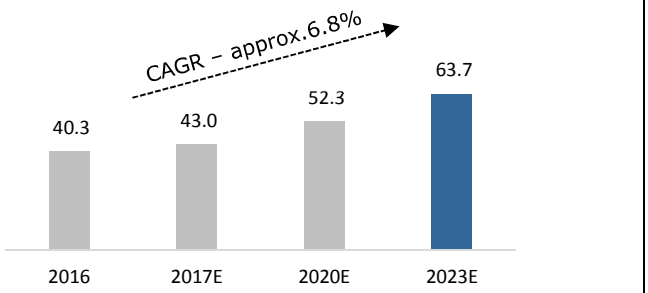
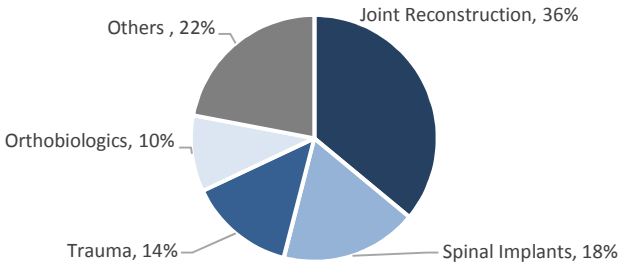


Exhibit 10: Market Share for Orthopedic Implants - by Segment - 2016[xiv]



Of the total market, joint reconstruction segment accounts for the majority share (36%) followed by spinal implants (18%), trauma (14%), orthobiologics (10%) and others (22%). Knee implants accounts for ~50% share of the joint reconstruction segment while hip contributes about 40% and extremities total the remaining 10% share. Joint reconstruction grew by 3.6% in 2016 as compared to 2015, up 4% over the prior year, while spine remained flat at 2%.[xvi]

Some of the prominent trends that the market is witnessing include increasing geriatric population, increasing healthcare awareness, technological developments of orthopedic implants and growth opportunities/investment opportunities.

Macroeconomic Factors

Growth in this market can be attributed to i) high incidence of osteoporosis, osteoarthritis, and obesity, ii) rapidly aging global population, and iii) increasing number of sports-related injuries and road accidents. People above the age of 65 years are highly prone to orthopedic diseases and fractures. This is because the bone density progressively reduces with increasing age.

However, limited medical insurance coverage and stringent regulatory approval process are major factors that are constraining the market. In addition, patients are also dissatisfied or have concerns regarding risks such as adverse effects typically associated with metal implants, post-surgery infections, implant dislocations, hypersensitivity, wear debris and toxicity issues associated with prosthetic implants. These concerns have resulted in increasing number of product recalls.

5.1 Classification and Segments in Orthopedic Implants

Medical implants are part of the medical devices category. They are defined as products used for medical purposes in patients, in diagnosis and/or treatment. There are three classes of devices that are controlled by the Food and Drug Administration (FDA)[xvii]:

Class I – Devices present the lowest safety risk and are only subject to general controls.

Class II – Devices require general and special controls involving labeling requirements, mandatory performance standards and adequate surveillance.

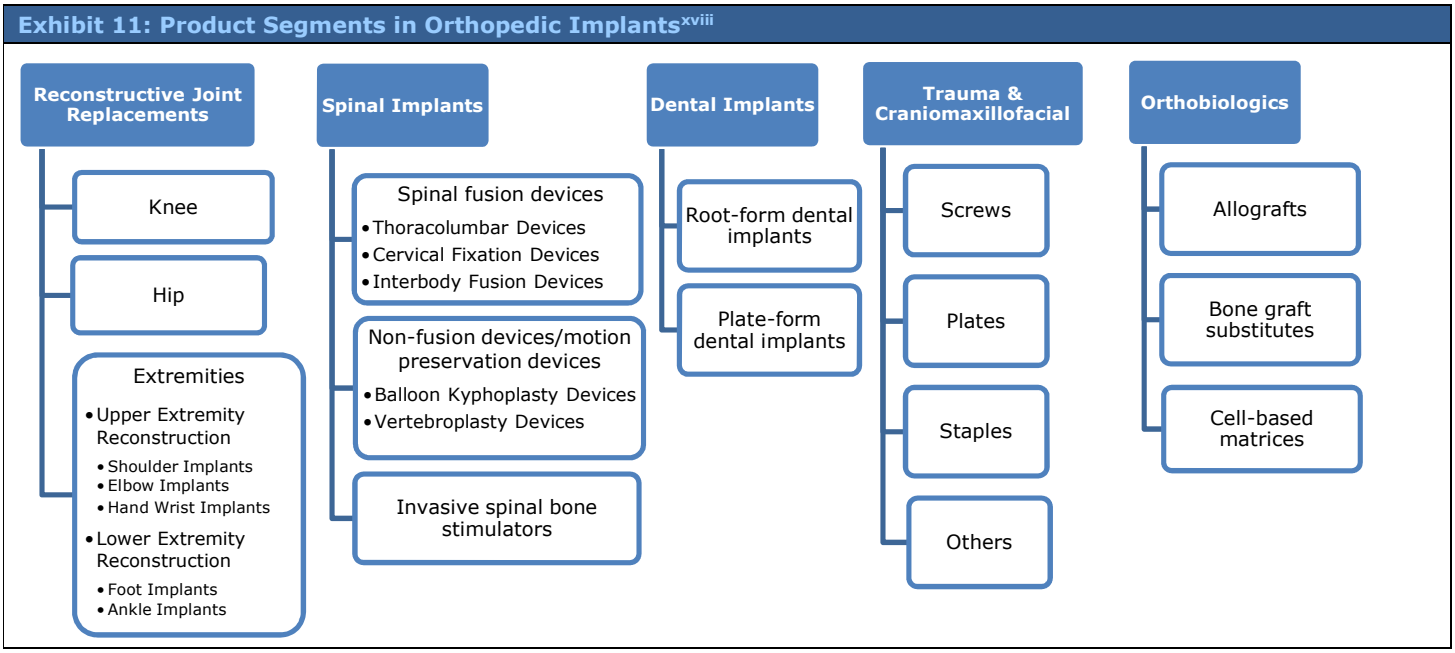
Class III – Devices must have the same general and special controls as Class I and II devices, and undergo scientific review. These are the most scientifically rigorous classification of medical devices. Most of the orthopedic implants are included in this segment.

The global orthopedic implants market is segmented into product and biomaterial.

5.1.1. Products

Based on the products, orthopedic implants market is classified into reconstructive joint replacements, spinal implants, dental implants, trauma & craniomaxillofacial, and orthobiologics.

Exhibit 11: Product Segments in Orthopedic Implants[xviii]



Reconstructive surgery is performed to treat body structure affected due to congenital defects, developmental abnormalities, trauma, infection, tumors or disease. The surgery improves body function and ability.

Reconstructive joint replacements market is segmented into knee, hip, and extremities. Of these, extremities is further classified into Upper Extremity Reconstruction (Shoulder Implants, Elbow Implants, Hand Wrist Implants) and Lower Extremity Reconstruction (Foot Implants and Ankle Implants).

Spinal implants are segmented into spinal fusion devices (Thoracolumbar Devices, Cervical Fixation Devices, Interbody Fusion Devices), non-fusion devices/motion preservation devices (Balloon Kyphoplasty Devices and Vertebroplasty Devices), and invasive spinal bone stimulators. Most of the spinal implants are made up of metals such as titanium, titanium-alloy or stainless steel. Some are made of non-metallic compounds. The size and the shape of the spinal implant vary according to the requirements of the patients.

Dental implants are metal posts or frames (titanium post or zirconium post like a tooth root) that are surgically placed into the jawbone beneath the gum line. Once they are placed, dentist can mount replacement teeth or a bridge in that

area. These implants are further segmented into root-form and plate-form implants based on the dental implant procedure.

Craniomaxillofacial surgery uses distraction and osteosynthesis techniques to correct such injuries and deformities. Severe craniomaxillofacial traumas or deformities pose a risk to the function of bodily senses and entail psychosocial consequences. People affected by such injuries suffer from functional impairment, i.e. not being able to eat, taste, swallow or speak properly.

Trauma & Craniomaxillofacial are further segmented into screws, plates, staples, and others.

Orthobiologics are substances used by orthopedic surgeons to heal injuries (broken bones and injured muscles, tendons, and ligaments) quickly. These products are made from substances that are naturally found in the body. Orthobiologics are further segmented into allografts, bone graft substitutes, and cell-based matrices.

Orthopedic implants can also be used as a treatment for bone infections and bone cancer.

Bone infections (Osteomyelitis): Occurs in bone of infant, children and adults due to different types of bacteria. In children, osteomyelitis most commonly occurs at the ends of the long bones of the arms and legs, affecting the hips, knees, shoulders, and wrists. In adults, it is more common in the bones of the spine (vertebrae), feet or in the pelvis. Bone infection can happen in different ways - bacteria travels through the bloodstream (bacteremia) and spread to the bone, due to open wound over a bone, surgery or injection around a bone.[xix]

While, bone cancer can be of two different types:

Primary Bone cancer: originates from rapid and uncontrollable growth of the bone and related tissues.

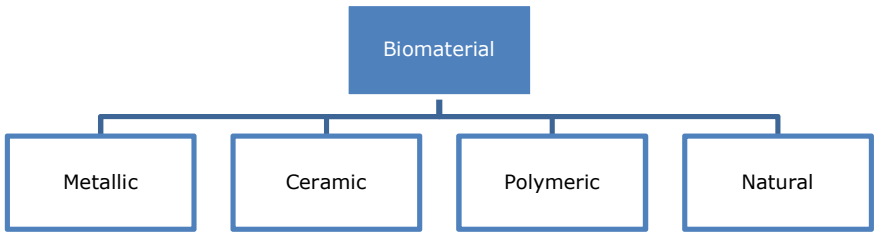
Secondary bone cancer (Bone Metastasis): originates from other part of the body and metastasize to bone structure. The primary cause for bone metastasis is the spread of cancer from Prostate, Thyroid, Breast, Lung and Kidney. Most common parts for metastasis include Upper arm bone (humerus), the skull, Hip bone (pelvis), upper leg bone (femur), Ribs and Spine.

Bone cancer lead to weak & brittle bones which result in compression fractures of the spinal vertebrae.[xx] In such cases, orthopedic oncologists treat the patients to remove tumors and reconstruct the bones.[xxi] Treatment for bone metastasis also requires individuals from interdisciplinary fields such as orthopedics, pain management, surgeons and medical specialties.

5.1.2. Biomaterials

Based on biomaterials, orthopedic implants market is segmented into metallic, ceramic, polymeric, and natural biomaterials.

Exhibit 12: Biomaterial Segments in Orthopedic Implants



Metallic biomaterial is widely used as medical devices, with stainless steel, titanium and cobalt-based alloys. These are employed in most permanent metallic implants due to their favorable mechanical properties, especially fracture toughness and fatigue strength.

Ceramic biomaterial (Bioceramics) is a class of ceramics used for repair and replacement of diseased and damaged parts of the musculoskeletal system.

Polymeric biomaterials are one of the important elements of tissue engineering. They are recommended when dealing with polymer device of therapeutic or biological interest.

Natural biomaterials are found inside the body and are valuable to the biomedical field also. Since they are found within the living body, large quantities are constantly available at a reasonable price. Further, biocompatibility is not a major issue as they already have access to the binding sites for cells and adhesion molecules.

5.2 Demand Drivers

High incidence of orthopedic diseases in growing ageing population and younger generation owing to changing lifestyle and lack of exercise and nutrition intake are key influential factors driving the market.

5.2.1. Ageing Population

Population ageing is poised to become one of the most significant social transformations of the 21st century. Globally, population of people aged 60 and above is growing faster than all younger age groups.

The world's population is ageing at such a rate that those aged 60 or above account for over 10% currently, and are likely to rise to over 20% by 2050.[xxii] According to the data from *World Population Prospects: the 2017 Revision*, the number of older persons (those aged 60 years or over) is expected to more than double (2.1 billion) by 2050 and to more than triple (3.1 billion) by 2100.[xxiii]

The constantly rising geriatric population is primarily driving the growth of the market since people aged above 60 years are at a high risk of developing degenerative disc disease, low bone density, and osteoarthritis.

5.2.2. Increasing Rate of Osteoporosis and Osteoarthritis

Osteoporosis and Osteoarthritis are common disabling joint disorder affecting millions of people worldwide. Osteoporosis is a condition that causes bones to become thin and porous, decreasing bone strength and leading to increased risk of breaking a bone. The most common sites of osteoporotic fracture are the wrist, spine, shoulder and hip. Osteoporosis can occur at any age and can affect both men and women. Over 80% of all fractures in people over the age of 50 and above are caused by osteoporosis. Globally, there are more than 8.9 million fractures annually caused by osteoporosis. Further, nearly 75% of hip, spine and distal forearm fractures occur among patients 65 years old or over.[xxiv] Replacement of joints due to osteoarthritis is the key factor which has resulted in high revenue share of joint reconstruction in the orthopedic implants market. Similarly, half of the osteoarthritis patients suffer from arthritis of knees, resulting in necessity of knee replacement. Therefore, knee among joint reconstruction products is observed to dominate the joint reconstruction market.

5.2.3. Sports-related Injuries and Serious Accidents

Increasing number of sports-related injuries and road accidents are leading to higher number of trauma cases, thereby propelling the demand for orthopedic implants. About 62% of most organized sports-related injuries occur during practice rather than in games.[xxv] The most common types of sports-related injuries are sprains, muscle strains, bone or growth plate injuries, repetitive motion injuries and heat-related illness.

5.2.4. Technological Advancements

Treatment of orthopedic disabilities or diseases has undergone a dramatic shift from conventional invasive procedures to minimally invasive surgeries. Development of longer-lasting and improved materials and implants is also a key contributor to the industry's growth.

Due to several limitations of conventional or traditional medical surgeries such as long recovery time, highly expensive, and more chances of infection, these procedures are uncomfortable, painful and expensive. This has led to a rise in minimally invasive surgeries in orthopedic and dental domains. Minimally invasive surgeries involve inserting a tested and reliable implant through a shorter incision using surgical approaches that avoid pain. Some of the other benefits of these surgeries are low cost, and faster recovery times. Further, advancements in the materials and design have led to greater durability of about 25-30 years as compared to other orthopedic implants.

This transformation has led to a positive impact in the market growth. The number of implant surgeries is expected to increase by using this technique, as it encourages young patients to live a painless lifestyle at low cost and within less time.

5.2.5 Growth in Use of Orthopedic Implants for Bone Infection & Metastasis Treatment

Orthopedic implants are increasingly used in treatment for bone infections & metastasis. As a result, the growth in bone infections & metastasis therapeutics market will have an impact on the orthopedic implants market.

According to a report by Research & Market, the global bone and joint infections therapeutics market was valued at € 0.6 B in 2009 and forecasted to reach € 1.03 B in 2016, by growing at a CAGR of 8.1%. During this period, the key factor responsible for this growth was the increase in diagnosis of bone and joint infections (prosthetic infections, diabetic ulcers, sports injuries etc.) and the increase in use of newly launched antibiotics for the treatment of such infections.[xxvi]

According to a report by GlobalData, the global bone metastasis therapeutics market was valued at € 1,223 M in 2010 and forecasted to reach at € 5,485 M in 2017, by growing at a CAGR of 12%. Globally, there are around 1.7 to 1.9 million patients that develop bone metastasis every year.[xxvii]

Key factor for driving the growth of bone metastasis therapeutics market globally is the increase in cancer prevalence and delayed diagnosis of cancer in low-income countries. As per University of Texas Southwestern Medical Center Dallas, there are more than 600,000 cases of bone metastasis in the U.S. every year. [xxviii]

5.3 Market Trends

Increase in the acceptance rates among patients for orthopedic implants is raising the market. This is complemented with the generation of innovative and personalized 3D printed implants with the integration of assistive imaging techniques. These techniques include computerized tomography and magnetic resonance imaging employed to create surgical designs with precision, coupled with the availability of advanced, robotically assisted surgical tools. The market is experiencing a shift from conventional surgical procedures to the use of modern fixation and prosthetic devices.

5.3.1. 3D Printed Implants

3D printing is a type of additive manufacturing, wherein a three-dimensional object is created by building successive layers of raw material. A digital 3D file, such as a computer-aided design (CAD) drawing or a Magnetic Resonance Image (MRI) helps create objects or devices.

Medical devices produced by 3D printing include orthopedic and cranial implants, surgical instruments, dental restorations such as crowns, and external prosthetics. With the help of 3D printing, manufacturers are able to create implants matching a patient's anatomy (patient-specific devices) or devices with very complex internal structures.

Adoption rate of 3D printing in medical applications, such as orthopedic implants, is increasing, especially in patients who met with serious accidents. For example, to reconstruct the bones of cancer patients after the damage of radiotherapy, doctors used patient-specific maxillofacial implants.[xxix] In 2014, global 3D printing medical devices market generated € 700 M in revenue. It is estimated to reach more than € 2 B in 2020 with a growth of 25%.[xxx]

5.3.2. Healthcare Spending and Medical Trend Rates

Global healthcare spending is expected to increase to € 15.57 T by 2040, as per the "*National spending on health by source for 184 countries between 2013 and 2040*", a joint research collaboration between the World Bank Group and the Institute for Health Metrics and Evaluation (IHME) at the University of Washington. The research further highlights that high-income countries are expected to spend € 7,681 per person on health in 2040, as compared to the projected € 1,648 for upper-middle income countries, € 432 in lower-middle income countries, and € 140 in low-income countries.[xxxi]

According to a survey conducted by Aon, the global medical trend rates will continue to exceed the local general inflation levels. The global average medical trend rate was 8.2% in 2017 (5.4 percentage points higher than the average inflation rate of 2.8%) as compared to the global average medical trend rate of 8.1% in 2016 (5.2 percentage points higher than the average inflation rate of 2.9%). The survey highlights increase in medical cost escalation due to global population aging, overall declining health, poor lifestyle habits becoming pervasive in emerging countries, continuing cost shifting from social programs, and increasing utilization of employer-sponsored plans.[xxxii]

5.3.3. Increasing Number of Primary Bone Cancer Cases/Patients

Patients with primary bone cancers may require orthopedic implants. Implants are a treatment option for patients with metastatic breast, colon, lung or prostate cancer that has spread to the bone, along with those who experience orthopedic problems with any type of cancer.[xxxiii] The most common sites of bone metastases are the vertebrae (bones of the spine), ribs, pelvis (hip bone), sternum (breastbone) and skull.

In 2017, it is estimated that 3,260 people of all ages (1,820 men and boys and 1,440 women and girls) in the U.S. will be diagnosed with primary bone cancer. Further, about 1,550 deaths (890 men and boys and 660 women and girls) from this disease will occur in 2017. The 5-year survival rate for adult bone cancer is 66%.[xxxiv] About 450,000 new breast and prostate cases are recorded each year and 1 in 3 people will develop bone metastasis from the spread of breast and prostate cancer.[xxxv] In 2017, about 252,710 estimated new cases of invasive breast cancer are expected to be diagnosed in women (along with 63,410 new cases of non-invasive (in situ) breast cancer) and about 2,470 new cases of invasive breast cancer are expected to be diagnosed in men in the U.S.[xxxvi] Further, there are more than 62,500 cases of bone metastasis per year and more than 3,750 sternal bone metastasis per year in the U.S.[xxxvii]

The French market for unloaded sternums market is worth € 2.5 M per year, the loaded sternums worth € 5.7 M per year, and shutters loaded worth € 16.7 M per year. Considering the three ranges of the implants market, the total French market is worth € 25 M per year. Meanwhile, the European market is estimated to be € 132 M per year.[xxxviii]

For Osteomyelitis, there are about 21.8 cases / 100,000 person of in the U.S. (of the total, Tibia - 25% of the cases, Femur: 7% of the cases, and Foot: 14 – 40% of the cases). Meanwhile, open fracture accounts for 30.7 cases/ 100,000 persons in the U.S. and risk of infection for tibia open fracture ranges between 15 to 25 %. Further, about ~500 amputations / year are recorded following the open fracture and infection.[xxxix]

Globally by 2030, it is expected that there will be 21.7 million new cancer cases and 13 million cancer deaths simply due to the growth and aging of the population. This will further be fueled due to the adoption of western lifestyles, such as smoking, poor diet, physical inactivity, and fewer childbirths, in economically developing countries.[xl]

5.4 Market Risks

Some of the factors inhibiting the growth of the global orthopedic implants market are high cost of medical implants (inflated surgery and devices cost), inadequate reimbursement policies, post/during surgery problems, lack of skilled human resource (skilled surgeons) and low per capita income levels in developing countries and lack of awareness.

In addition, the adverse effects associated with metal or prosthetic implants such as toxicity issues, post-surgery infections, implant dislocations, hypersensitivity, led to patient dissatisfaction and pushed for many product recalls. For instance, during 2002-2013 in US, the six major players – Biomet, DePuy Synthes, Smith & Nephew Plc, Stryker Corporation, Wright Medical and Zimmer made 578 Hip Implant recalls. There were different reasons for these recalls – manufacturing issues, labelling issues, design flaws, early implant failure, missing components etc.[xli]

Further, bone infections are one of the key problems in orthopedic and trauma surgery. It is essential to have adequate knowledge of the bacteria found in infected bones, to choose the suitable antibiotics. The most common cause of bone infection is Staphylococcus aureus, followed by Streptococcus and Pseudomonas (different variety of bacteria).[xlii]

Bone infection includes surgical site infection, nosocomial infection, antecedent of pathology tumor, recovery on prosthesis, and additional risk factors of the patient (obesity, diabetes, etc.).

On the other hand, bone metastasis leads to severe pain, impaired mobility, pathologic fractures, spinal cord compression, bone marrow aplasia and hypercalcemia.[xliii] Some of the key risks include risk of chronic diseases, non-effectiveness of the antibiotics, and requirement for bone removal, risk of functional sequelae, multiple surgeries, and relapses.

As a result, regulatory authorities have enforced strict product approval procedures to ensure patient safety, which has increased the product approval timelines. Existing stringent regulatory framework is expected to impact the growth of the orthopedic implants market.[xliv]

5.5 Future Outlook

The impact of factors driving the market and high acceptance rate for orthopedic implants by people is expected to surpass the effect of market constraints. Moreover, increase in R&D in orthopedic implants and emerging economies is expected to provide new market opportunities to orthopedic implants manufacturers in the near future.

Further, there is a growing requirement for orthopedic implants for treatment of bone infections & metastasis. However, there are certain challenges and knowledge gaps in the industry that prohibits the effective treatment of bone infections & metastasis. [xlv]

There is a huge opportunity for the manufacturers which deals in personalized medicine and identification of new therapeutic targets for bone metastasis. Still, R&D is going on for large number of treatment methods. However, factors including cancer diversity and high development cost of neoplastic agents are limiting the growth of global bone metastasis therapeutics market. Large companies are making huge investment in cancer research, which is expected to drive the growth of global bone metastasis therapeutics market during 2016-2024. [xlvi]

5.5.1. Growth prospects

The global orthopedic device market is expected to grow at a CAGR of 6.8% to reach € 63.7 B in 2023 from the market value of € 40.3 B in 2016.[xlvii]

Of the total orthopedic implants market, joint reconstruction devices industry has gained popularity due to growing requirement for better and effective solutions for bone related ailments. Technological advances in implants and minimally invasive implant techniques will promote business growth. The joint reconstruction market trends are expected to remain similar to previous years, with surgical assistance technologies, e.g. robotics and navigation, remaining a focus in hip and knee product launches, and total shoulder and ankle replacements driving the extremities reconstruction market.

Further, trauma fixation devices are expected to experience huge growth due to rising geriatric population susceptible to bone disorders and growing instances of road accidents, leading to bone fractures and spinal injuries. Orthobiologics market is expected to exceed € 3.4 B by 2024 as surgeons are increasingly using orthobiologics as bone grafts and other substitutes. [xlviii]

According to the World Health Organization (WHO), the average age of the world population was 37.3 years in 2000 and is anticipated to reach 45.5 years by 2050.[xlix] Due to the fast-changing lifestyle and other factors, such as early burnout and lack of exercise, patients in their middle-age are increasingly opting for orthopedic implants. The growth of orthopedic implants market will be led by an increase in the mean age over the next few years.

Moreover, with the widespread application of orthopedic implants in areas such as oncology, spine surgeries, and traumatology; use of minimally invasive surgeries for the treatment of orthopedic diseases, and rapidly growing 3D innovative technology with advanced imaging techniques to create precise orthopedic implants could be considered as opportunities in the orthopedic implants market.

5.6 Markets in Europe, Asia, North America and Latin America

North America continues to be the largest regional market for the orthopedic implants market due to the growing geriatric population count, and consequently increasing number of patients suffering from osteoarthritis and osteoporosis. Further, factors such as the gradual transition toward minimally invasive procedures are expected to drive the market growth in the North America region. Meanwhile, Asia Pacific is the fastest growing market due to increased medical tourism.

The bone metastasis market is experiencing a continuous growth over the years. Primary factors driving the growth of bone metastasis therapeutics market include global increase in cancer prevalence and delayed diagnosis of cancer in low-income countries. Major markets for bone metastasis include the US, Europe (Germany, Spain, Italy, France and the UK) and Japan.[l]

5.6.1. Market in Europe and UK

In Europe, the key overall markets are Germany, the UK, France & Italy and Spain. [li] Further, key orthopedic trauma markets include the UK, France, Germany, Portugal, Switzerland, Austria, Scandinavia, Benelux, Spain and Germany. In the intramedullary nails market, Germany and Austria have the greatest number of competitors.[lii]

The European joint reconstruction market is estimated to grow at a CAGR of 4.6% from 2014 to 2019. In the joint reconstruction segment, knee and hip implants account for the largest share while the market for small joints is expected to gain momentum. Aging population, combined with rising cases of chronic diseases and reduction in cost of implants are amongst the major factors driving the growth of the European joint reconstruction market. Germany and France are the key markets for joint reconstruction in the European region. Further, key players in the European joint reconstruction market include Biomet, Inc., B. Braun Melsungen AG, DePuy Synthes, Mathys Ltd Bettlach, Smith & Nephew, Stryker Corporation, Tornier N.V., Waldemar LINK GmbH & Co. KG, Wright Medical Group and Zimmer Holdings, Inc.[liii]

Europe has been witnessing a long-term trend of population ageing since several decades ago. The percentage share of the population aged 65 years and over is increasing in Europe. Further, percentage share of people aged 80 years or above in the European Union (EU) is expected to increase by more than double from 5.4% to 12.7% between 2016 and 2080.[liv] Due to changes in population demography, the number of men and women with osteoporosis in the EU will rise from 27.5 M in 2010 to 33.9 M in 2025 (an increase of 23%), while the annual number of fractures in the EU will rise from 3.5 M in 2010 to 4.5 M in 2025 (an increase of 28%).[lv]

In 2016, the UK orthopedic devices market accounted for more than 15% of Europe revenue share due to huge geriatric population base and rising prevalence of bone diseases.[lvi] According to a report published by the Mayor's Design Advisory Group, "Ageing London", the number of over-60s in London is expected to increase by 48% by 2035; the number of those aged over 80 is set to increase by 70% in the same period.[lvii]

For global bone metastasis therapeutics market, Europe is expected to hold second largest market share after North America by 2024. [lviii] Among the European Union (EU) Member States, the share of deaths from cancer in the total number of deaths were more than 30.0% in Denmark, Ireland, the Netherlands and Slovenia - among men this share was 36.1% in Slovenia, while among women at 29.9% in Ireland. Less than one-fifth of all deaths in Bulgaria and Romania were caused by cancer.[lix]

5.6.2. Market in Asia

Asia accounts for 60% of the world's population (about 4.5 billion by April 2017), but the region currently holds about 16% of the global orthopedic device market. [lx] The region is expected to experience fast-paced growth mainly due to the rising disposable income, growing awareness with regard to improved and advanced orthopedic prostheses, progressively improving healthcare infrastructure, and flourishing medical tourism industry. Therefore, Asia is expected to witness a huge growth in orthopedic implants markets, specifically in Japan, Korea, Taiwan and China (all have rapidly-aging populations). China and India are expected to emerge as one of the world's largest orthopedic medical devices market in a few years.

Further, Asia is a small market for bone metastasis therapeutic, as it has one of the lowest overall cancer rates globally. However, cancer patients are more likely to die there than most other regions. For instance, Asia has about half the cancer incidence rate of North America (152.2 cases/100,000 person-years versus 315.6 cases/100,000 person-years).

The most common cancer in Asian males is lung cancer and in Asian females is breast cancer, but cervical and liver cancers occur more frequently than in other regions. Even though cervical cancer has a long latency period and effective screening methods, more women die from it in Asia compared to West. India accounts for 27% of global cervical cancer deaths, which is mainly due to the unavailability of screening.[lxi]
Such a scenario indicates the opportunity for orthopedic implants market in Asian market.

Chinese orthopedic implants market is classified into trauma implants, spine implants, joint implants and other implants. Trauma implants is the largest segment, followed by spine implants, joint implants and other implants. Under the joint reconstruction segment, cemented knee replacement devices are commonly used in China, which results in a fairly large bone cement market given the fairly low average selling prices of this market. The Chinese large joint market is expected to exceed € 850 million by 2020.[lxii] The market has growing unit sales within all three of its segments: hip devices, knee devices and bone cement. Increase in demand from the aging population and a higher average income allowing patients to opt for more elective surgeries is driving the large joint arthroplasty market.

China has the largest elderly population in the world, with more than 200 million people over the age of 60, roughly 15% of the country's 1.4 B people. According to Frost & Sullivan, China is also the only country in the world with more than 100 M people over the age of 65 and the number will increase from 127 M in 2014 to 331 M by 2050. Further, more than 69 M Chinese above the age of 50 are suffering from osteoporosis leading to almost 700,000 hip fractures

every year. According to forecasts by China Industrial Information (CII) report, expenditures on osteoporosis will exceed by € 10.6 B by 2020.[lxiii]

Moreover, Chinese orthopedic supplies currently make up about 20% of all materials used in minor surgeries in Mainland China. They are the second most used type of devices behind general surgery supplies. Some of the Chinese vendors include Shandong Weigao Orthopedic Device Company, Beijing Chunlizhengda Medical Instruments Co., Ltd. and PW MedTech. The largest competitor in the Chinese large joint replacement device market is Zimmer Biomet.

Japanese orthopedic devices market accounted for over 40% of regional (Asia) revenue share in 2016 and is expected to exceed € 1.7 B by 2024. [lxiv] The orthopedic large joint reconstruction device market includes hip and knee implants, as well as bone cements. Aging Japanese population and a higher number of highly active individuals are increasing the demand for large joint arthroplasty. The hand and wrist devices segment forms the largest segment (representing over 70% of the total market) followed by the shoulder reconstruction market. Knee reconstruction will continue to outpace hip reconstruction growth in future. Both the knee and hip markets experienced a slowdown in growth in 2012, caused by reimbursement protocols instituted by the Japanese government. However, unit volumes will continue to grow steadily due to the growing demand for arthroplasty as there is a continuous increase in the aging Japanese population. In Japan, over 25% of the population is older than 65, thereby, providing an opportunity for foreign manufacturers, especially those marketing devices used in treating lifestyle and age-related conditions, to invest in the market. There is strong demand for interventional cardiology equipment, pacemakers, orthopedic implants, home care, preventative care, and innovative technologies. Some of the prominent Japanese industry players include Japan MDM Inc., KYOCERA Corporation, Seikagaku Corporation and Teijin Nakashima Medical Co.

5.6.3. Market in North America

North America dominates the orthopedic implants market with a revenue share of more than 50%. The US orthopedic devices market was over € 17 B in 2016. [lxv] It is projected to continue to dominate the market in future also due to rising technological advancements. The US market comprises orthopedic implants and orthopedic equipment, such as operating room equipment, arthroscopy devices among others.

In the US, the largest customers of reconstructive products such as hip, knee and spinal implants are individuals over the age of 60 years. Moreover, younger individuals in their 40s and 50s are also undergoing orthopedic surgeries, thereby driving the market for implants used in these surgeries.

Under the joint reconstruction segment, knee implants are the largest segment followed by hip implants in the US reconstructive joint replacement market. The two major segments of knee implants are primary knee replacement implants and revision knee replacement implants. The US hip implant market can be segmented into stem, shell/liner, head and others (basis on the type of components). Stem is the largest segment in the overall hip implant market of the US. The growth in the hip implants segment is due to an increase in the rising number of primary and revision hip replacement procedures among the US population. Around 325,000 people had total hip replacement surgery in 2015 in the US. Further, computer-assisted total hip replacement surgery is one of the latest revolutions in total hip replacement.[lxvi]

Osteoporosis and low bone mass are currently estimated to be a major public health threat for almost 44 million U.S. women and men aged 50 and older. Moreover, in Canada, 30,000 hip fractures occur each year and the number of hip fractures is expected to quadruple by 2030. [lxvii]

US is also expected to continue dominating the global bone metastasis therapeutics market. In 2017, estimated new cases for bone metastasis is expected to be 3,260 (0.2% of all new cancer cases) and estimated deaths to be 1,550 (0.3% of all cancer deaths).[lxviii] Further, approximately 3,300 new cases of bone cancer were diagnosed in 2016, out of which, around 1,490 deaths were due to bone cancer, according to the American Cancer Society.[lxix]

Some of the most common cancers in the region are breast cancer, lung and bronchus cancer, prostate cancer, colon and rectum cancer, bladder cancer, melanoma of the skin, non-Hodgkin lymphoma, thyroid cancer, kidney and renal pelvis cancer, leukemia, endometrial cancer, and pancreatic cancer.

5.6.4. Market in Latin America and the Middle East

The orthopedic implants market in Latin America and the Middle East is expected to witness slow growth due to low income growth, leading to lower health care expenditure. On the other hand, rise in incidence of orthopedic disease and rapid adoption of orthopedic implants drive the growth of the orthopedic implants market in LAMEA.

The Middle Eastern market growth is driven by improvement in healthcare infrastructure and rise in disposable income. Lack of healthcare facilities and increased requirement for treatment devices for orthopedic disease provide huge opportunities for major players to foray into the region. The market is expected to rise at a CAGR of 8.3% from 2017 to 2023.[lxx]

5.7 Regulatory Framework

The regulatory compliance framework for medical devices is vast and rapidly evolving. Various regional regulatory authorities (RRAs) have come up with regulations from time to time. Further, for marketing any medical device, marketing authorization from regulatory authority is required across countries.

5.7.1. Regulatory body in Europe[lxxi]

In the European Union (EU), national authorities approve marketing of medical devices. A system of third party compliance is followed, where notified bodies (third party) ensure quality assurance, pre- and post-approval.

The European Medicine Agency (EMA) regulates the medical devices industry, which is regulated by the Medical Devices Directive. This Directive further consists of three directives that regulate the safety and marketing of medical devices in Europe. The three directives are Medical Device Directive (MDD 93/42/EEC), Active Implantable Medical Device Directive (AIMDD 90/42/EE) and In vitro Diagnostic Medical Device Directive (IVDMDD 98/79/ EC). Further, medical devices are classified into Classes I, IIA, IIB and III, depending upon the risk involved with usage of device. All the medical devices should conform to the strict safety requirements of EU and must bear a CE mark, except for Custom-made devices; devices for clinical investigation, health protection-urgent unusual circumstances; humanitarian use and In-house use.

5.7.2. Regulatory body in India[lxxii]

In India, the Central Drug Standards Control Organization (CDSCO) is the main regulatory body for pharmaceuticals and medical devices. Within the CDSCO, the key official is the Drug Controller General of India (DCGI). The DCGI is responsible for the approval of the manufacturing of certain drugs (vaccines, large volume parenterals, blood products, r-DNA derived), specific medical devices, and new drugs.

In February 2017, the Indian government replaced the existing Drugs & Cosmetic Act and Rules (DCA) with the new medical device and in vitro diagnostic (IVD) regulations that take effect in January 2018 – Medical Device Rules, 2017, issued by the CDSCO.[lxxiii]

Orthopedic implants, falling under the medical devices category, need to be classified under the following - Class A – Low Risk (example: thermometers, tongue depressors), Class B – Low-moderate Risk (example: hypodermic needles, suction equipment), Class C – Moderate-high risk (example: lung ventilator, bone fixation) and Class D – High Risk (example: heart valves, implantable devices).[lxxiv]

Further, the Quality Council of India (QCI), along with the Association of Indian Medical Device Industry (AIMED) and the National Accreditation Board for Certification Bodies (NABCB), has recently launched a new quality assurance certification scheme for Indian products, called the Indian Certification of Medical Devices (ICMED). ICMED will reduce the time and cost involved in obtaining globally accepted quality certifications, will enhance patient safety as well as improve the credibility and competitiveness of Indian manufacturers. It will also reduce the manufacturing and use of substandard products. The Scheme has been launched with two levels of certification – ICMED 9000 certification (an ISO 9001 plus additional requirements) and ICMED 13485 (an ISO 13485 plus additional requirements).[lxxv]

5.7.3. Regulatory body in China [lxxvi]

China Food and Drug Administration (CFDA) is a ministerial-level agency directly under the State Council of the People's Republic of China. It is responsible for the administration and supervision of food (including health food), drugs,

cosmetics, and medical devices in the country. The former Department of Medical Device supervision in the State Food and Drug Administration (SFDA) was later divided into two new departments in CFDA – 1) Department of Medical Device Registration (responsible for pre-market approval) and 2) Department of Medical Device supervision (responsible for post-market supervision).

5.7.4. Regulatory body in U.S. [lxxvii]

In the U.S., medical devices are regulated by the Food and Drug Administration (FDA). FDA's Centre for Devices and Radiological Health (CDRH) is responsible for regulating firms who manufacture, repackage, re-label, and/or import medical devices sold in the U.S. The FDA regulated the industry through the Medical Device Amendment in the Food, Drugs and Cosmetic Act of 1938, placed in 1976.

Devices are classified into Class I, II or III and each device is assigned to a panel (Cardiovascular, Anaesthesiology etc.). The panel determines the Class and special controls and exemptions applicable to the device.

In the U.S., manufacturers are required to apply to the FDA for marketing authorization. There are two types of applications in the U.S.; 510 (k) and Pre-Market Application (PMA).

5.8 Competitive Landscape

Orthopedic implants market has both global and regional vendors. These include knee, hip and shoulder prosthetic implant model manufacturers, knee implant companies, hip implant companies, etc. The major players operating in this market include Medtronic Plc, Stryker Corporation, ZimmerBiomet Holdings, Inc., DePuy Synthes, and Smith and Nephew Plc. These 5 major companies control more than 60% of the global orthopedics market. [lxxviii]

The other prominent players in the value chain include Wright Medical Group N.V., Aesculap Implant Systems, Arthrocare Corporation, NuVasive, Inc., Integra LifeSciences Holdings Corporation, Arthrex, Inc., Conmed Corporation, Globus Medical, Inc., Synthes Holding AG, The Orthopedic Implant Company, BIOTEK, and Baxter International Inc.

The industry is highly competitive and the competition is primarily based on pricing, technology, innovation, quality, reputation and customer service. Moreover, other factors influencing competition includes local distribution systems, complex regulatory environment, differing medical philosophies and product preferences.

Exhibit 13: Orthopedic Implants – Key Vendors 2016 (Net Sales and Segment Sales - € B)[lxxixlxxx]

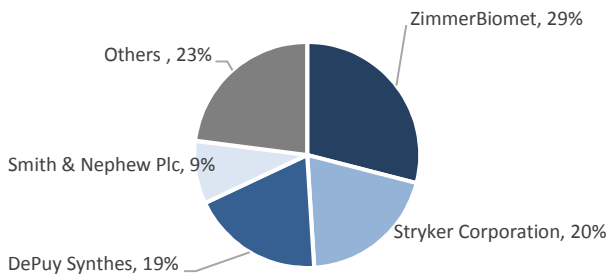
Company Name	Headquarters	Total Revenue	Orthopedic Implants Segment Revenue	Joint Reconstruction	Spine	Trauma	Orthobiologics
Medtronic Plc	Ireland	24.5	2.5	-	2.0	-	0.4
Stryker Corporation	US	9.6	5.4	2.9	0.6	1.0	0.2
DePuy Synthes	US	7.7	7.7	2.8	1.4	2.0	0.3
ZimmerBiomet	US	6.6	6.0	4.3	0.3	0.4	0.3
Smith and Nephew plc	UK	4.0	2.8	1.4	-	0.3	-

For major players such as DePuy Synthes, Zimmer Biomet, Stryker, Smith & Nephew and Medtronic, joint reconstruction is a priority segment. The top five players in joint reconstruction hold 79% of the market share. Spine implants continue to be a slower-growing market, but with a high activity. Two major players in the spine segment include Medtronic and DePuy Synthes experienced flat and declining sales in 2016, respectively. The two companies lost market share for a second year, while NuVasive reached the third position in the segment in 2016. Spine has experienced a lot of M&A, collaboration and funding activity in recent years, thereby, making the segment attractive for small companies seeking to enter and potentially exit the market. DePuy Synthes continues to dominate the trauma market, accounting for 37% of the total market share. Players in trauma segment will continue to innovate through materials, coatings and manufacturing processes to achieve growth, reduce healthcare costs and eliminate the need for follow up surgeries.

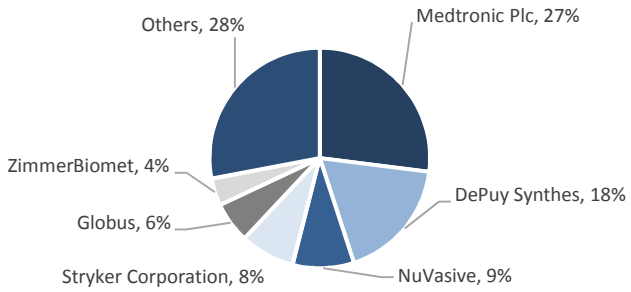
Orthobiologics segment grew by 3% in 2016 as compared to 2015. Market leader in orthobiologics Medtronic accounted for 10% market share and posted flat sales in 2016.[lxxxi]

Exhibit 14: Global Market Share (%) for Top Companies - Orthopedic Implants - by Segment - 2016[lxxxii]

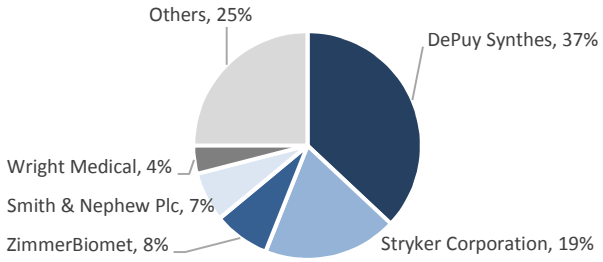
Market Share (%) – Joint Reconstruction Segment



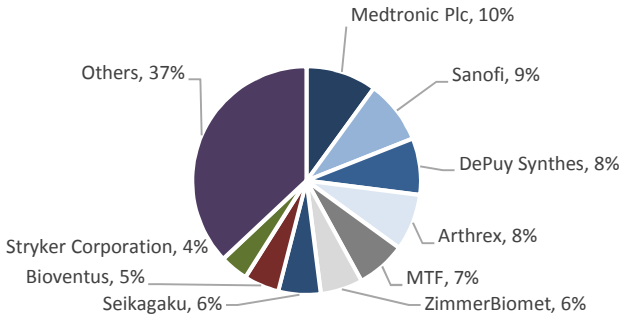
Market Share (%) – Spine Segment



Market Share (%) – Trauma Segment



Market Share (%) – Orthobiologics Segment



Orthopedic implants industry is primarily driven by strategic acquisitions along with new product launches and geographical expansion. Market players are adopting strategies including mergers and acquisitions and distribution partnerships to expand their overall market share and sustain themselves in the competition. For example, DePuy Synthes acquired BioMedical Enterprises in 2016 in order to boost its small bone portfolio. Zimmer Holdings, Inc. acquired Biomet, Inc. in June 2015 to form a single entity ZimmerBiomet Holdings, Inc. The new company has a combined product portfolio and has resulted in a strengthened position in the musculoskeletal market. Similarly, Smith & Nephew plc acquired Blue Belt Technologies, Inc., in October 2015, to strengthen its product offerings in the orthopedic robotics-assisted surgery domain.

Some of the challenges or inhibitors for new players to enter the market include requirement of high, initial capital investment and the regulatory compliance requisites. Moreover, factors such as strong brand identity and the wide distribution network of the existing players boost the adoption of the products offered by them. As a result, few international players are dominating the global market.

6. Valuation

The Fair Market Value for all the Company shares stands between € 60.6 MM and € 74.8 MM as of April 16, 2018. The Fair Market Value for one Company publicly traded share stands between € 11.35 and € 14.01 as of April 16, 2018. The valuation approach followed is the Discounted Cash Flow method.

6.1 Discounted Cash Flow Method

Valuation	
WACC	
Risk-free rate	0.72%[lxxxiii]
Beta	0.46[lxxxiv]
Equity Market return	9.47%[lxxxv]
Country Risk Premium	0.0%[lxxxvi]
Cost of Equity	4.75%
Cost of Debt	1.91%
Terminal Growth Rate	3.0%
WACC (Discount Rate)	4.18%

Year Ending- Dec	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E
FCFF (Low)								
Net cash from operating activities	(42)	107	286	434	614	776	943	1,076
Capital Expenditure	258	259	260	261	262	262	262	262
Free Cash Flow to Firm	216	366	546	695	876	1,038	1,205	1,338
Discount factor	0.96	0.92	0.88	0.85	0.81	0.78	0.75	0.72
Present Value of FCF	207	337	483	590	714	812	905	965
FCFF (High)								
Net cash from operating activities	(35)	126	286	455	691	917	1,170	1,405
Capital Expenditure	258	259	260	261	262	262	262	262
Free Cash Flow to Firm	223	385	546	716	953	1,179	1,432	1,667
Discount factor	0.96	0.92	0.88	0.85	0.81	0.78	0.75	0.72
Present Value of FCF	214	355	483	607	777	922	1,076	1,201

Arrowhead Fair Value Bracket	High	Low	
Terminal Value (TV)	98,384	78,988	
Present Value of TV	70,915	56,934	
Present Value of FCF	3,358	3,143	lxxxvii
Net Debt	(549)	(549)	
Equity Value Bracket			
Shares O/s (000's)	5,371	5,371	
Fair Share Value Bracket (€)	**14.01**	**11.35**	
Current Market Price (€)	8.90	8.90	**lxxxviii**
Upside/(Downside)	57.4%	27.5%	
Current Market Cap. (€ '000)	47,532	47,532	
Target Market Cap. Bracket (€ '000)	74,822	60,626	

Sensitivity Analysis

Sensitivity Table - High		WACC (%)				
		2.2%	**3.2%**	**4.18%**	**5.2%**	**6.2%**
GROWTH RATE(%)	**0.0%**	6.32	5.88	5.47	5.10	4.76
	2.5%	12.78	11.85	11.00	10.22	9.50
	3.0%	16.29	15.10	**14.01**	13.01	12.09
	3.5%	22.62	20.96	19.43	18.03	16.75
	4.0%	37.46	34.68	32.14	29.80	27.65

Sensitivity Table - Low		WACC (%)				
		2.2%	**3.2%**	**4.18%**	**5.2%**	**6.2%**
GROWTH RATE (%)	**0.0%**	5.19	4.83	4.50	4.19	3.92
	2.5%	10.37	9.62	8.94	8.31	7.73
	3.0%	13.19	12.23	**11.35**	10.54	9.80
	3.5%	18.27	16.93	15.71	14.58	13.54
	4.0%	30.18	27.95	25.90	24.03	22.30

Approach for DCF Valuation

Time Horizon: The Arrowhead fair valuation for I.CERAM is based on a DCF method. The time period chosen for the valuation is 81 months (2018E-2025E).

Terminal Value: Terminal value is estimated using terminal growth rate of 3.0%.

Prudential nature of valuation: It should be noted that this Arrowhead Fair Value Bracket estimate is a relatively prudential estimate, as it discounts the eventuality of any new products being launched in the market or any significant change in the strategy.

Important information on Arrowhead methodology

The principles of the valuation methodology employed by Arrowhead BID are variable to a certain extent depending on the subsectors in which the research is conducted, but all Arrowhead valuation research possesses an underlying set of common principles and a generally common quantitative process.

With Arrowhead Commercial and Technical Due Diligence, Arrowhead extensively researches the fundamentals, assets and liabilities of a Company, and builds solid estimates for revenue and expenditure over a coherently determined forecast period.

Elements of past performance, such as price/earnings ratios, indicated as applicable, are present mainly for reference purposes. Still, elements of real-world past performance enter the valuation through their impact on the commercial and technical due diligence.

Elements of comparison, such as multiple analyses may be to some limited extent integrated in the valuation on a project-by-project or asset-by-asset basis. In the case of this I.CERAM report, there are no multiple analyses integrated in the valuation.

Arrowhead BID Fair Market Value Bracket

The Arrowhead Fair Market Value is given as a bracket. This is based on quantitative key variable analysis, such as key price analysis for revenue and cost drivers or analysis and discounts on revenue estimates for projects, especially relevant to those projects estimated to provide revenue near the end of the chosen forecast period. Low and high estimates for key variables are produced as a tool for valuation. The high-bracket DCF valuation is derived from the high-bracket key variables, while the low-bracket DCF valuation is based on the low-bracket key variables.

In principle, an investor who is comfortable with the high-brackets of our key variable analysis will align with the high-bracket in the Arrowhead Fair Value Bracket, and likewise in terms of low estimates. The investor will also take into account the Company intangibles – as presented in the first few pages of this document in the analysis on strengths and weaknesses and other essential Company information. These intangibles serve as supplementary decision factors for adding or subtracting a premium in the investor's own analysis.

The bracket should be understood as a tool provided by Arrowhead BID for the reader of this report and the reader should not solely rely on this information to make his decision on any particular security. The reader must also understand that on one hand, global capital markets contain inefficiencies, especially in terms of information, and that on the other hand, corporations and their commercial and technical positions evolve rapidly: this present edition of the Arrowhead valuation is for a short to medium-term alignment analysis (one to twelve months). The reader should refer to important disclosures on page 27 of this report.

7. Appendix

7.1 I.CERAM's Financial Summary

Exhibit 17: Financial Summary	*Low Bracket Estimates*							
Year Ending Dec	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E
Revenue (€ '000)	1,654	1,818	1,902	1,987	2,078	2,175	2,275	2,377
Operating Profit (€ '000)	(1,077)	(764)	(498)	(210)	112	394	669	881
Net Income (€ '000)	(1,025)	(710)	(444)	(156)	165	445	716	924
EPS	(0.19)	(0.13)	(0.08)	(0.03)	0.03	0.08	0.13	0.17
Growth rates (%)								
Revenue	11.1%	9.9%	4.7%	4.5%	4.5%	4.7%	4.6%	4.5%
Operating Profit	NM	NM	NM	NM	NM	251.6%	69.7%	31.7%
Net Income	NM	NM	NM	NM	NM	169.9%	61.0%	29.0%
EPS	NM	NM	NM	NM	NM	169.9%	61.0%	29.0%
Margins (%)								
Gross Margins	71.2%	71.5%	71.9%	72.1%	73.1%	74.6%	76.1%	77.6%
Operating Profit Margin	(39.0%)	(25.9%)	(16.3%)	(6.6%)	3.4%	11.6%	19.0%	24.2%
Net Profit Margin	(37.1%)	(24.1%)	(14.5%)	(4.9%)	5.0%	13.1%	20.3%	25.3%
Ratios								
ROA	(11.2%)	(8.5%)	(5.6%)	(2.0%)	2.1%	5.3%	7.8%	9.0%
ROE	(17.1%)	(13.8%)	(9.8%)	(3.7%)	3.9%	9.7%	13.9%	15.5%
Debt/Equity	0.34x	0.39x	0.45x	0.49x	0.51x	0.50x	0.48x	0.45x
Interest Coverage	NM	NM	NM	NM	0.59x	0.18x	0.12x	0.10x

Exhibit 18: Financial Summary	*High Bracket Estimates*							
Year Ending Dec	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E
Revenue (€ '000)	1,685	1,910	2,089	2,292	2,522	2,785	3,084	3,423
Operating Profit (€ '000)	(1,006)	(678)	(398)	(75)	330	701	1,096	1,448
Net Income (€ '000)	(953)	(624)	(344)	(21)	383	751	1,143	1,490
EPS	(0.18)	(0.12)	(0.06)	(0.00)	0.07	0.14	0.21	0.28
Growth rates (%)								
Revenue	13.2%	13.4%	9.3%	9.7%	10.1%	10.4%	10.7%	11.0%
Operating Profit	NM	NM	NM	NM	NM	112.3%	56.4%	32.1%
Net Income	NM	NM	NM	NM	NM	96.3%	52.1%	30.4%
EPS	NM	NM	NM	NM	NM	96.3%	52.1%	30.4%
Margins (%)								
Gross Margins	74.0%	74.5%	74.9%	75.1%	76.6%	78.1%	79.6%	81.1%
Operating Profit Margin	(35.7%)	(22.2%)	(12.2%)	(2.1%)	8.7%	17.1%	24.7%	30.0%
Net Profit Margin	(33.9%)	(20.4%)	(10.5%)	(0.6%)	10.1%	18.3%	25.7%	30.9%
Ratios								
ROA	(10.4%)	(7.3%)	(4.2%)	(0.3%)	4.6%	8.2%	11.0%	12.4%
ROE	(15.8%)	(11.9%)	(7.2%)	(0.5%)	8.0%	14.1%	18.2%	19.6%
Debt/Equity	0.33x	0.38x	0.42x	0.45x	0.44x	0.42x	0.38x	0.35x
Interest Coverage	NM	NM	NM	NM	0.20x	0.10x	0.07x	0.06x

7.2 I.CERAM's Balance Sheet Forecast

Exhibit 2: Consolidated Balance Sheet

Low Bracket estimates

Year Ending-Dec	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E
Total current assets	5,561	5,245	5,156	5,338	5,838	6,624	7,695	8,993
Total non-current assets	3,145	2,806	2,540	2,329	2,163	2,031	1,927	1,845
TOTAL ASSETS	**8,706**	**8,052**	**7,695**	**7,667**	**8,001**	**8,656**	**9,622**	**10,838**
Total current liabilities	1,239	1,270	1,287	1,305	1,324	1,344	1,365	1,386
Total non-current liabilities	1,971	1,996	2,066	2,176	2,326	2,516	2,746	3,016
TOTAL LIABILITIES	**3,209**	**3,265**	**3,353**	**3,481**	**3,650**	**3,860**	**4,111**	**4,402**
Total shareholder's equity	5,488	4,778	4,334	4,178	4,343	4,788	5,504	6,428
TOTAL LIABILITIES & EQUITY	**8,706**	**8,052**	**7,695**	**7,667**	**8,001**	**8,656**	**9,623**	**10,838**

Exhibit 20: Consolidated Balance Sheet

High Bracket estimates

Year Ending-Dec	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E
Total current assets	5,641	5,420	5,449	5,790	6,534	7,657	9,192	11,098
Total non-current assets	3,145	2,806	2,540	2,329	2,163	2,031	1,927	1,845
TOTAL ASSETS	**8,786**	**8,227**	**7,989**	**8,118**	**8,697**	**9,689**	**11,119**	**12,943**
Total current liabilities	1,247	1,288	1,324	1,364	1,410	1,461	1,518	1,582
Total non-current liabilities	1,971	1,996	2,066	2,176	2,326	2,516	2,746	3,016
TOTAL LIABILITIES	**3,218**	**3,283**	**3,390**	**3,540**	**3,736**	**3,976**	**4,264**	**4,598**
Total shareholder's equity	5,559	4,935	4,591	4,570	4,953	5,704	6,847	8,337
TOTAL LIABILITIES & EQUITY	**8,786**	**8,227**	**7,989**	**8,119**	**8,697**	**9,689**	**11,119**	**12,943**

8. Analyst Certifications

I, Parvati Rai, certify that all the views expressed in this research report accurately reflect my personal views about the subject security and the subject Company, based on the collection and analysis of public information and public Company disclosures.

I, Sumit Wadhwa, certify that all the views expressed in this research report accurately reflect my personal views about the subject security and the subject Company, based on the collection and analysis of public information and public Company disclosures.

Important disclosures

Arrowhead Business and Investment Decisions, LLC received fees in 2017 and will receive fees in 2017 and 2018 from I.CERAM for researching and drafting this report and for a series of other services to I.CERAM including distribution of this report and networking services. Neither Arrowhead BID nor any of its principals or employees own any long or short positions in I.CERAM. Arrowhead BID's principals intend to seek a mandate for investment banking services from I.CERAM and expect to receive compensation for investment banking activities for I.CERAM in 2017 or 2018.

Aside from certain reports published on a periodic basis, the large majority of reports are published by Arrowhead BID at irregular intervals as appropriate in the analyst's judgment.

Any opinions expressed in this report are statements of Arrowhead BID's judgment to this date and are subject to change without notice.

This report was prepared for general circulation and does not provide investment recommendations specific to individual investors. As such, any of the financial or other money-management instruments linked to the company and company valuation described in this report, hereafter referred to as "the securities", may not be suitable for all investors.

Investors must make their own investment decisions based upon their specific investment objectives and financial situation utilizing their own financial advisors as they deem necessary.

Investors are advised to gather and consult multiple sources of information while preparing their investment decisions. Recipients of this report are strongly advised to read the Information on Arrowhead Methodology section of this report to understand if and how the Arrowhead Due Diligence and Arrowhead Fair Value Bracket integrate alongside the rest of their stream of information and within their decision making process.

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Should a security described in this report be denominated in a currency other than the investor's home currency, a change in exchange rates may adversely affect the price of, value of, or income derived from the security.

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Arrowhead Business and Investment Decisions, LLC is not responsible for any loss, financial or other, directly or indirectly linked to any price movement or absence of price movement of the securities described in this report.

9. Notes and References

[i] Source: Bloomberg, retrieved on April 16, 2018
[ii] 52 weeks to April 16, 2018. Source: Bloomberg, April 16, 2018
[iii] 3 months to April 16, 2018. Source: Bloomberg, April 16, 2018
[iv] Arrowhead Business and Investment Decisions Fair Value Bracket – AFVBTM. See information on valuation on pages 27-29 of this report and important disclosures on page 33 of this report.
[v] Source: Company Fillings, Company Website and Press Releases
[vi] Source: Company Website and Company Fillings
[vii] Source: Company Fillings and Company Website
[viii] Source: Company Website and Press Releases
[ix] Source: Company Websites
[x] Source: Company Website & Press Releases
[xi] Source: Company Website and Bloomberg
[xii] Source: Press Releases and Company Website
[xiii] Source: Company Website and Company Fillings
[xiv] Source: Orthopreneurpub (http://www.orthopreneurpub.com/component/content/article/700-orthopaedic-industry-revenue-reaches-481-billion)
[xv] Source: Allied Market Research (https://www.alliedmarketresearch.com/orthopedic-implants-market)
[xvi] Source: Orthopreneurpub (http://www.orthopreneurpub.com/component/content/article/700-orthopaedic-industry-revenue-reaches-481-billion)
[xvii] Source: NCBI (https://www.ncbi.nlm.nih.gov/pubmed/20939778)
[xviii] Source: Allied Market Research (https://www.alliedmarketresearch.com/orthopedic-implants-market)
[xix] Source: Medicine Net (https://www.medicinenet.com/osteomyelitis/article.htm)
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