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LUX MEA FINAL REPORT

MBA 770 – Leading & Implementing Change

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I. Introduction

In the international standard ISO/ASTM 52900, Additive Manufacturing (AM) is defined as a "process of joining materials to make parts from 3D model data, usually layer upon layer". 3D printing, or additive manufacturing, is gaining traction in the construction industry. Innovations in materials, equipment, and methods allow for the printing of building parts. The benefits include automated production, increased design freedom, and optimization possibilities for both the building and its components. **Lux Mea** is a 3D printing company that specializes in 3D printing construction projects. They use advanced AI-enabled computational design, machine learning-driven digital fabrication, and rapid on-demand industrial-scale 3D printing to design, fabricate, and produce almost anything their clients require.

Traditional construction methods, like bricklaying and concrete reinforcement, are time-consuming, labor-intensive, and pose safety risks. They also limit design possibilities to the forms achievable with conventional building components.

In contrast, additive manufacturing enhances design freedom, boosts workplace safety and efficiency, and reduces production costs. It allows the creation of any shape and the use of various materials to reinforce specific areas, optimizing component strength. Additionally, automation in additive manufacturing is well-suited for construction in challenging environments.

II. Problem Statement

LuxMea, a pioneering organization in the 3D printing industry, is faced with the challenge of scaling up its operations effectively and sustainably. The organization aims to identify the optimal growth strategy that aligns with its values and mission, addressing questions about roles, processes, and resources to ensure responsible expansion.

III. Organizational Transformation for LuxMea: Implementing Kotter's 8-Step Change Model

Since this any change management is a big initiative for any company to undergo, these are the basic steps the company can incorporate to effectively navigate the challenges of growth and innovation while empowering its employees to contribute to the vision –

Step 1: Establish a Sense of Urgency

- Highlight the housing shortage and the need for affordable, sustainable housing solutions in Massachusetts
- Emphasize the company's potential to revolutionize the construction industry by developing innovative and cost-effective 3D printing technologies.
- Convey the importance of leveraging 3D printing to make homeownership more accessible and address the housing affordability crisis.

Step 2: Form a Powerful Guiding Coalition

- Bring together a diverse team of experts, including architects, engineers, construction professionals, cost reduction specialists, and technology innovators.
- Empower the coalition to develop a clear vision for the company's role in advancing construction technology and building low-cost homes.
- Encourage open communication and collaboration within the coalition to foster cross-disciplinary expertise and drive effective change implementation.

Step 3: Create a Vision for Change

- Articulate a compelling vision that captures the company's commitment to transforming the construction industry through 3D printing and reducing housing costs.
- Define the company's unique value proposition in providing affordable, sustainable, and high-quality 3D-printed homes.

- Clearly communicate the vision to all employees, emphasizing the company's mission to make homeownership a reality for a wider range of people.
- Conduct diversity and inclusion training to promote understanding and appreciation of different backgrounds and perspectives. Develop and implement policies that foster an inclusive and diverse work environment.

Step 4: Communicate the Vision for Change

- Develop a comprehensive communication plan to effectively convey the change vision to all stakeholders, including employees, partners, investors, and potential homeowners.
- Utilize multiple channels of communication, including public relations campaigns, social media engagement, and community outreach initiatives.
- Encourage open dialogues and address concerns promptly to build trust and support for the company's mission to provide affordable housing solutions.

Step 5: Empower Employees for Broad-Based Action

- Provide training and development opportunities to equip employees with the necessary skills and knowledge to develop, implement, and optimize 3D printing technologies for low-cost housing construction.
- Encourage employees to share their ideas and contribute to the development of innovative cost-reduction strategies and sustainable building practices.
- Delegate responsibilities and provide autonomy to empower employees to take action and drive the change initiatives forward.

Step 6: Generate Short-Term Wins

- Set achievable short-term goals and celebrate successes along the way.
- Recognize and reward employees who contribute to achieving these milestones, reinforcing positive behaviors and maintaining momentum.
- Use these short-term wins to demonstrate the tangible benefits of 3D printing for low-cost housing construction and foster employee engagement.

Step 7: Never Let Up

- Continuously monitor and evaluate the progress of the change process, identifying areas for improvement and making adjustments as needed.
- Establish clear performance metrics aligned with the company's growth goals. Conduct regular performance reviews to provide feedback, identify areas for improvement, and recognize achievements.
- Maintain open communication channels and address any lingering concerns or resistance to change promptly.
- Sustain the momentum of change by reinforcing the vision, encouraging employee participation, and celebrating ongoing successes in providing affordable housing solutions.

Step 8: Anchor the Changes in Corporate Culture

- Incorporate the new 3D printing technologies, cost-reduction strategies, and sustainable building practices into the company's standard operating procedures and policies.
- Integrate new technologies that enhance collaboration, project management, along with the 3D printing process.
- Encourage continuous learning and adaptation as the company grows and the 3D printing industry evolves.
- Celebrate the company's achievements and recognize employees who embody the values of innovation, adaptability, and continuous improvement in making housing more affordable and accessible.

IV. The Dynamics of 3D Printing in Construction: Trends and Challenges.

USA's 3D printing market for construction is witnessing remarkable expansion, with a forecasted Compound Annual Growth Rate (CAGR) ranging from 87% to 101.9% between 2022 and 2030. This substantial growth trajectory is anticipated to propel the market size to a staggering US $523.3 billion by 2030, (GlobeNewswire). In 2022, the market was valued at US $3.5 billion, showcasing its rapid ascent. According to projections from Grand View Research, the market is expected to reach US $750.8 billion by 2031. The forecasted CAGR between 2023 and 2030 reflects the industry's robust expansion, highlighting the transformative impact of 3D printing on the construction sector.

A. Positive Trends:

- Advancements in 3D printing technology: 3D printing technology is constantly evolving, becoming faster, more accurate, and able to handle a wider range of materials. This is making 3D printing more viable for construction applications.
- Reduced costs: The cost of 3D printing equipment and materials is decreasing, making it more affordable for construction companies to adopt this technology.
- Increased demand for sustainable construction: 3D printing can be a more sustainable construction method than traditional methods, as it can reduce waste and energy consumption.
- Growing awareness of the benefits of 3D printing: Construction companies and government agencies are becoming more aware of the potential benefits of 3D printing, such as increased efficiency, design flexibility, and reduced labor costs.
- Development of new 3D printing materials: New 3D printing materials are being developed that are stronger, more durable, and more suitable for construction applications.

B. Negative Trends:

- Lack of standardization: There is a lack of standardization in 3D printing technology and materials, which can make it difficult for construction companies to adopt this technology.
- Limited skilled workforce: There is a limited skilled workforce in 3D printing for construction, which can make it difficult for construction companies to find qualified workers.
- Cost of construction projects: The cost of setting up the initial cost of 3D printing construction projects can still be higher than the cost of traditional construction projects.
- Public perception: There is some public perception that 3D printing is not a safe or reliable technology.
- Regulatory hurdles: There are some regulatory hurdles that need to be overcome before 3D printing can be widely adopted in the construction industry.

Despite these challenges, the future of 3D printing in the construction industry is very promising. As technology continues to evolve and industry becomes more aware of its benefits,

3D printing is expected to play an increasingly significant role in the construction industry in the years to come.

C. Key Stakeholders

The 3D printing construction market is a rapidly growing industry with a wide range of stakeholders. These stakeholders can be broadly categorized into five main groups:

Technology providers: These companies develop and provide the 3D printing hardware and software used in construction applications. Key players in this group include:

- Cobod International: A Danish company that develops large-scale 3D printing robots for construction.
- Apis Cor: An American company that develops mobile 3D printing systems for construction.

Material suppliers: These companies provide the materials used in 3D printing construction, such as concrete, cement, and polymers. Key players in this group include:

- LaFargeHolcim: A Swiss multinational cement company with a 3D printing solutions division.
- BASF: A German chemical company that develops 3D printing materials for construction.
- Lafarge North America: A North American subsidiary of LaFargeHolcim that rovides 3D printing concrete solutions.

Construction companies: These companies implement 3D printing technology in their construction projects. Key players in this group include:

- Apis Cor: An American company that builds houses using its own 3D printing technology.

Research institutions: These organizations conduct research and development to advance 3D printing technology for construction applications. Key players in this group include:

- Carnegie Mellon University Next Manufacturing Center: Renowned for its cutting-edge research in metal and ceramic 3D printing, particularly for aerospace and medical

applications. They also boast a state-of-the-art facility with various printers and post-processing equipment.

- Pennsylvania State University Additive Manufacturing Demonstration Facility & CIMP-3D: Focuses on industrial-scale 3D printing, developing novel materials and processes for large-format structures. CIMP-3D, their research consortium, collaborates with industry giants like Boeing and Lockheed Martin.
- MIT Center for Additive and Digital Advanced Production Technologies: Pioneering research in multi-material 4D printing, bioprinting, and computational design for 3D printing. Their projects range from self-folding robots to biocompatible implants

Government agencies: These organizations regulate and promote the use of 3D printing technology in construction. Key players in this group include:

- ASTM International: An American standards organization that develops standards for 3D printing in construction.
- National Institute of Building Science (NIBS): An American non-profit organization that promotes the adoption of innovative construction technologies, including 3D printing.
- National Institute of Standards and Technology (NIST): Develops standards and guidelines for 3D printing technologies and materials.
- American Society for Testing and Materials (ASTM): Develops standards for 3D printing materials and processes.
- Association for Advanced Manufacturing (AAM): Promotes the adoption of advanced manufacturing technologies, including 3D printing.

These stakeholders are working together to advance the 3D printing construction market and make it a viable and sustainable alternative to traditional construction methods. As the technology matures and more projects are completed, the impact of 3D printing on the construction industry is expected to grow significantly.

D. Key Competitors (North American market)

- ICON 3D: Pioneering large-scale 3D printing of homes and structures with a focus on sustainability and affordability.

- Alquist 3D: Developing innovative 3D printing solutions for construction, leveraging robotic systems and advanced materials.
- Mighty Buildings: Solving the housing and climate crises by transforming the way the world builds homes. Using innovative material science, 3D printing, robotics, and automation to make carbon-neutral housing a reality for everyone.
- COBOD: Building smarter through multifunctional construction robots based on 3D printing technology.
- Apis Cor: Apis cor is a construction technology company that's developing advanced robotics technology to combat the housing crisis.
- nidus3D: Revolutionizing the construction sector with 3DCP and building generation-next homes

E. Relevant regulations in the construction industry

The regulatory landscape for 3D printing in construction is still evolving in the USA, and there is currently no single national standard or code specifically for this technology. However, there are several regulations and guidelines that apply to various aspects of 3D printing in construction:

Building Codes:

- International Code Council (ICC): The ICC has developed Appendix AW to the International Residential Code (IRC) which provides a framework for evaluating 3D printed construction. This appendix incorporates the Underwriters Laboratories' UL 3401 standard for testing and evaluating 3D printed building components.

- National Building Code (NBC) and International Building Code (IBC): These codes require that all construction materials and methods comply with established standards and tests. 3D printed materials and methods must demonstrate compliance with these codes to be approved for use.

- State and Local Building Codes: Just like traditional construction, 3D printed buildings require permits and inspections throughout the process. This typically involves

submitting detailed design plans, material specifications, and printer information for approval. Inspections will be conducted at various stages, including pre-construction, during printing, and upon completion.

As 3D printed construction is a relatively new technology, most jurisdictions require licensed engineers to be involved in the design and construction process. They will ensure the structural integrity of the building and compliance with relevant codes and standards.

- Testing and Certification:
  Underwriters Laboratories (UL): UL 3401 is a standard for testing and evaluating 3D printed building components. This standard helps to ensure that 3D printed materials and methods meet safety and performance requirements. Appendix AW *of the International Code Council provides for the design, construction, and inspection of 3D building construction. UL 3401 was developed to evaluate critical aspects of this construction process to result in consistent 3D-printed building techniques that comply with a level of safety and performance equivalent to legacy construction techniques currently in the code. 3D-printed buildings, structures and building elements shall be designed by an organization certified in accordance with UL 3401 by an approved agency and approved by the building official*

- American Concrete Institute (ACI): ACI 544.1R-18 provides recommendations for the design and construction of 3D printed concrete structures.

Other Relevant Regulations:

- Occupational Safety and Health Administration (OSHA): OSHA regulations apply to all construction workplaces, including those using 3D printing technologies. Companies must comply with OSHA safety standards to protect workers from hazards.

- Environmental Protection Agency (EPA): The EPA regulates the use of materials and emissions in construction. 3D printing companies must comply with EPA regulations to ensure environmental protection.

V. Recommendations

Strategic Recommendations for Effective Operational Scaling for Lux Mea [based on our analysis which is added to the report as an Appendix]:

A. Sub-brand

Sub-brand name: LuxMea Homes

Target audience: B2B business model Homebuilders, developers, and individual homeowners

Focus: 3D printing custom homes and residential buildings

Value proposition: Faster construction times, lower costs, and more design flexibility

Overview

- Brand that is specifically made for LuxMea to target businesses to partner with and be able to sell their services to make homes and pieces for those homes
- The goal of producing this brand is to have the main brand separated and have a` specific brand that is only for construction of homes.
- Will work with several construction agencies to be able to get name and do more work out there.

Benefits to Lux Mea

- This sub brand will allow LuxMea to be able to separate from their main brand and have a specifically new tailor brand for their new venture into building homes.
- The B2B Model will allow LuxMea to position themselves as an intermediary in between the construction agencies and the customers, being able to work with the construction agencies and make the parts needed to build the homes for the custom needs of that company.
- If a company's product or service range is broad, creating sub-brands can help clarify and organize the offerings, making it easier for customers to understand and choose what suits them best. This can help LuxMea differentiate from all their other ventures such as jewelry or AI (Artificial Intelligence) generated pieces of art from their new construction line.

- A sub-brand creates an opportunity for innovation, as it can operate with its unique identity and approach, experimenting with innovative ideas without affecting the parent brand. This would enable LuxMea to be able to experiment with their architecture venture with less risk of affecting all the brands of LuxMea if anything were to go wrong.

Risks to Lux Mea

- Introducing a sub-brand might weaken LuxMea's established brand identity, especially if the new brand's values, market, or offerings are not well-aligned with those of the main brand.
- The development and marketing of a new sub-brand would require substantial investment in terms of finances, personnel, and technology. This could divert essential resources away from LuxMea's core operations and projects.
- There is a significant risk that the B2B market may not accept the new sub-brand, especially in a sector like housing, where decisions are based on factors like cost, performance, and existing relationships. Additionally, existing clients might view the new sub-brand as irrelevant or competitive, potentially damaging established business relationships.
- The housing industry is heavily regulated. Any new venture in this sector must navigate complex building codes, safety standards, and environmental regulations. Non-compliance could lead to legal challenges and reputational damage.
- Given LuxMea's focus on advanced digital technology and 3D printing, adapting these technologies to the housing sector's demands poses a significant challenge. Ensuring that their innovations are scalable, reliable, and meet the varied needs of B2B clients in the housing industry is critical.

Costs to Lux Mea

- Significant investment is needed to adapt LuxMea's 3D printing and digital fabrication technologies for the housing market. This includes research and development, technology acquisition, and prototype development.
- Before launching the sub-brand, LuxMea needs to invest in extensive market research to understand the housing sector's specific needs and trends, including expenses for data collection, analysis, and consulting services.

- Developing the identity of the sub-brand, including its name, logo, brand message, and overall positioning, involves costs related to branding ability and potentially hiring external agencies.
- Ensuring compliance with building codes, safety standards, and environmental regulations in the housing industry can be costly, involving certifications, inspections, and adaptations to meet regulatory requirements.
- A substantial financial commitment is needed for marketing the sub-brand, including digital marketing, advertising, public relations, and promotional events to set up its presence in the market.

Construction Companies

Here are some of the top construction companies in Massachusetts that would be good to consider as customers:

- Suffolk Construction
- Turner Construction
- Shawmut Design and Construction
- CDM Smith
- Commodore Builders
- Consigli Construction
- Delphi Construction Inc.

Benefits of having Construction Companies as Customers

- Partnering with established and reputable construction companies would significantly boost LuxMea's credibility in the market, especially important for a new sub-brand.
- These construction companies have extensive networks and a strong market presence. Collaborating with them would give LuxMea immediate access to a broader range of projects and clientele.
- These companies could offer valuable expertise and insights, leading to innovative collaborations that combine LuxMea's advanced technologies with their construction experience, potentially creating groundbreaking housing solutions.
- Securing contracts with top construction firms would directly enhance LuxMea's revenue, setting a solid foundation for future business growth and attracting additional clients in the industry.

- Working with these established companies would provide LuxMea with crucial feedback on their products and services, offering market validation and insights necessary for refining their offerings and identifying new market opportunities.

B. Recruitment Strategy

Collaborating with Top Recruitment Agencies

To find and hire exceptional talent, recruitment agencies are essential. These organizations focus on finding, vetting, and introducing quality applicants who could help in the general growth of LuxMea.

Provided is a list of top recruitment agencies LuxMea could potentially partner with:

- Robert Half
- Randstad
- Korn Ferry
- Hays US
- Michael Page
- 3Recruit: specifically for recruitment of engineers, IT, and management within 3d printing industry. https://www.3ecruit.com/about

Benefits of Using these Agencies:

- Network: Using various platforms, such as job boards, social media, and industry events, agencies manage huge networks of potential candidates. They can access a wide range of talent because of this.
- Evaluation and Screening: Recruiting firms carry out stringent screening procedures, such as skill evaluations, reference checks, and interviews. This guarantees that LuxMea will only be presented with eligible prospects.
- Recruiting agencies help businesses save time and money by handling the hiring process on their behalf. Agencies take care of tiresome jobs including candidate communication, first interviews, and resume screening.
- Negotiation and Onboarding: Recruitment firms frequently support both the onboarding and pay negotiations. This makes it easier to guarantee that the candidate will integrate into LuxMea smoothly.

Software/Tools to Explore.

- **Job Score:**
  https://www.jobscore.com/

This is an applicant monitoring and recruitment system that could assist Lux Mea in efficiently managing and streamlining its entire hiring process in a cooperative and well-organized manner. Recruiters can use the program to post job openings, find prospects, monitor applications as they move through the pipeline, filter resumes, conduct assessments and interviews, use hiring analytics, and make data-driven hiring choices.

Features

- **Job Posting and Distribution:** In order to reach a larger audience, it can create and post job listings on a variety of job boards and social media channels.
- **Application Tracking:** Throughout the hiring process, the platform offers a consolidated dashboard for managing and keeping track of all candidate applications.
- **Resume Parsing:** To make it simpler to manage and search candidate profiles, JobScore employs resume parsing technology to extract pertinent information from resumes.
- **Collaborative hiring:** It facilitates communication, feedback sharing, and group decision-making among hiring team members through the platform.
- **Evaluation and Scorecards:** This feature enables users to generate standardized scorecards for assessing applicants according to predetermined standards. This aids in keeping the evaluation procedure consistent.
- **Candidate Communication:** It also enables a standardized and effective communication process by facilitating communication with candidates using email templates and automated messaging.

Overall, when it comes to recruiting, Jobscore functions similarly to a CRM by centralizing all candidate data and correspondence in one safe area that is accessible to the hiring team via mobile-friendly interfaces and customized dashboards. It makes personnel acquisition effective and metrics-driven, with hiring quality as its top priority.

- **Textio:**
  https://textio.com/

Textio is an AI-enhanced writing platform that could help Lux Mea increase the efficacy, inclusivity, clarity, and engagement of all written communications. The program analyzes text as it is produced and suggests ways to improve phrasing, word choice, and emotional resonance based on linguistic psychology and persuasion concepts. It connects with common applications like Microsoft Word. It enhances writing by analyzing and improving written content especially job advertisements and recruitment communications.

Features

- **Augmented Writing:** Textio makes real-time recommendations to enhance the efficacy of written content by analyzing linguistic patterns using machine learning.
- **Gender-Neutral Language:** Using the platform Lux Mea may find and replace gender-biased language in job descriptions to make it more inclusive and appealing to a wider pool of applicants.
- **Predictive Analytics:** Textio uses predictive analytics to anticipate how well job listings would perform. It offers information on how well a specific work of writing is probably going to connect with the intended audience.
- **Ideas for Improving the Inclusivity of Language:** It Provides advice on how to make job postings more hospitable to applicants with varying backgrounds and demographics.
- **Talent Attraction Score:** Offers a "Talent Attraction Score" that represents the expected effect of a job posting on drawing in eligible applicants.

In summary, using natural language processing, Textio transforms business writing by providing actionable insights that center on inclusive and efficient communication between hiring managers and candidates, teams and leadership, and businesses and customers.

Job aggregators serves as a means of bringing together employers and job seekers by compiling job postings from multiple sources onto a single, easily navigable website. Here are a few well-known job aggregators where Lux Mea can post job openings and job seekers can look for opportunities:

- Indeed
- Linkedln

- Glassdoor
- Monster
- Career Builder
- HireEZ
- Zip Recruiter
- LinkUp
- Simply Hired
- CareerJet
- Google Jobs

Job aggregators will help LuxMea to:

- Set up an online Presence: Utilize Social Media Platforms: Social media platforms, such as LinkedIn, Twitter, and Facebook, can be utilized to attract potential candidates. These platforms allow Lux Mea to showcase the company's culture and values, highlighting the unique selling proposition of working for the organization. This can help to increase brand awareness, as well as the interest of potential candidates. For example, 79% of job seekers use social media in their job search process, making it a valuable tool in attracting quality candidates (Hootsuite, 2021).

- Engage in Employer Branding: Employer branding is a critical aspect of attracting top talent. Lux Mea should invest in creating a strong online presence that showcases its culture and values, highlighting its unique selling proposition. The company website should be optimized with easy-to-read career pages that highlight the company's mission, culture, and available job openings. For example, 75% of job seekers consider an employer's brand before applying for a job, making it a key factor in attracting high-quality talent (LinkedIn Talent Solutions, 2021).

Explore Rotational Development Programs.

Individuals should be rotated across teams and disciplines to gain comprehensive knowledge in design, engineering, and sales departments in LuxMea.

Overview

- The average duration of a cross-functional program is 18 to 24 months.
- Rotates highly skilled individuals like engineers, IT developers, architects among multiple teams and departments
- Enhances decision-making abilities, broadens skill sets, and creates peer networks by providing exposure to industry, business, and multidisciplinary knowledge.

Program Structure

- Senior leadership sponsorship as well as mentorship for every participant.
- It is planned to alternate between three to five departments/teams (engineering, industrial design, sales, producing, services, marketing, finance, etc.) every four to six months.
- Every rotation has a set of well-defined goals, development activities, and deliverables to complete.
- Participation in innovation workshops, client service, strategy planning, budgeting cycles, prospect pitches, and new product development.
- Executive networking, self-evaluations, coaching, and off-site leadership training.

Benefits to LuxMea

- The program brings about cross-regional leaders capable of scaling up activities.
- The participants will be better equipped to navigate uncertainties and make calculated decisions.
- The risk of talent shortages brought on by unexpected departures is reduced.

VI. IMPLEMENTATION PLAN

This implementation plan for a 3D printing company outlines a three-phase approach to growing the business, focusing on the sub-brand LuxMea Homes.

Phase 1: Short-Term (2024)

Sub-Brand: Establish LuxMea Homes as a B2B brand focused on providing 3D printed elements to builders and developers. This allows the company to target a specific customer segment with high-value, high-margin products.

Recruitment: Establish a common change vision within the LuxMea organisation so that all stakeholders at LuxMea have the same vision towards growth of LuxMea.
Develop a hiring strategy to recruit talent with expertise in 3D printing, design, and construction. LuxMea can utilize AI tools mentioned in the report above and job aggregators to spread the word on opportunities at LuxMea.

Phase 2: Mid-Term (2025)

Sub-Brand: Expand LuxMea Homes to serve individual homeowners, offering a wider range of 3D printed products for customization and personalization. This leverages the brand equity established in the B2B market and taps into the growing consumer interest in 3D printing.

Recruitment: Utilize recruitment agencies to find experienced professionals to support the expansion.

Phase 3: Long-Term (2030 and beyond)

Sub-Brand: Continue building brand equity for LuxMea Homes, solidifying its position as a leading provider of 3D printed home goods and architectural elements. This could involve sponsoring industry events, partnering with influencers, or launching innovative new product lines.

Recruitment: Implement a rotational development program to train and upskill employees across different departments, fostering a culture of internal growth and talent retention.

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APPENDIX

STAKEHOLDER ANALYSIS LUXMEA

Project Topic:
Scaling up the Lux Mea organization. What is the "right" way to grow? Given the historical context, what does change management theory tell us are the right types of roles, people and processes to invest in? What type of challenges should Lux Mea expect (internal and external)? What might a P&L look like for this?

Stakeholder Analysis

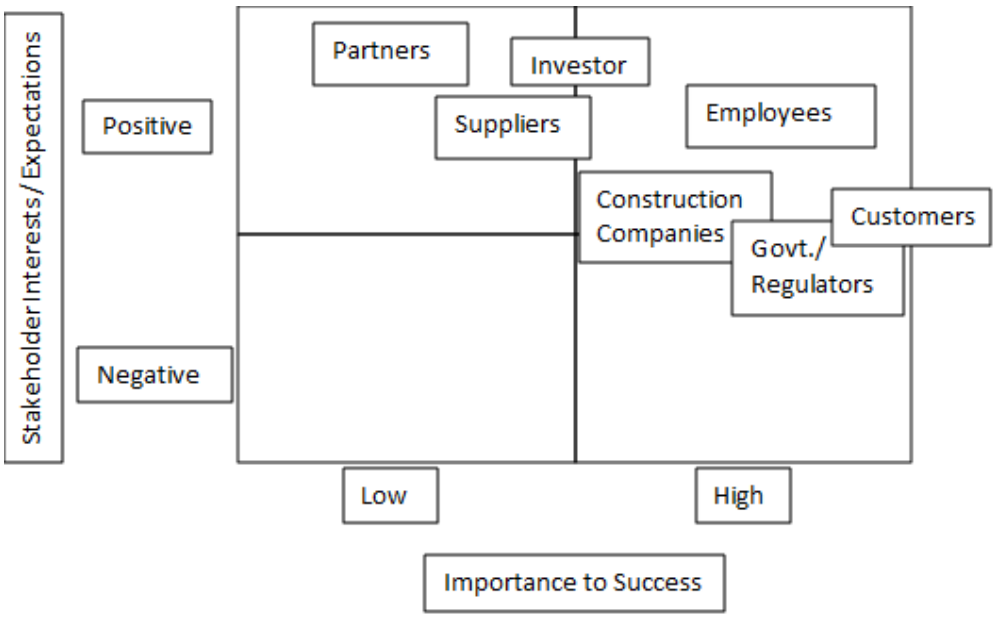
Company Name: Lux MEA
Reviewer Name: Group 3 (MBA 770_Suffolk University)
Date of Analysis: 10.16.2023
Briefly describe the new venture, strategic initiative, or project you would like to accomplish: Scaling up the Lux Mea organization. What is the "right" way to grow?

Stakeholder	**Interests/Expectations** Put a (+) beside those interests/expectations that you believe will have a positive impact on your goals/strategy and a (-) beside those that you believe will have a negative impact	**Importance** 1=Low 3=Neutral 5=High
Construction Companies	• Upskill to use the new technology (-) • Labour (+) • Access to quality construction materials (-) • Cost effectiveness and competitive pricing • Effective communication (+)	**5** **5** **3** **3** **5**
Suppliers	• Demand projections are clearly communicated. (+) • Fair and Transparent procurement processes. (+) • Consistent and Long-term Contracts. (-)	**5** **3** **3**
Employees	• Seeks a creative, collaborative work environment. (+) • Desire job security, fair compensation, and opportunities for career advancement. (-) • Have a defined Project plan. (+) • New design/ Innovation. (+) • Proper project management. (+) • HR to identify relevant resources when scaling up. (+)	**5** **3** **3** **1** **5** **3**
Government/ Regulatory Bodies	• Regulatory bodies essential for permissions, especially in construction and public projects. (-) • Policymakers who influence regulations related to 3D printed structures, construction, and technology adoption. (+)	**5** **3**

	• Labor Unions representing workers' interests. (-)	**5**
Investors	• Return on investment and the long-term sustainability of the organization. (-) • Clear communication on how the scaling strategy aligns with the organization's financial goals, potential risks, and mitigation plans. (+)	**5** **3**
Partners	• Partnership with mutually beneficial collaborations, innovative projects, and shared expertise. (-) • Local Communities seeking community engagement, job opportunities, and minimized disruption. (+) • Partnership with Universities for knowledge exchange, special courses. (+)	**1** **3** **3**
Customers	• Assurance of product/service quality. (+) • Transparent communication on any changes. (-) • Involvement in feedback processes. (+) • Awareness of the accessibility of innovative technology. (+)	**5** **3** **3** **5**

Stakeholder Map

Company Name: LuxMEA
Reviewer Name: Group 3 (MBA 770_Suffolk University)
Date of Analysis: 10.16.2023



Stakeholder Action Planning

Company Name: Lux MEA
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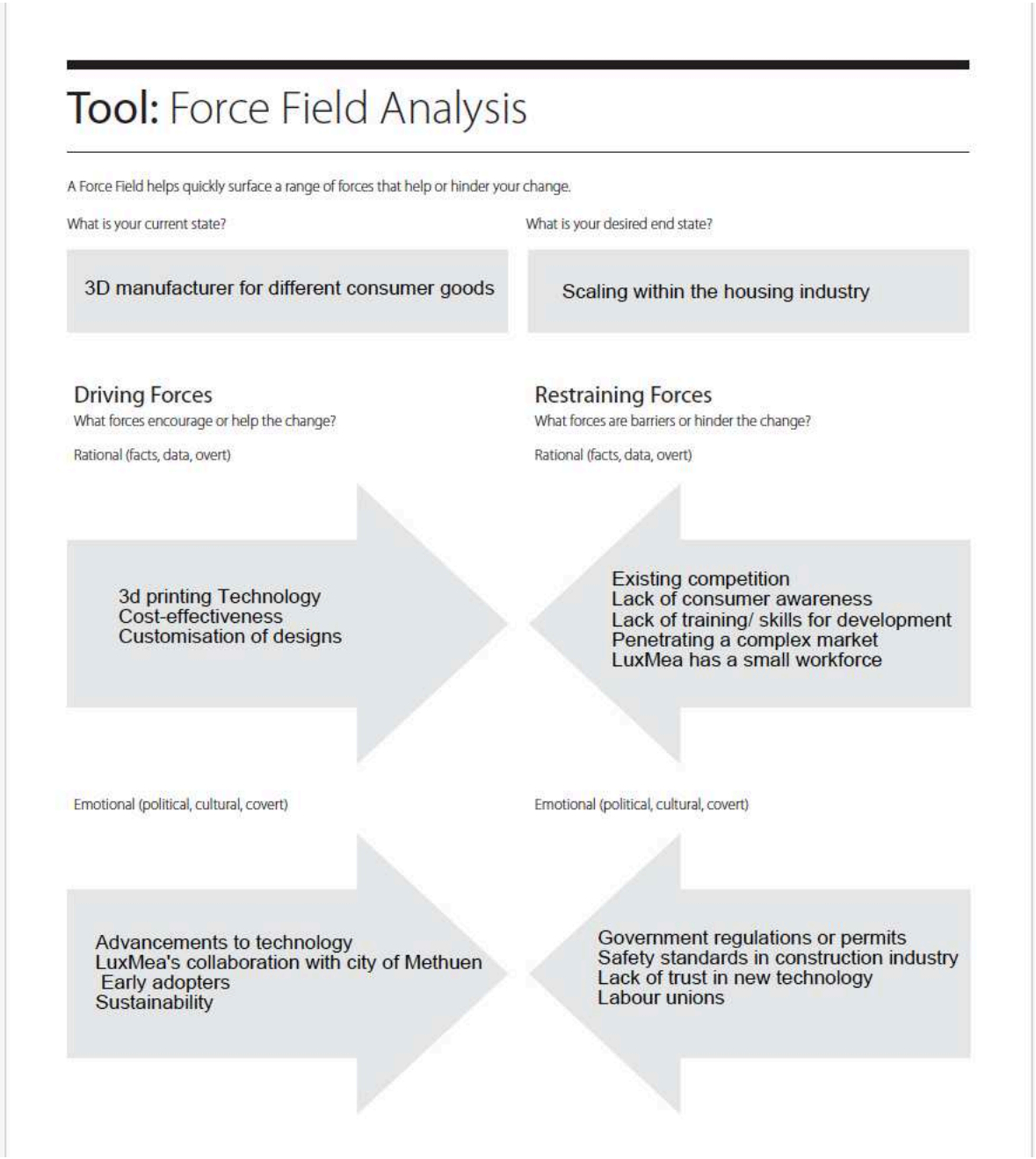
Identify three key issues you need to resolve based on your stakeholder analysis.		
Issues	Actions	Comments
Upskill construction partners/ employees to leverage the benefits of using new and innovative technology.	• Open dialogue • Ways to upskill labour force quickly • Marketing strategies	• Certifications and Workshops: Encourage employees to attend certifications and workshops. Offer incentives for completing these programs successfully. • Subscriptions to online learning platforms and resources. • Gaining the support of stakeholders requires constant communication and transparency. • Adapt training programs to the unique requirements and preferences of the workforce.
Collaborative work environment and a well-defined Project management.	• Hiring the right personnel while expanding team. • Training and Development • Feedback Mechanism	• Project management approaches should be reviewed and updated frequently to remain flexible. • Promote a team environment where learning and development are valued.
Working with regulatory bodies and Policy makers to sanction projects.	• Building rapport/ contacts. • Having a dedicated team to manage the projects.	• Understanding Regulations and Stakeholder Mapping • Arrange meetings with key stakeholders to introduce project and its potential benefits and establish a continuous communication channel. • Launch public awareness campaigns to garner community support. • Prepare compelling presentations emphasizing economic, social, and environmental benefits and addressing potential concerns with expert endorsements and data.

FORCE FIELD ANALYSIS



Force What are the top 3 forces you want to tackle?	Next Steps What do you need to do in order to minimize or maximize them?
1. Penetrating a market/ Market Share	Increase awareness of the low cost, quicker turnaround time for projects. Analyse driving forces in the market and existing key players s Budgets allotted by governments for technological and innovative projects may present prospects for Lux MEA's cutting-edge AI and 3D printing capabilities. Focus on quality, exclusivity and design. Foster community engagement by involving local communities in projects, ensuring social acceptance and minimizing resistance.
2. Small Workforce at LuxMea	Emphasis on training the workforce to embrace new technology. Training programs for labor force to foster ease of work with new technology. Recruit fresh talent which align with LuxMea's focus on growth. Foster collaboration and communication between existing employees. Small work force can also benefit LuxMea in this stage as it makes strategic changes. Smaller companies can quickly pivot their business model.
3. Government Regulations	Look up all regulations that are relevant to 3D printing and construction. Make sure to abide by them. See what is capable in those regulations and alter what needs to be change to abide by them too. Make sure everything is well documented if any conflics come into play and you have full evidence of all aspects of the piece made and that it abides by all regulations. Establish relations with government agencies which will help LuxMea expand

PEST ANALYSIS FOR LUXMEA

POLITICAL
• Recognizing the transformative potential of 3D printing, many countries have already adopted, albeit unevenly, different strategies to create an economic and technological ecosystem that favors its development. The European Commission, for example, has identified 3D printing as a priority area for action with significant economic potential, especially for innovative small businesses. • Generally, regulations impacting equipment associated with additive manufacturing will depend on such things as installation environment (for example, workplace or school), raw materials that are utilized, handled and stored (such as powdered metal), and any by-products, such as dust, that may be associated with the manufacturing processes. See Annexure A for existing legislation that affects 3D printing for different usages. • 3D printed medical devices are regulated by the Food & Drug Administration. • Manufacturers should also be aware of the potential liability from 3D printer emissions. According to the Environmental Protection Agency, "the 3D printing process releases gasses and particulates which could pose health risks to users." In 2019, the Underwriters Laboratory (UL) published a standard for testing 3D printer emissions. • Appendix AW *of the International Code Council provides for the design, construction and inspection of 3D building construction. UL 3401 was developed to evaluate critical aspects of this construction process to result in consistent 3D-printed building techniques that comply with a level of safety and performance equivalent to legacy construction techniques currently in the code. 3D-printed buildings, structures and building elements shall be designed by an organization certified in accordance with UL 3401 by an approved agency and approved by the building official* • While the proposed IRC Appendix shows one small step toward the law catching up with innovation, there are still avenues related to 3D printing that are unregulated. Local building codes will have to be tailored to accommodate 3D printing, with permitting and building inspectors being educated in the mechanics of 3D printed structures. • Projects that leverage 3D printing typically entail partnerships between construction companies, technology firms, and manufacturers. These partnerships are often formalized via a joint venture agreement, which can introduce contractual and insurance challenges. Joint ventures can introduce contractual and insurance challenges, especially when leveraging a newer technology such as 3D printing, so it is important to understand the risk-management nuances of this type of arrangement. • Intellectual Property: Protecting an object from being printed in 3D without authorization does not raise any specific IP issues as such. Copyright will protect the originality of a work and the creator's right to reproduce it. This means that if copies

of an original object are 3D printed without authorization, the creator can obtain relief under copyright law. Similarly, industrial design rights protect an object's ornamental and aesthetic appearance – its shape and form – while a patent protects its technical function, and a three-dimensional trademark allows creators to distinguish their products from those of their competitors

ECONOMICAL

- Lux Mea's innovations might disrupt traditional construction jobs, potentially leading to resistance from labor unions.
- Researching the economic benefits of 3D printed structures, such as reduced costs and increased efficiency, could support Lux Mea's initiatives and influence policy decisions.
- Review economic data that is pertinent to Lux MEA's sector, such as manufacturing production, technology spending, and R&D spending. Indicators of a favorable business environment include positive trends in several areas.
- Budgets allotted by governments for technological and innovative projects may present prospects for Lux MEA's cutting-edge AI and 3D printing capabilities.
- Market and trade cycles may have an impact on Lux Mea's sales. For instance, during a recession, Lux Mea's sales of luxury products can be decreased. The market and trade cycles in the countries where Lux Mea conducts business must be understood.
- The demand for individualized consumer products and construction materials will be influenced by the purchasing power and spending patterns of the country's consumers.
- The operations of Lux MEA depend heavily on the availability of competent workers, therefore observing the changes in the labor market, working with educational institutions, and spending money on staff training is essential.
- In order to create goods and services that satisfy the expectations of its clients, Lux Mea must be aware of the factors influencing consumer demand. These factors could include but not limited to quality, exclusivity and design.
- For Lux MEA's global business operations, the trade balance analysis is essential. Imports and exports are both carefully analyzed as part of a trade balance evaluation. When exports outpace imports, the trade balance is positive or favorable, which suggests a healthy business climate. It shows that Lux MEA is exporting more products and services than it is importing, possibly promoting economic stability and growth.

SOCIAL

- Public acceptance and understanding of 3D printed structures could affect LuxMea's market penetration.

- Foster community engagement by involving local communities in projects, ensuring social acceptance and minimizing resistance.

- Lux Mea can also engage with industry experts and thought leaders to advocate for the benefits of 3D printed structures.

- By prioritizing education, community engagement, and social responsibility, Lux Mea can establish itself as a reputable and reliable player in the 3D printing space.

- Building partnerships with local organizations and community leaders can also help Lux Mea gain traction and establish its brand.

- The company can leverage case studies and testimonials to showcase the safety and effectiveness of its products.

TECHNOLOGICAL

- Continuous advancements in 3D printing and computational design technologies in the industry offer Lux Mea opportunities to enhance their products and services.

- Monitoring patents and intellectual property rights in the 3D printing sector is crucial to avoid legal challenges and foster innovation securely.

- Research and development investments in 3D printing technologies to stay ahead in the competitive landscape and offer innovative solutions.

- Advancements in the AR (Alternate Reality) design space keep advancing and help give more tools for designers to develop 3D designs. This gives way to the designers to be more interactive with their art and also to be able to see the pieces be put where they need to go already in a holographic form in a AR plane.

- Several Companies like Meta and Apple are switching to 3D printing their devices. This shows that the 3D printing space is getting more attention from big companies to be able to make their technology more efficient and cheaper, this could lead in advancements in technology to further the big companies goals as they will need to fund the 3d printing space to get better machines to print faster and better quality.

- Nikon has partnered up with AI Build limited and given 8.5 million dollars in funding for the innovative technology that works like chat GPT called "AiSync". This could pose a competitive threat to LuxMea as it is a similar type of software that when asked will give a model through different types of written words.

- There is another technology that works similar that creates AI generated 3d designs coming from people's modern language called “Style2Fab”. This software is more open to the public and is another competitor to the software that LuxMea can use to create their own generated 3D art.

- “3DGPT” keeps on advancing and shows that now generating designs is exceedingly more advanced than it used to be. Chat GPT is already a big thing that has taken off in the world and has changed several spaces in the technology AI world, a version of tat for 3D designs will in no doubt explode in the market once it is fully developed.

- Several 3D printers have emerged on the market that can print more than plastic for a consumer friendly price. This could make the consumer have more control and instead on relying on a company to 3D print the designs that are generated or designed by them, they could do it themselves.

- “Can l 3D Print This is the new platform from EOS Additive Minds that will help unlock the benefits of additive manufacturing for your part design.” This new tool can help several companies on what is good to outsource to be able to fully 3D print any components that are capable of being 3D printed.

- “Researchers at North Carolina State University have developed a new, electrically conductive metallic gel that can be used with commercial-grade 3D printers. “Another way for consumers to be able to do it themselves instead of relying on a company for a 3D print.