



KAMP SOLUTIONS

Team Consulting Project 2021

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Stone Paper Team Consulting

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I. Project Summary

Jurriaan Kamp is the founder of Kamp Solutions, a magazine and television show on PBS. With the goal of educating the wider public on climate issues and sustainability solutions, Kamp has highlighted solutions and innovations for both companies and individuals. One of the solutions that Kamp feels strongly about is stone paper. Stone Paper, composed of 80% calcium carbonate, and 20% high-density polyethylene (HDPE) is an innovative solution that uses stone waste in hopes to minimize paper waste. Stone paper is water impenetrable, more durable than traditional paper, and can be infinitely recycled. Jurriaan currently prints his magazines on this paper and other prototypes have been made. However, Jurriaan wants to take the next step with this revolutionary product. The cardboard industry has boomed dramatically with online shopping and the increased demand for packaging. However, cardboard production, consumption, and waste have harmful effects on the environment, and cardboard is rarely properly recycled. Stone paper can be used as paperboard so that the industry can decrease its environmental footprint. The American cardboard market is vast and valuable. In this project, we will research of the American cardboard market, research of players in this industry, evaluate the industry, and make recommendations for how Kamp Solutions should enter the market.

The Problem

In 2018 alone, the paper and paperboard consumption in North America reached 74.21 million metric tons. This market is expected to continue to grow. The life-cycle of cardboard is ultimately wasteful. Though a better packaging substitute than plastic, cardboard has an intensive production process (see cardboard production below), and the consumption, waste, and recycling are not sustainable. In hopes to create a closed-loop system, Jurriaan Kamp strives to bring stone paper as a replacement for damaging cardboard. To achieve this, more stone paper factories need to be built. A closed-loop system for stone paper would start with a stone paper factory, large batch stone paperboard sold to companies or wholesalers, and the stone paperboard would ultimately be recycled within the stone paper factory.

II. About Stone Paper

Production

The discovery of stone paper, or rock paper, began in China in the 1990s. There are currently only three factories producing stone paper, two of which are in China and one in Taiwan. Stone paper is made of 80% calcium carbonate, and 20% high-density polyethylene (HDPE). Calcium carbonate is a common compound found in rocks. HDPE is a non-toxic and recyclable compound that is used as a binding agent for calcium carbonate. No chlorine or acid compounds are used in production. Requires 85% less energy than traditional paper.

Why Stone Paper?

Jurriaan Kamp initially designed stone paper to compete with plastic bags, which are damaging to the environment. Plastic bags require roughly 12 million barrels of oil to manufacture per year. 730,000 tons of plastic bags were manufactured in 2015, 87% of which were never recycled, meaning they ended up

in landfills and oceans. While stone paper is still a sustainable alternative to plastic bags, stone paper's cardboard replacement could greatly reduce the amount of traditional cardboard used in America. To produce just one sheet of paper uses more than three gallons of water. Stone paper requires no water and no trees in production. When scaled, stone paper is 50% cheaper than traditional cardboard and uses no harmful chemicals like bleach. Mold loves cardboard. When cardboard is wet it becomes a perfect habitat for mold to thrive and spread. A unique advantage to stone paper is that it is water impenetrable. This could provide benefits to companies that ship and store perishable goods because stone paper would be completely mold-free. On top of stone paper's water resistance, it can be easily washed when dirtied. Taking water resistance and enhanced durability (See Appendix 1) into account the stone paperboard box could be reused many times, decreasing the frequency of wasting or recycling the good. Cardboard gets progressively thinner and weaker each time it is recycled, thinner board is used to make boxboard (cereal boxes or container boxes not used for shipping). It will continue to thin and weaken until it ultimately cannot be used. To be recycled the cardboard must be clean and dry. Stone paper is infinitely recyclable but not compostable. Stone paper is photodegradable and it takes about 1-2 years to degrade in UV sunlight, if covered by soil or not exposed to sunlight, it will not biodegrade.

Benefits of Stone Paper (summarized)

- No water
- No trees
- Product is 50% cheaper
- Equipment to manufacture is 40% cheaper than traditional paper
- Water and mold resistant
- Washable
- Reusable
- More durable, less likely to tear
- Quality does not reduce when recycled
- 67% lower carbon footprint than pulp paper

III. Cardboard Production

Raw Materials

- Fast-growing pine trees
- Large production companies have thousands of acres of land for these trees to mature, be cut down, and seedlings can be re-planted
- Tree harvest
 - Stripped of branches
 - Only trunks go to the pulp mill

Kraft Process

- Chemical conversion of wood into wood pulp
 - Wood chips cooked in a sodium hydroxide solution along with other ionic compounds
 - Pressurized
- Wood pulp fibers are made into Kraft paper via machine

- Kraft paper: The paper result of the Kraft process, commonly used as brown wrapping paper or as the initial element of boxboard and cardboard.

Corrugating

- Corrugate: A material shaped into alternate ridges and grooves (Appendix 2)
- Corn starch glue to bond sheets

IV. Environmental Impact of Cardboard

Production

- 4 billion trees are cut down annually to make paper
- Deforestation
- Tree plantations cause biodiversity loss and CO2 emissions
- 3 gallons of water to produce 1 sheet of paper
- Pulp and paper manufacturing industry is the largest consumer of water in developed countries
- Pulp and paper mills can contaminate water, damaging aquatic life and risking the health of communities

Consumption

- In the United States more than 80 billion cardboard boxes are used per year
- About 80% of US products are packaged in cardboard

Waste

- Cardboard and paper accounts for 41% of solid waste
- In the US about 9,000 pieces of cardboard are thrown away per family per year
- In the US more than 800 million tons of cardboard and paper are thrown away annually
- For each ton of non collected paper/cardboard, there is about 2.11 tons of CO2 released into the atmosphere

Recycling

- Recycling 1 ton of cardboard saves on 700 gallons of water
- Globally one of the most recycled items
- Recycled cardboard only saves 24% of the energy needed to create new cardboard
- 70% of cardboard boxes shipped commercially are recovered for recycling
- If wet, cardboard is tossed out in the recycling process

V. Our Market Research

Primary Research

Throughout the course of this project, our team attempted to reach out to many different companies to gauge their interest in a product like stone paper. We also wanted to get a feel for how real businesses implement cardboard into their processes. Initially, we tried to contact International Paper Company, which is America's largest manufacturer of paper products. After 3 separate attempts and no responses, we concluded that multi-billion dollar companies aren't interested in answering college students' questions. With no luck contacting Walmart either we decided to move on to smaller more progressive local companies, as well as contacts affiliated with CU Boulder. Mad Agriculture is a local non-profit that advises farmers on how to implement more sustainable practices. Phil Taylor with Mad Agriculture has

connections to CU Boulder and we were able to speak with him after multiple contact attempts, however, his response was not very helpful. Phil said that Mad Agriculture uses probably 5 cardboard boxes per month. As an agriculture consulting non-profit we didn't expect them to have any actual yields, we expected to receive more information about the farmers that they work with but they didn't have that information about their partners. We also tried contacting Noosa, Justin's Nut Butter, and Bobo's Oat Bars but received no response from them. Luckily we were able to contact Mike Massimino with Alberson's and Kroger. Massimino had good insights into the grocery industry's use of cardboard. We concluded that about 10,000 products are received per week, most shipped in cardboard. Grocery stores compress 10-12 bales of cardboard that typically weigh 400-500 lbs per week, which is roughly 2.25 tons of cardboard per week. Massimino said that meat and vegetable containers are usually waxed and unable to be recycled (see Appendix 3 for a copy of the email).

Industry Analysis

- \$74.3 billion industry
- 2.7% expected annual growth 2021-2026
- The pulp and paper industry uses between 33–40% of all industrial wood traded globally
- Cardboard is priced by size and quantity, prices decrease with quantity per economies of scale (See Appendix 4)

VI. Recommendation

After analyzing the cardboard market and factors that affect it our team has put together a comprehensive market entry strategy for Kamp Solution's stone paper to enter the United States market.

1. Locate investors to finance a stone paper factory in the U.S. under the name of Kamp Solutions.

The overall goal of the stone paper initiative is to create a closed-loop system for stone paper boxes. With a factory in the United States Kamp Solutions will be the sole manufacturer of stone paper in North America. This will give Kamp Solutions the foundation to begin building their clientele and pinpoint the cost with economies of scale.

To achieve this:

- Gather information to compile an ROI report
 - Locate investors
 - Sustainability non-profit foundations
 - Current cardboard manufacturers
2. Enter the market starting with small, progressive businesses.

To ensure success on a large scale Kamp Solutions needs to prove the effectiveness of their product on a small scale. Smaller and progressive, eco-conscious businesses are more likely to adopt new technologies that have promise as opposed to large businesses that are more secure in their processes. As stone paper gains popularity, economies of scale will take effect and larger

businesses will slowly accept stone paper as a cardboard alternative as stone paper gains popularity among smaller businesses.

To achieve this we recommend Stone Paper enter the following US markets:

- Small businesses that package their own products
- Eco-conscious small businesses who will be incentivized by stone paper's low environmental impact
- Local farmers who package their own goods
 - Closed-loop system for produce containers (e.g. berries, tomatoes, etc)
 - Reusable stone paper boxes for transporting goods

3. Prove successes with small businesses and develop a strategy to scale.

Jurriaan Kamp claims, and our research supports that stone paper is much cheaper than pulp paper cardboard. This cost efficiency can only be achieved with economies of scale. If stone paper can prove this model it has a better chance of securing larger players in the industry.

To achieve this:

- Target larger farmers to implement stone paper so that the beginning of the closed-loop system begins with producers
- Go after larger businesses who package their own products
- Analyze the potential for small/medium post offices

4. Enter e-commerce market

The profit potential of e-commerce is large and growing. If stone paper can enter this segment of the market there is huge potential for fast growth.

To achieve this:

- Continue to target smaller players first, it's unlikely that Kamp Solutions will be able to sign contracts with large corporations like Amazon or Walmart without prior international successes.
 - Perhaps start here: <https://noissue.co/>

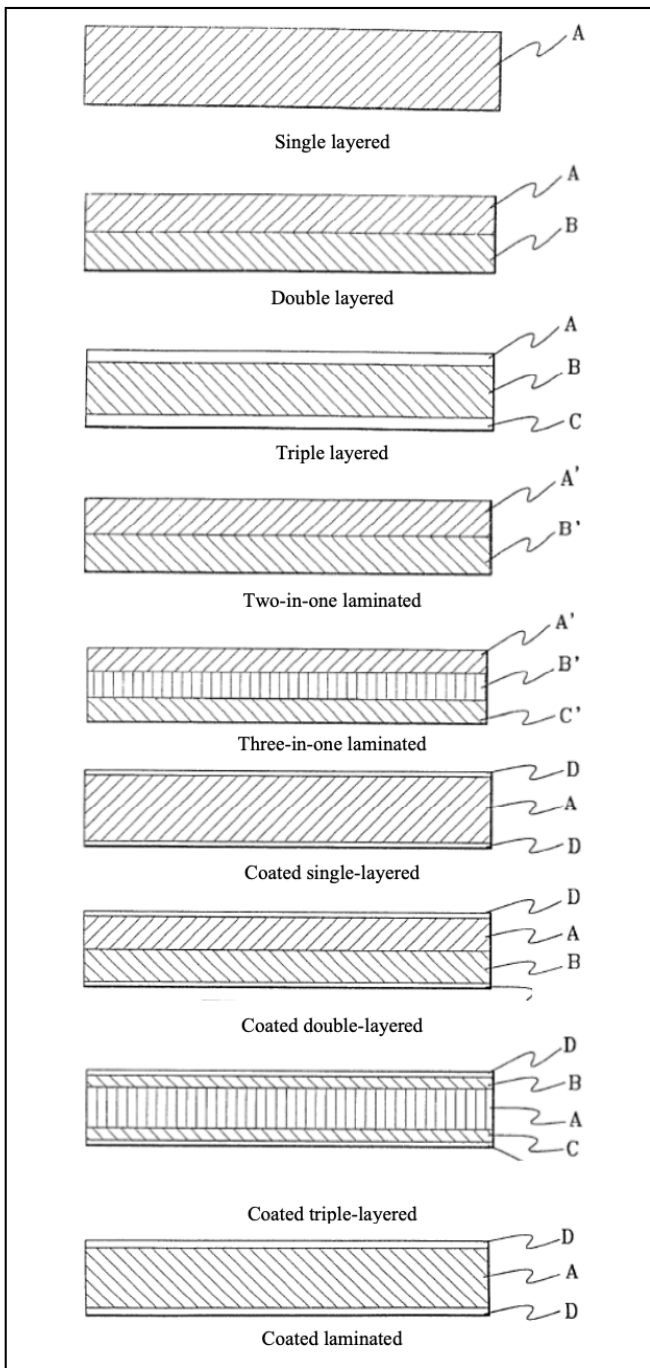
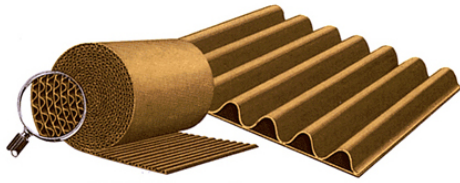
VII. Appendix**Appendix 1:**

Diagram of different stone paper layering possibilities for different levels of durability of stone paper cardboard.

Appendix 2:



**SINGLE FACE
CORRUGATED**



**SINGLE WALL
(DOUBLE WALL)
CORRUGATED**



**DOUBLE WALL
CORRUGATED**



**TRIPLE WALL
CORRUGATED**

Examples of different corrugated cardboard.

Appendix 3:

Hello Aoife,

Sorry for delayed reply...I was "on the road" and just got back online.

Your charter looks thorough with good objectives. I'll answer your questions to the best of my ability and based on my experience.

1. Grocery stores discard a lot of cardboard daily. The amount obviously varies by store sales volume. In the top two brick and mortar supermarket/grocery retailers (Kroger and Albertsons Companies), a guesstimate average sales \$500K per week and that is from about 10k cases of products per week...of which most are shipped in cardboard! The used cardboard is compressed in to large bales that weigh around 400-500 lbs. each. The same store probably creates 10-20 of these bales per week. So that is about 2 or 3 per day.
2. Most is returned for recycling. I am not sure about today...but during my time in stores waxed cardboard was NOT recyclable...so most meat and produce boxes were trashed.

WalMart does more per store volume so their numbers will be higher.










I hope this helps. If you need more info...let me know.














Mike

208-559-1799

Email from Mike Massimino, Kroger and Albertsons.

Appendix 4:

PRODUCT NAME	DESCRIPTION	PRICE EACH					QUANTITY			NET PRICE
		5	100	250	500	1000	-	5	+	
 24 x 30" Large Corrugated Cardboard Sheets SKU: BSSP2430	32 ECT	.63	.59	.59	.56	.53	-	5	+	\$3.15 5/bundle
 24 x 36" Large Corrugated Cardboard Sheets SKU: BSSP2436	32 ECT	.75	.72	.68	.67	.63	-	5	+	\$3.75 5/bundle
 24 x 48" Large Corrugated Cardboard Sheets SKU: BSSP2448	32 ECT	.99	.94	.92	.86	.84	-	5	+	\$4.95 5/bundle
 24 x 60" Large Corrugated Cardboard Sheets SKU: BSSP2460	32 ECT	1.24	1.18	1.12	1.09	1.06	-	5	+	\$6.20 5/bundle
 24 x 72" Large Corrugated Cardboard Sheets SKU: BSSP2472	32 ECT	1.48	1.43	1.35	1.31	1.25	-	5	+	\$7.40 5/bundle
 30 x 30" Extra Large Corrugated Cardboard Sheets SKU: BSSP3030	32 ECT	.79	.75	.72	.68	.67	-	5	+	\$3.95 5/bundle
 32 x 48" Extra Large Corrugated Cardboard Sheets SKU: BSSP3248	32 ECT	1.32	1.26	1.20	1.18	1.10	-	5	+	\$6.60 5/bundle
 36 x 36" Extra Large Corrugated Cardboard Sheets SKU: BSSP3636	32 ECT	1.10	1.07	1.02	.99	.94	-	5	+	\$5.50 5/bundle
 36 x 48" Extra Large Corrugated Cardboard Sheets SKU: BSSP3648	32 ECT	1.48	1.43	1.35	1.31	1.25	-	5	+	\$7.40 5/bundle

	36 x 72" Extra Large Corrugated Cardboard Sheets SKU: BSSP3672	32 ECT	2.20	2.10	2.01	1.94	1.86	-	5	+	\$11.00 5/bundle
	40 x 48" Extra Large Corrugated Cardboard Sheets SKU: BSSP40	32 ECT	1.64	1.58	1.50	1.44	1.39	-	5	+	\$8.20 5/bundle
	40 x 40" Extra Large Corrugated Cardboard Sheets SKU: BSSP4040	32 ECT	1.36	1.32	1.25	1.20	1.18	-	5	+	\$6.80 5/bundle
	40 x 42" Extra Large Corrugated Cardboard Sheets SKU: BSSP4042	32 ECT	1.44	1.37	1.32	1.26	1.21	-	5	+	\$7.20 5/bundle
	42 x 42" Extra Large Corrugated Cardboard Sheets SKU: BSSP4242	32 ECT	1.50	1.44	1.37	1.33	1.26	-	5	+	\$7.50 5/bundle
	42 x 48" Extra Large Corrugated Cardboard Sheets SKU: BSSP4248	32 ECT	1.71	1.64	1.59	1.50	1.45	-	5	+	\$8.55 5/bundle
	44 x 44" Extra Large Corrugated Cardboard Sheets SKU: BSSP4444	32 ECT	1.65	1.59	1.50	1.45	1.40	-	5	+	\$8.25 5/bundle
	48 x 48" Extra Large Corrugated Cardboard Sheets SKU: BSSP4848	32 ECT	1.95	1.87	1.79	1.74	1.67	-	5	+	\$9.75 5/bundle
	48 x 60" Extra Large Corrugated Cardboard Sheets SKU: BSSP4860	32 ECT	2.44	2.34	2.25	2.16	2.07	-	5	+	\$12.20 5/bundle
	48 x 72" Extra Large Corrugated Cardboard Sheets SKU: BSSP4872 Note : This product may not qualify for our free shipping program.	32 ECT	2.93	2.81	2.69	2.58	2.49	-	5	+	\$14.65 5/bundle
	48 x 96" Extra Large Corrugated Cardboard Sheets SKU: BSSP4896 Note : This product may not qualify for our free shipping program.	32 ECT	3.90	3.74	3.57	3.42	3.32	-	5	+	\$19.50 5/bundle
	48 x 96" Heavy Duty Corrugated Cardboard Sheets SKU: BSSP4896HD Note : This product may not qualify for our free shipping program.	44 ECT	5.71	5.45	5.24	5.09	4.84	-	5	+	\$28.55 5/bundle
	60 x 96" Extra Large Corrugated Cardboard Sheets SKU: BSSP6096 Note : This product may not qualify for our free shipping program.	32 ECT	4.86	4.65	4.47	4.28	4.11	-	5	+	\$24.30 5/bundle

Example of how cardboard is priced.

VIII. Resources

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