Combi USA, Inc.

1962 Highway 160 W., Suite #100
Fort Mill, SC 29708-8027

Confidential Business Plan

Product Name: weGO™ Stroller

*Prepared by the weGO™ Stroller Product Development Team for review by Combi USA, Inc. Senior Management

Development Team:

Jeffrey Bishop
jbishop@ucsd.edu

Shaun Coughlin
scoughlin@ucsd.edu

Fan Ding
fding@ucsd.edu

Tim Hwang
jhwang@ucsd.edu

Luke Nickerman
lnickerman@ucsd.edu

External Consultant:

Roger Bohn
rbohn@ucsd.edu

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A. Executive Summary: The weGO™ Stroller – A Logical Next Step

The weGO™ Stroller is designed to meet the greatest stroller needs of active parents with children ages 1-5 years old; it is ultra-lightweight, super-compact, and extremely portable. This innovatively designed stroller weighs only 5.3 pounds, conforms to airline carry-on specifications, and can be folded up and easily worn on the back or over the shoulder. It features a machine washable denim seat that will keep toddlers comfortable and happy for hours, a convenient storage compartment, and an ergonomic design to eliminate back strain while hauling it. Designed as a secondary stroller, the weGO™ is ideal for parents who travel frequently with their child on longer outings.

In just six short months of development and test time, the weGO™ team promises to deliver a finished product that meets the aforementioned consumer needs. To do this, the team needs the support of four engineers, two marketing personnel, and $326,400. For Combi, the stroller will represent a complementary addition to their existing product line, which currently offers no travel-oriented product. For this reason, we believe that the weGO™ will be a top performer at Combi, where cannibalization of existing products will not be a concern. The end result will be increased profits and a larger share of the $180 million stroller market.

Analysis indicates that there is currently no stroller sold in the United States which achieves these levels of portability and compactness, nor one that features this innovative folding design. As such, Combi will be first to market and will face little competition among those consumers in its initial target group: upper middle-class parents who travel frequently and pride themselves on staying active.

The weGO™ Stroller is a natural extension of Combi's long-term goals: to be a lead innovator in baby products and to cater to the lifestyles of families. The weGO™ would enable the company to reach new and profitable market segments while capitalizing on the growing trend of distinctive, lifestyle-oriented strollers.

Key weGO™ Facts and Figures

- Project NPV: $15,042,783
- Projected peak unit sales: 43,714
- Price to wholesaler: $70
- Projected peak sales revenue: $3,060,000
- Market penetration: 1.7% in 2015 (24.5% of travel stroller market)

B. Bringing the weGO™ Stroller to Life: The Development Need

In order to make the weGO™ a reality, our team is asking for a staff of eight and a modest budget. Two customer liaisons will conduct interviews and review customer needs, translating those needs into more exact product specifications. An art designer and two mechanical designers, along with the customer liaisons, will do concept generation and selection. Following concept selection, the assembly tool designer and manufacturing engineer will assist with prototype construction. The prototype will then be tested for technical soundness and market reaction. This feedback will be the basis for fine-tuning the prototype to make the final production model. Not every member of the team will be needed at every stage of development and thus time has been allocated accordingly.

This allocation requires an investment of $326,400, which represents the bulk of development costs at $242,000. Other expected costs include materials and prototype molds as well as travel and beta testing expenses.[1]

[1] See Appendix I for detailed team member time outlay, budget allocations, and development task list

C. Why the weGO™ Stroller?

Performance, portability, comfort: The weGO™ Stroller has everything parents on the go with their child could want. Consumers have indicated a desire for a product that not only adapts to the needs of the child, but also those of the adult. In addition, the baby product market has shown healthy growth in recent years, with stroller sales keeping pace and higher-end models driving sales.[2] After assessing customer needs and current trends in the industry, the weGO™ Stroller makes sense. It is an innovative product that solves problems for busy parents.

1. Mission Statement

The weGO™ Stroller is ultra-lightweight, super-compact, and extremely portable, easily folded up and carried on the back or over the shoulder. It fits perfectly with Combi's existing core competencies in stroller production as well as its redefined company goal to be a lead innovator that caters to the lifestyles of parents within the baby product market.

2. Customer Needs Assessment

2.1 Needs Identification Process

The product development team conducted a series of face to face interviews to assess customer needs using an interview format based on open-ended questions.[3] Twenty-four interviews were conducted in a number of San Diego locations with interviewees representing the core customer base in addition to a range of ethnicities and socioeconomic levels. Overall the product development team is confident that the interview process succeeded in speaking to a demographically diverse potential customer base which yielded an accurate representation of customer needs.

2.2 Customer Needs

Interviews brought to light a critical need that the United States baby stroller market had not yet met: a stroller that is lightweight and very portable, folding up smaller than the "umbrella style" strollers typically used for travel. This need became the basis for the mission statement and prototype design of the weGO™ Stroller.

Potential customers also identified two standard features and an essential attribute that are found on all but the cheapest ($10 or less) strollers: a sun visor, locking wheels, and compactness.

Secondary features considered "nice but not absolutely necessary" included trays for child and parent, drink holders, reclining seat and a reasonable price (deemed to be around $100). The development team considered these to be "bells and whistles" that would be included if the features did not interfere with primary product attributes.[4]

[2] Sales of infant and toddler products have grown 10% in the last three years.
[3] See Appendix II for interview format and Appendix III for sample interviews.
[4] See Appendix IV for complete customer needs matrix.

D. Meet the weGO™ Stroller

Incorporating all of the features a parent could ever wish for, the weGO™ exemplifies the attributes of a true travel stroller for today's active family. Utilizing the general look of today's standard strollers, the weGO™ expands on a *good* blueprint while adding a *great* design that provides consumers with the ease and portability that they've been hoping for in a travel-oriented baby product. Why bother with the inconvenience of past heavy and unwieldy designs when you can take the next step in comfort for both child and parent: the weGO™ Stroller.

3. Product Description

3.1 Non-Technical Product Overview

The weGO™ Stroller is a lightweight, easily collapsible children's stroller that meets standard safety requirements, but offers the comfort and convenience parents are looking for. This device is specifically aimed solving one aspect of parents' busy lives, providing them with a convenient alternative to the heavy traditional baby stroller. Moreover, the weGO™ Stroller conforms to air-line carry-on specifications, an innovation that allows parents to use a child transport device during all modes of travel.

In compact mode, the stroller resembles a traditional backpack, easily folding, locking and resting on the user's back or shoulder. A zippered storage compartment underneath the seat provides parents with a place to store baby wipes and other small baby items. All 4 wheels fit neatly into a plateau-matrix, maintaining projections of the axels beyond the user's body, minimizing snags on objects or other people. Telescoping handlebar shafts eliminate dead-space, allowing the weGO™ Stroller to boast a comfortable length of 33 inches from head to toe.

To convert for child transport, the Velcro lock strap is released using a simple one-handed operation allowing the seating region to fully extend into a standard child seat. The wheels drop into the standard rectangular formation, creating instant functionality

upon opening. The aluminum seating frame slides down to a steel support bar for maximum stability once the child is placed into the weGO™ Stroller. Two lock pins on the handlebar shafts allow the user to extend the push handle up to the appropriate height for an upright, proper parental posture.

The weGO Stroller weighs a mere 5.3 lbs in either mode, a safe harnessing weight for any adult, while the storage compartment remains externally accessible when carried or in use.

3.2 Technical Product Overview

Stroller Structure/Frame

Focusing on the essence of a lightweight model that harnesses the correct yield strength to support a child of approximately 20-50 lbs, the weGO™ Stroller is composed primarily of T6 6061 aluminum alloy, a structurally stable material (yield strength ~ 25,000 psi). The design of the seat-folding mechanism was derived from a portable beach chair, due to its comfort and simple design (see figure A). The use of z-configured hinges here allows the back and bottom portions of the seat to fold parallel during carry mode and open flat to a perpendicular format during child transport mode. A steel rod (material chosen for maximum stability with minimal bending) acts as a support between the seat and leg shafts, absorbing the weight of the child at a solid central plane as opposed to spreading the weight independently on to each of the legs. The arm rests both provide for child comfort and act as reinforcements to support the back of the seat frame. This design feature ensures that the decline angle of the seat will be consistent each time the stroller is fully deployed. The bottom of the seat features a double bar support, serving a dual purpose of maintaining the rectangular seat shape and anchoring the seat fabric/harness.
Size Specs: 34.5" x 11" x 18.5" when opened, 30" x 11" x 6" when closed

Telescoping Handlebar

To minimize dead space when folded the weGO™ Stroller features a telescoping handlebar that can easily be adjusted and locked using ball-bearing spring pins. In carry mode, the telescoping handlebar is fully collapsed, leaving the aluminum handle exposed a mere 4 inches above the top of the seat frame. With the spring pins removed, the handlebar is able to extend a full 16 inches above the seat frame, allowing the parent to maneuver the weGO™ Stroller at a comfortable height upon relocking the lengthened aluminum shaft.

Child Seat/Harness

Seat design addresses three important properties: comfort, support, and safety. The weGO™ seat will contain an easily adjusted 5 point-safety harness (to be included in the final product) that extends from the top points of the back and the lower corners of the seat bottom, meeting with an appropriate clasp in the middle of the child's waist. The denim material is

breathable and slightly stretchy, providing comfort and support while creating a firm shape to cradle the child's back and bottom. *Size Specs: 10" x 19"*

Wheels

Utilizing the stability of standard industrial designs, the weGO™ stroller is equipped with 4 double-rimmed rubber wheels, independently suspended from each leg shaft. Each pair of legs (front and back) is reinforced in a parallel configuration by two additional support bars attached towards the bottom of the front and back legs. The back wheels maintain a standard forward-backward motion (zero degrees of motion on lateral plane parallel to ground) with a single-click foot brake on each axel (to be featured in the final product). The front wheels feature a full 360 degree range of motion, allowing the user to maneuver the weGO™ Stroller in all directions with ease.
Size Specs: 3.5" wheel diameter

3.3 Performance Specifications (Initial, Revised, Final)

When identifying performance specifications three stages of classification were implemented during various development times of the prototype. The initial specifications arose from customer needs determined through face to face interviews. Revised specifications were derived from concept development, achieving definition upon cost and feasibility analysis. The final specifications were created directly prior to prototype design, as further investigation and trade-offs led to a tangible model. Below is a sample of customer needs including in bold those that the team sought to improve upon the most.[5]

1. Stroller is convenient to use
    - **A. Stroller is easily collapsible/set up**
    - **B. Stroller is lightweight**
2. Stroller is safe for child
    - A. Stroller shields child from sun when necessary
    - B. Stroller wheel/s can be immobilized
3. Stroller is comfortable for child
4. Stroller has storage space
5. Stroller has long product life
6. Stroller is reasonably priced
7. Stroller is aesthetically pleasing

To successfully create an innovative and marketable product, the weGO™ development team sought to design a lighter, more compact, and easily transportable stroller. Two feasible designs arose from interviews and group discussion. Design A utilized a

[5] See Appendix V for a complete chart.

"folding-parts" mechanism where interlocking shaft components would connect to form the stroller frame when deployed and easily be disconnected into smaller fragments to fit into a backpack (the backpack acting as a reversible seat) when compacted. Design B was based on a collapsible beach chair, with the frame's components being interlaced into a parallel "stacked" configuration, creating a flat backpack (the straps directly installed onto the back of the stroller seat). Design A was constructed using plastic PVC piping while Design B, made of aluminum alloy, turned out to best meet the expectations of the final prototype.

As expressed before, the key design features of creating a more lightweight, compact, and travel-friendly device were focused on during prototype development. At a mere 5.3 pounds and 30"x11"x6" when closed, the stroller definitely achieves these goals.

3.4 Prototype Testing

Upon revising the prototype specifications and designing two feasible stroller models, the development team then put them to the test. In order for the concept to be successful, the weGO™ Stroller needed to be up to par in comparison to current market-standard strollers. Moreover, each prototype needed to show significant improvements in terms of size and weight over traditional designs to qualify as a "travel-friendly" stroller.

	Results (Excellent, Pass, Fail)	
Test/Description	**P1: Folding Parts**	**P2: Collapsible Chair**
Safety/Stability: Placed 20 lbs of weight in seat and pushed stroller 100m in all directions, examining the structural integrity based on user review.	**Pass:** A bit wobbly on turns due to extended inner/outer wheel configuration.	**Excellent:** Traditional configuration of wheel shafts matches most strollers, stable during entire ride.
Portability: User review of compact configuration for traveling situations.	**Excellent:** Folded configuration fits easily into normal adult backpack.	**Excellent:** Collapsible seat minimizes width of stroller to a minimal 5 inches.
Ease of Setup: Measured average time required to fully convert stroller from "closed" to "open" configuration.	**Pass:** Requiring two hands to attach the backpack seat fabric and open the 4 wheels, the setup took approximately **20 seconds**.	**Excellent:** Simple lock clasp opens immediately to release compact stroller into full child size with wheels already deployed, the setup took approximately **4 seconds**.
Maneuverability: User review of movement during motion for 360 degrees of freedom in circle of 1 meter diameter.	**Fail:** Interlaced wheel configuration created opposing forces, making it difficult to accurately maneuver the vehicle.	**Pass:** Locked back wheels stabilized movement as front wheels freely rotated during turn situations.
Physical Metrics: Effectively fits within airline carry-on requirement specifications	**Pass:** Specs fit within 45" total length-width-height limitation	**Pass:** Specs fit within 45" total length-width-height limitation

Carrying Comfort: User review of comfort level of each prototype when carrying on shoulder and directly over the back after 30 minutes.	**Pass:** Extra-flat design fits nicely into bag; frame can be slightly felt through material, no different than wearing a book-bag.	**Pass:** Flat design fits snuggly against sides of body, wheels touch body a bit, but still comfortable.

3.5 Test Implications

After careful analysis of the prototype testing results, the team determined that the "collapsible chair" design would best result in fulfillment of specified customer needs: ultra-light, super-compact, and extreme portability. Ease of setup and maneuverability were also important needs that customers had expressed during interviews, meaning that any prototype which sacrificed these functions would not be favored designs. The "collapsible chair" model was comparable to the "folding parts" model in most, but its excellence in these additional categories pushed the development team towards selecting it as the final prototype.

3.6 Final Design Testing

Once the final prototype was selected, further testing was implemented to ensure that the weGO™ would be able to withstand the normal "bumps and bruises" of a typical outdoor child product.

	Results
Test Scenario	**weGO™ Stroller**
Cold/Condensation Test: Stroller was left outdoors for 9 hours in an evening environment, temperature varying from 50° - 60° F	**Pass:** Structural Integrity preserved, aluminum shafts did not experience any yielding or mutation in configuration. Seat temperature was cool to touch; nevertheless appropriate for child use.
Dry Heat Test: Stroller was left outdoors for 8 hours in a daytime environment (10 am – 6 pm), temperature varying from 70° - 80° F	**Pass:** Structural Integrity preserved, aluminum shafts did not experience any yielding or mutation in configuration. Paint on handlebar did absorb heat; nevertheless was appropriate for parent use.
Drop Test: Stroller was dropped from a 4 foot height position onto a concrete sidewalk	**Pass:** Aluminum did experience minimal scraping (as expected for any object), but overall configuration remained intact. Fasteners remained intact.
Child Movement Test: Test subjects (3) were asked to wiggle around in seat for 20 seconds. Overall comfort and seat condition were assessed.	**Fail (initial):** Single stitching proved to be weak and unsupportive. All 3 subjects complained of seat "sagging." Denim fabric displaced an average of 2 inches after each test run. ***Second Round:** Double stitching reinforced original seat configuration, children reported no complaints.

Analysis: The weGO™ Stroller passed all of the final tests initially except for the child movement test. To correct for the results of this test, the development team re-stitched the denim seat, using a double-stitch reinforcement to provide additional support for the bottom of the child. Moreover, the fabric was shortened in length to provide better contact on the stroller frame. Foam padding at key contact points on the chair shaft reduced friction and provided protection from the metal frame for the child.

E. The weGO™ Stroller: A Profitable Next Step

Combi Corp. has undoubtedly secured its reputation as a dependable manufacturer of baby products worldwide, making its mark as a stroller company focused on providing products of quality and ingenuity. Despite competition, the US market promises increased company profits. The weGO™ is a novel stroller that exemplifies an awareness of consumer needs while expanding the position of the company as a significant player in the baby stroller market. It extends Combi's foothold in the stroller industry in addition to providing financial growth and increased brand awareness.

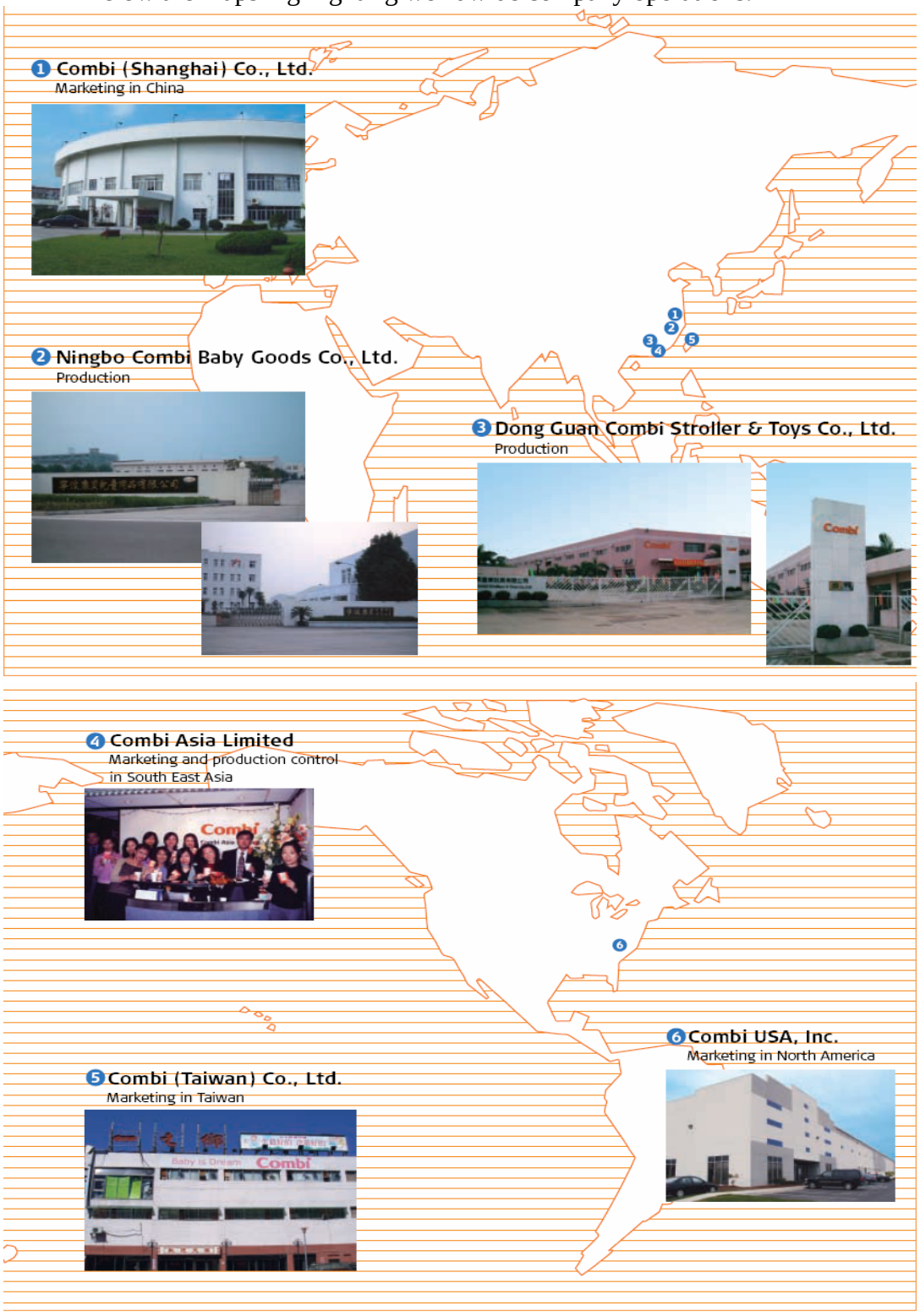
4. Marketing and Competitor Analysis

4.1 Company Overview

Combi Corporation is a Japanese company that has been in operation since 1957. The company specializes in baby products and, in particular, strollers, car seats, travel systems, and high chairs. The company first established itself as a market leader in Japan before expanding internationally in 1989, establishing a wholly owned subsidiary for marketing purposes in the US. The company made further international expansions in the 1990s, opening several marketing branches and manufacturing operations across Asia.

The name "combi" is short for combination, referring to the combination of mother and child. The weGO™ name was chosen in part because of a company mission to provide products and services that support the healthy growth of infants and babies. Combi's US operations, Combi USA, Inc., has its headquarters in South Carolina. In 2002, the company underwent a study to determine its brand potential. The effort culminated with the adoption of a new brand platform (which reflects the company's vision, mission and value) and the redesign of its products in alignment with the new platform.

Below are maps highlighting worldwide company operations.



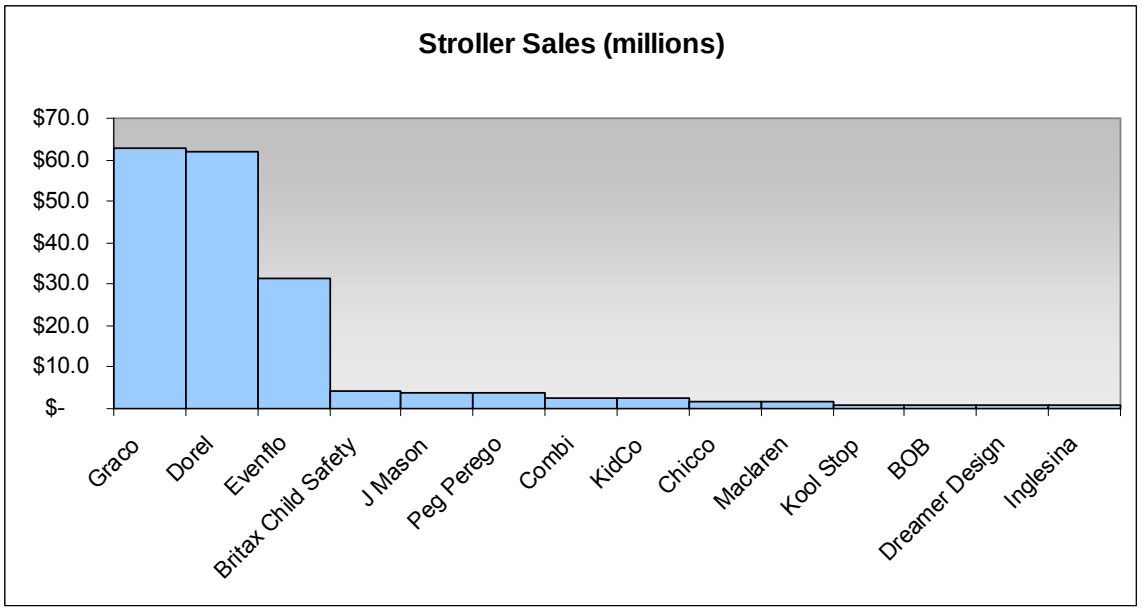
4.2 The Stroller Market

The stroller market is experiencing strong growth. The global market for infant and toddler products was estimated to be $40 billion in 2005 and had increased 10% over the past three years. Demand for premium products has also exploded, driven by an older generation of parents with high incomes; this is clearly seen by the explosive popularity of the $730 Bugaboo or the $750 Stokke Xplory. B.O.B., a maker of high end jogging strollers, has been able to capitalize on strong demand from rugged parents that want to take their children with them outdoors. In line with these trends, the weGO™ could be uniquely positioned to capture a traveling market that is always looking for more lightweight, compact, portable alternatives. At the same time, the team believes that a secondary market exists among parents who take frequent weekend excursions and day trips as well as a tertiary markets among those living in large, crowded cities such as New York; the city that has driven sales of the Bugaboo and the Xplory.

The estimated US market for strollers in 2005 was 2,571,429 units, as indicated by the following table.

All brands US	$180,000,000
Average stroller manufacturer price	$70
Total units	2,571,429

Despite the fact that Combi has been in the US market for more than fifteen years, their market share remains low at less than 2%. The company can do better than this! The graph below and the subsequent table show that the market is dominated by three firms, followed by many small players, of which Combi is one of the largest.

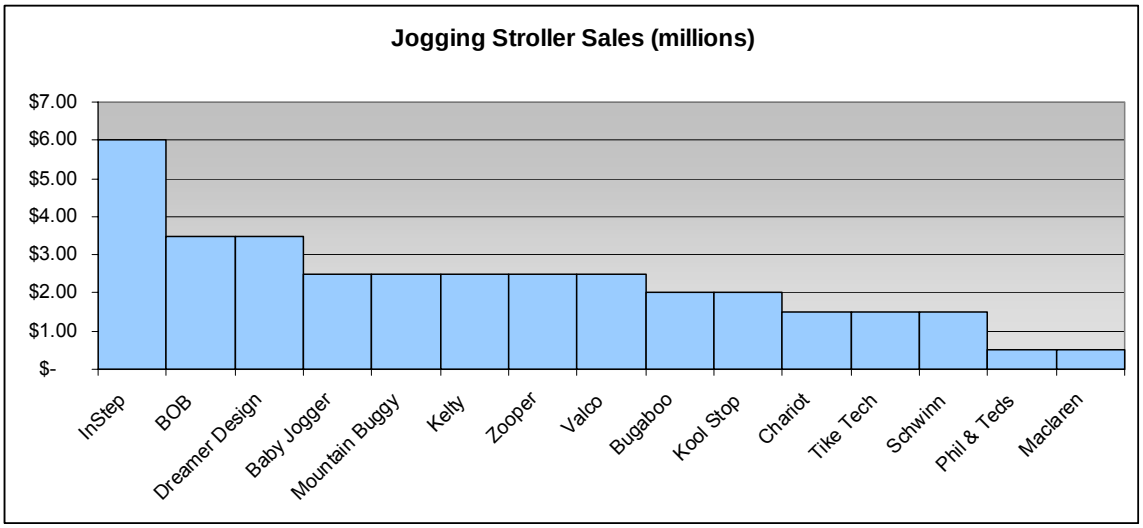


Stroller Companies	Sales		Stroller Sales		% of market
Graco	$	300.0	$	63.0	35.1%
Dorel	$	325.0	$	61.8	34.4%
Evenflo	$	150.0	$	31.5	17.6%
Britax Child Safety	$	20.0	$	4.2	2.3%
J Mason	$	17.5	$	3.7	2.0%
Peg Perego	$	17.5	$	3.7	2.0%
Combi	$	12.5	$	2.6	1.5%
KidCo	$	12.5	$	2.6	1.5%
Chicco	$	7.5	$	1.6	0.9%
Maclaren	$	7.5	$	1.6	0.9%
Kool Stop	$	5.0	$	1.1	0.6%
BOB	$	3.5	$	0.7	0.4%
Dreamer Design	$	3.5	$	0.7	0.4%
Inglesina	$	3.5	$	0.7	0.4%
Total	$	886	$	179	

*While Dorel is a larger company in terms of sales, Graco has a larger share of the stroller market

4.3 Growth Potential: Branching into New Markets

Combi's stroller line currently focuses on an all inclusive system that fits most car seats, which functions well as an infant stroller. They also accommodate children of up to 45 pounds, enabling the parent to use them for the life of the child. While this creates an outstanding value for parents, research shows that parents will buy more than one stroller, and up to three or four, to suit different needs. One specific lifestyle oriented stroller that has already enjoyed huge success is the jogger. As the following graph points out, the jogger market is not dominated by any one firm, a structure that is similar in the ultra-lightweight stroller market. If it were to act soon, Combi could capitalize on this dispersion.



4.4 The weGO™ Stroller

While umbrella strollers and a handful of competing strollers are generally considered to be the most portable on the market, the length of the stroller can make transportation inconvenient and awkward. In addition, one of the few places people tend not to take strollers is on airplanes. The weGO™ easily fits into airplane overhead bins, is more compact than umbrella strollers, and is more portable than any other stroller on the market, solving a variety of problems parents typically juggle on a daily basis.

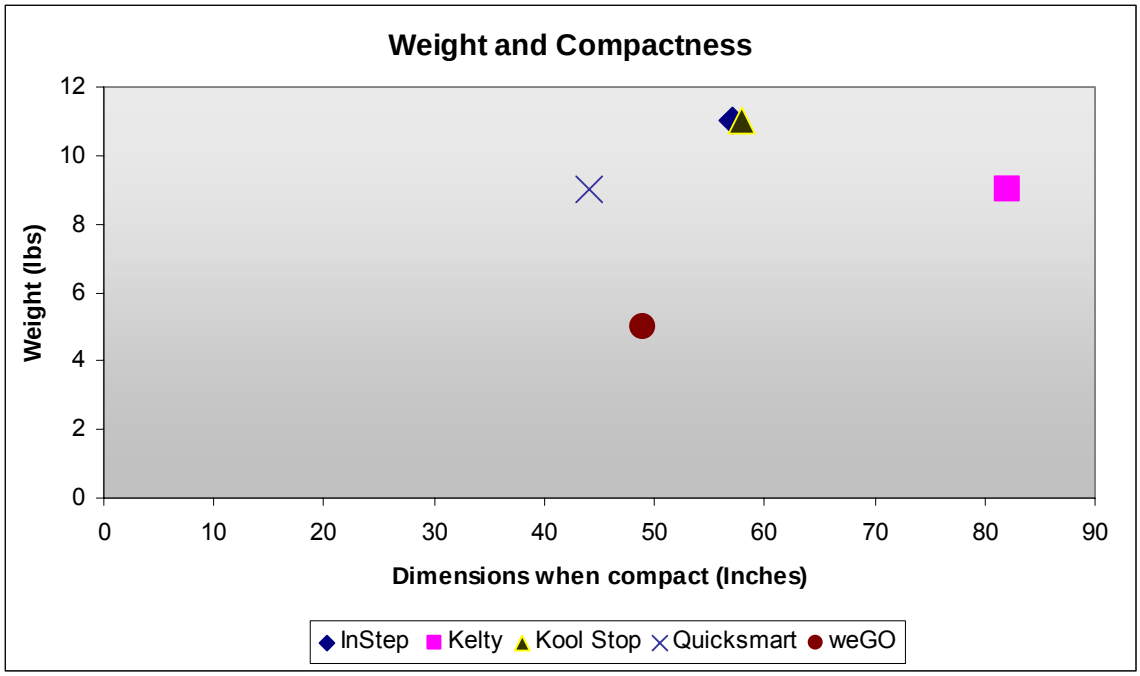
4.5 Positioning against Competing Strollers

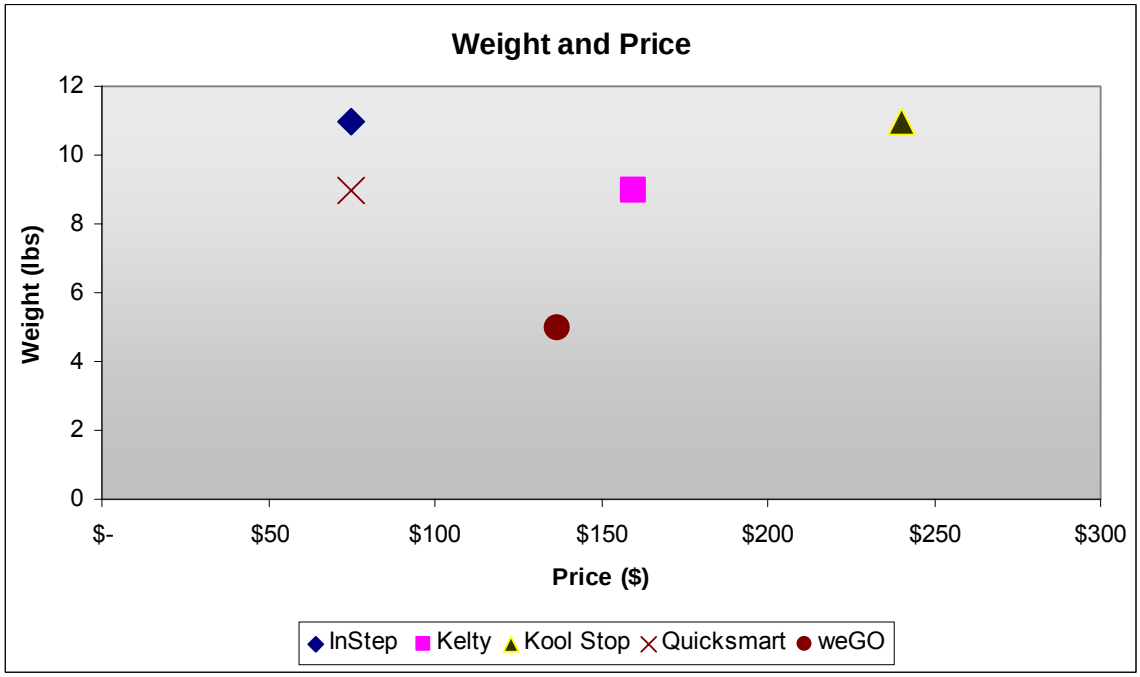
There are a handful of strollers on the market that do similar things to the weGO™: the Kool Stop Stroller Backpack, the Kelty K.I.D.S Convertible Stroller Pack, and the InStep Stroller Backpack. However, all of these "stroller backpacks" differ from the weGO™ in one very important way: they serve as backpacks for carrying children on your back. Based on the customer needs we developed from interviews, this need does not exist. The weGO™ solves parents' problems by enabling their child to walk until they get tired, at which point the parent can take the stroller off their back and let their child ride. Thus, the need isn't a way to carry the child on one's back, but an easy way to transport the stroller while one's child walks. There is the QuickSmart Stroller, an Australian stroller that offers a similar value proposition, but this stroller uses a tripod wheel design that could be considered to be unstable by many parents; it is also currently not available in the US. Lastly, there is the umbrella stroller, however, the weGO™ features a unique design that will appeal to middle and upper-class parents as well as a lighter and more portable design.

4.6 Comparative Benchmarking

The two most important benchmarks in terms of the weGO's™ core value propositions are weight and compactness. The graphs below compare the weGO™ to its competitors. It is clear from the graph that the weGO™ beats all competing strollers on weight and all competing US strollers on compactness. It is also clear that the weGO™ will compete on price as a mid to upper range lightweight stroller.[6]

[6] See Appendix VI for the base table used to create the above graphs





4.7 Recommendations

Based on the above market analysis, we strongly urge Combi to allocate our team the necessary funding to bring the weGO™ to market as a new product line of light, trendy, compact strollers. While it would be a mid to high-end travel stroller, it is differentiated by its weight, compact design, and extreme portability.

US market presents excellent growth opportunities, yet much of this growth is in specialty strollers. For this reason, investment in the weGO™ is an excellent way to expand the existing product line to include complementary strollers. Furthermore, the weGO™ supports the company's efforts to establish itself as an innovator in the field and while promoting a brand image that provides for the needs of parent and child.

5. Manufacturing Processes

5.1 Prototype Manufacturing

A small-scale prototype was first made on October 31, 2005 based on a folding beach chair to determine appropriate proportions and mimic the folding mechanism. The final prototyping process consisted of drawing detailed diagrams of parts and then ordering them from various vendors (www.onlinemetals.com for aluminum tubing, www.mcmaster.com for spring pins, and the Home Depot for screws, washers, bolts, etc.). A Wal-Mart brand umbrella stroller provided wheels. The development team contracted a machine workshop on November 8, 2005 to proceed with assembling the frame.

Constructing the stroller frame took roughly four hours and consisted of three basic steps: cutting, drilling, and connecting parts. Team members performed the actual measuring and cutting of the aluminum with a small-form, portable metal cutter. A machinist then polished the ends with machinery for smoothness and drilled holes at the appropriately marked spots using a highly precision industrial drill. The aluminum mainframe and wheels were then assembled by the weGO team using screws, washers, bolts, and ring locks. Following completion of the frame, a seat was sewn and attached to the frame using brown denim due to its attributes as a breathable, machine washable, and slightly stretchy material. Finally, the team painted the stroller using Rustoleum spray paint (black for color and enamel for extra finish) for asthetics and to protect the frame from the elements.

Overall, the team experienced no major setbacks while manufacturing the prototype and each process was completed according to schedule. For manufacturing in high volumes, aluminum tubes will be purchased pre-cut and pre-drilled for quick and easy attachment utilizing a human assembly line. Experienced textile workers will sew seats and painting will be automated. Thus total assembly time will be drastically reduced.[7]

5.2 Manufacturing in High Volumes

Because the weGO™ stroller will enter the market with modest sales, production will be low during the initial period. The production process is relatively uncomplicated. Therefore we will use mostly manual processes for assembly. Aluminum tubes will be ordered pre-cut and drilled. While customized parts are more expensive, this cuts down on capital investment expenditures. The factory will then consistent of three main areas: frame and wheels assembly, seat sewing, and painting and packaging. The weGO™ stroller, like other strollers made by Combi, will be manufactured in China.

[7] See Appendix VII for detailed prototype development notes

5.3 Bill of Materials

Below is an estimate of the likely unit manufacturing costs for the weGO™ stroller. These projections assume a volume discount of 25% on raw materials and a wage rage of $1.50 per hour for assembly workers in China. The assembly time for one stroller is seven minutes.

Component	Average($) per Stroller	% of Total
12' Aluminum .625" OD T6 6061 Round Tube	17.16	48.7
3.5' Aluminum .5" OD T6 6061 Round Tube	6.58	18.7
Screws, bolts, washers	2.51	7.1
Wheels	2.00	5.7
Denim seat fabric	3.00	8.5
Paint	0.50	1.4
Assembly at $1.50 an hour	0.18	0.5
Overhead at 10% of materials and 80% of labor	3.32	9.4
Total Cost	**35.25**	**100.0**

6. Economic Analysis

6.1 Overall Market Perspective and Combi USA, Inc. Market Share

The weGO™ complements Combi USA's existing product line as a lifestyle stroller, serving as its sole offering in the "travel stroller" market. Currently Combi USA makes only infant strollers which integrate with baby car seats and fail to be either ultra-lightweight or extremely portable. As a result the weGO™ will not cannibalize existing sales, which makes it an even more profitable project.

With a retail list price of $137 the weGO™ will be a higher end secondary stroller in the market, which generally ranges between $30—$150. However, this price is appropriate given the innovative, extremely portable backpack design and high grade aluminum used to manufacture the ultra-lightweight frame. Furthermore, as a first-to-market product Combi can charge a premium.

As a secondary stroller the weGO™ is geared towards a particular segment of the market—active parents with children. In doing so it embodies Combi's new strategic direction to expand from its core focus on mothers and children into the overall lifestyles of families. Furthermore, the weGO™ represents a first-to-market, demand-creating product that will further the company goal outlined in the 2005 Annual Report to establish the Combi brand as a world leader in innovation.

6.2 Pricing

Prototype Cost	Volume Discount	Initial Manf Cost
$47	25%	$35

	Initial cost	Margin	End Price
Manufacturer	$35	50%	$70
Wholesaler	$70	15%	$82
Retailer	$82	40%	$137

6.3 Sales Projections and Market Share Based on Market Data

Year	weGO Market share	Within travel segment	Unit sales
2005	0	0.0%	0
2006	0	0.0%	0
2007	0.1%	1.3%	2,571
2008	0.2%	2.6%	5,143
2009	0.4%	4.5%	9,000
2010	0.6%	7.7%	15,429
2011	0.8%	10.3%	20,571
2012	1.1%	14.1%	28,286
2013	1.3%	16.7%	33,429
2014	1.5%	19.3%	38,571
2015	1.7%	21.9%	43,714

*Travel segment market share based on a 100,000 unit/year market

Sales projections estimate that the weGO™ stroller will achieve a .1% market share (in terms of units sold) in the first year of production (beginning January of 2007). A steady adoption rate leads to a final market penetration of 1.7% after 9 years. This corresponds to a final market share in the "travel stroller" market segment (estimated to be 100,000 units per year) of 21.9%. Growth will be achieved due to a combination of sales to parents with children newly 2 years old (approximately 5 million per year) as well as parents with children ages 3-4 who have not previously purchased the stroller. This is reasonable given the weGO's™ positioning as a secondary stroller designed for use once the child begins walking.

6.4 Timeline, Development and Ramp-up Costs

Ramp-up will begin in July of 2006 following the conclusion of market tests in June. The expectation is to have the finished product in stores at the end of January 2007, which coincides with families planning for winter and spring school vacations. In addition, this will provide ample time for a marketing push leading up to the summer travel season. Overall, ramp-up costs break down into three main elements: retooling costs, fixed costs, and marketing costs.

Retooling expenses will be minimal, as the aluminum framing and other materials will be purchased pre-cut and drilled to avoid having to alter existing machinery. The bulk of the cost will from the three production managers who will need to be either reassigned or hired to oversee line operations. Also, human assemblers must be retrained in the assembly and packaging of the weGO™ stroller.

Fixed costs are due to administrative needs, logistical support, and inventory requirements.

Marketing Costs

Worldwide	$2,181,000
% Sales	0.78%
weGO	$61,200

*Worldwide sales taken from Combi 2005 Annual Report

Combi's 2005 Annual Report indicates that the North American market is as area of strategic growth. This is due to a declining birthrate and stagnant sales in Japan, which is currently the company's principle market. To achieve significant growth in this region and support the introduction of the weGO™ stroller Combi should reallocate resources away from Japan to North America.

In 2006, and in the first year of production in 2007, $100,000 per year will be spent in the initial marketing push. After that $61,200 per year will be spent on marketing beginning in the second year of production (2008). This is calculated as 2% of sales revenue in 2015, when the weGO™ reaches peak sales and market share. This is slightly higher than the overall company average of marketing as less than 1% of total sales revenue. However the team believes larger marketing expenditures are necessary to help the company achieve its goal of greater penetration of the American market. In addition, the weGO™ can contribute to cross selling, generating consumer interest in other Combi products.

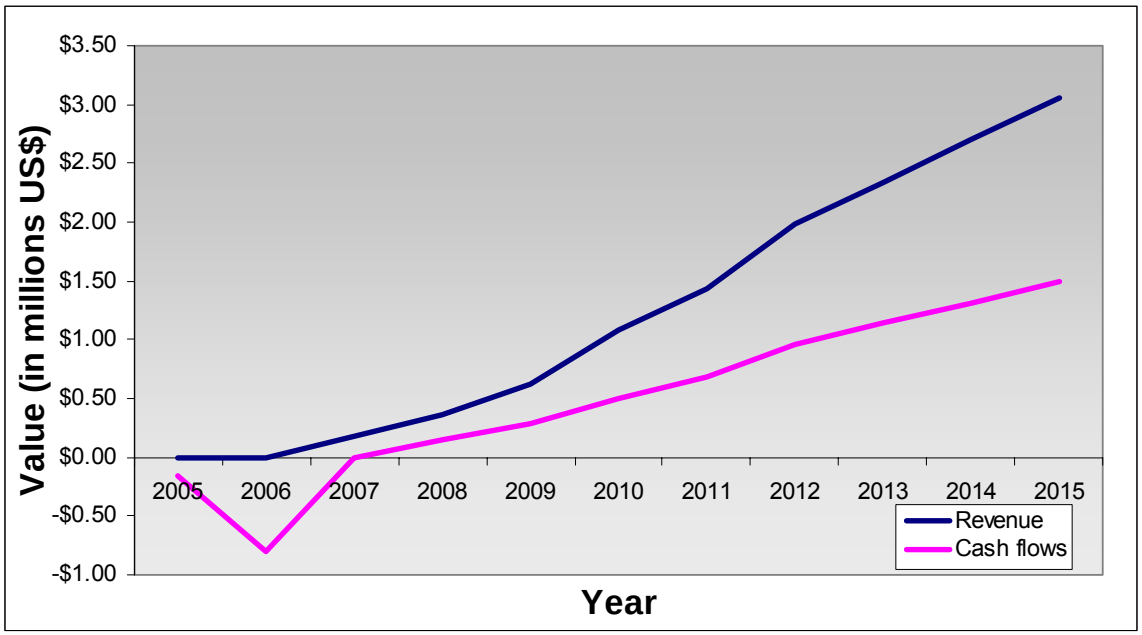
6.5 Base Case Financial Analysis

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Development cost	-$163,200	-$163,200									
Ramp-up cost		-$532,929									
Marketing and Support cost		-$100,000	-$100,000	-$34,272	-$34,272	-$34,272	-$34,272	-$34,272	-$34,272	-$34,272	-$34,272
Production volume	-	-	2,571	5,143	9,000	15,429	20,571	28,286	33,429	38,571	43,714
Unit production cost			$35	$35	$35	$35	$35	$35	$35	$35	$35
Production Cost			-$90,000	-$180,000	-$315,000	-$540,000	-$720,000	-$990,000	-$1,170,000	-$1,350,000	-$1,530,000
Sales volume	-	-	2,571	5,143	9,000	15,429	20,571	28,286	33,429	38,571	43,714
Unit price			$70	$70	$70	$70	$70	$70	$70	$70	$70
Sales Revenue			$ 180,000	$ 360,000	$ 630,000	$ 1,080,000	$ 1,440,000	$ 1,980,000	$ 2,340,000	$ 2,700,000	$ 3,060,000
Yearly cash flows	-$163,200.00	-$796,129.00	-$10,000.00	$145,728.00	$280,728.00	$505,728.00	$685,728.00	$955,728.00	$1,135,728.00	$ 1,315,728	$ 1,495,728
PV year 1, r = 12%	-$163,200.00	-$891,664.48	-$12,544.00	$204,737.35	$441,730.94	$891,265.53	$1,353,505.48	$2,112,810.12	$2,812,020.71	$ 3,648,617	$ 4,645,504

Project NPV	$15,042,783

*Break even in 2011, which is the fifth year of production

The weGO™ is clearly a profitable project, with a positive NPV of $15,042,783. A 12% discount factor is used to account for risk and rate of return slightly higher than the stock market. The stroller project achieves positive cash flows in only the second year of production in 2008 and breaks even in 2011. Below is a graphical representation of the revenue and cash flows.



6.6 Sensitivity Analysis

The development team considered two possible scenarios which could affect the profitability of the project: development and ramp-up cost over-runs and lower than projected sales. As the tables below indicate, even a doubling in costs or significantly lower than expected sales and market share the weGO remains a highly profitable venture with a large NPV.

Table 1: Development and ramp-up cost doubling

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Development cost	-$326,400	-$326,400									
Ramp-up cost		-$1,065,858									
Marketing and Support cost		-$100,000	-$100,000	-$34,272	-$34,272	-$34,272	-$34,272	-$34,272	-$34,272	-$34,272	-$34,272
Production Cost	$ -	$ -	-$90,000	-$180,000	-$315,000	-$540,000	-$720,000	-$990,000	-$1,170,000	-$1,350,000	-$1,530,000
Sales Revenue	$ -	$ -	$ 180,000	$ 360,000	$ 630,000	$ 1,080,000	$ 1,440,000	$ 1,980,000	$ 2,340,000	$ 2,700,000	$3,060,000
Yearly cash flows	-$326,400	-$1,492,258	-$10,000	$145,728	$280,728	$505,728	$685,728	$955,728	$1,135,728	$1,315,728	$1,495,728
PV year 1, r = 12%	-$326,400	-$1,671,329	-$12,544	$204,737	$441,731	$ 891,266	$ 1,353,505	$ 2,112,810	$ 2,812,021	$ 3,648,617	$4,645,504

Project NPV	$14,099,919

Table 2: Lower than expected market share and sales

Year	weGO Market share	Within travel segment	Unit sales
2005	0	0.0%	0
2006	0	0.0%	0
2007	0.1%	1.3%	2,571
2008	0.2%	2.6%	5,143
2009	0.3%	3.9%	7,714
2010	0.4%	5.1%	10,286
2011	0.5%	6.4%	12,857
2012	0.6%	7.7%	15,429
2013	0.7%	9.0%	18,000
2014	0.8%	10.3%	20,571
2015	0.9%	11.6%	23,143

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Development cost	-$163,200	-$163,200									
Ramp-up cost		-$532,929									
Marketing and Support cost		-$100,000	-$100,000	-$34,272	-$34,272	-$34,272	-$34,272	-$34,272	-$34,272	-$34,272	-$34,272
Production volume	-	-	2,571	5,143	7,714	10,286	12,857	15,429	18,000	20,571	23,143
Unit production cost			$35	$35	$35	$35	$35	$35	$35	$35	$35
Production Cost			-$90,000	-$180,000	-$270,000	-$360,000	-$450,000	-$540,000	-$630,000	-$720,000	-$810,000
Sales volume	-	-	2,571	5,143	7,714	10,286	12,857	15,429	18,000	20,571	23,143
Unit price			$70	$70	$70	$70	$70	$70	$70	$70	$70
Sales Revenue			$ 180,000	$ 360,000	$ 540,000	$ 720,000	$ 900,000	$ 1,080,000	$ 1,260,000	$ 1,440,000	$1,620,000
Yearly cash flows	-$163,200.00	-$796,129.00	-$10,000.00	$145,728.00	$235,728.00	$325,728.00	$415,728.00	$505,728.00	$595,728.00	$ 685,728	$ 775,728
PV year 1, r = 12%	-$163,200.00	-$891,664.48	-$12,544.00	$204,737.35	$370,922.57	$574,044.03	$820,573.36	$1,118,003.49	$1,475,000.59	$ 1,901,578	$2,409,293

Project NPV	$7,806,744

*Break even in 2011, which is the fifth year of production

7. Risk Analysis

7.1 Technical Risks

In the prototype testing process, the prototype performed as a fully functioning stroller, yet additional efforts must be made to ensure that the final model is stable and safe for a child. The final prototype will have locking back wheels, a durable frame and fabric, and be free of protruding screws or other sharp objects.

Recalls are a problem in the industry. The US Consumer Product Safety Commission (CPSC) website identifies numerous brands that have faced recalls including Cosco, Century, Mountain Buggy, Kelty, Graco, Kolcraft, BOB, InStep, Baby Trend, Peg Perego, Evenflo, and Combi. While defects are technical risks, recalling products has spillover effects that impact the financial viability, legal future and the company brand. The weGO™ minimizes this risk by employing a simple design, quality components, and extensive testing.

In order to maintain the current production schedule and profit estimates, the weGO™ team will add four engineers to ensure that safety, strength and durability requirements are satisfied. This team will be able to deliver a better, safer, and a better design than the current prototype which will be able to satisfy JPMA safety standard requirements.[8]

7.2 Market Risks

The concept testing surveys revealed that the suggested price for both the standard and deluxe stroller appeared reasonable for each market segment. However, the sample size of 30 is not sufficient enough to ensure that these strollers are priced at optimal levels.

[8] Safety standards for strollers in the United States are voluntary. However, JPMA tests and certifies strollers and issues JPMA seals. ASTM F-833 standards, which JPMA uses, consider the following requirements: stability, free of sharp edges, and able to withstand the types of forces that a stroller may encounter. Given the resources we have requested, potentially problematic issues associated with our prototype will be fully addressed and the weGO™ will receive certification.

In order to minimize these risks, the weGO™ team will perform a more thorough customer survey following final design in order to better determine customers' willingness to pay in each market segment.

7.3 Financial Risks

In the event of an economic downturn, consumers may become more sensitive to price, altering sales forecasts. However, as the recent introduction of several high-end strollers indicates, the market for premium baby products remains strong, despite a lackluster economy.

Competing products could be launched by competitors, however, proper marketing of the weGO™ will establish it as a market leader among distinctive, light-weight, quality strollers.

Contactors, suppliers and/or wholesalers costs could rise and be passed on to Combi, thereby reducing its profitability. However, as the sensitivity analysis revealed, even if costs were to double, the product would be very profitable.

7.4 Legal Risks

Due to the litigious culture in the United States, legal risks are always a potential threat. In addition to recalls of two of its strollers, Graco this past year was slapped with a fine of $5 million from the CPSC for failing to report unsafe products in a timely manner.

While Combi's high standards are not likely to lead the company into Graco's position, the weGO™ team would reduce this risk by using better components, featuring a simple design, and thoroughly testing the product in a variety of conditions.

RISK ANALYSIS CHART

Risk	Risk Type	Risk Level	Actions to Minimize Risk
Safety concern that stroller will collapse	technical	low	• Work with industrial engineers to build stronger, safer and more stable stroller.
Concern that stroller will not last a long time	technical	moderate	• Perform engineering tests to ensure long-term durability of stroller.
Price is perceived as too high	market	moderate	• Gather a larger survey representation to determine customers' willingness to pay
Economic downturn - people buy less strollers and travel less	market	moderate	• Have less features on stroller. Create a more "economic" model.
Competition wants to create similar product	market	high	• Create strategy to position product quickly and create pride in band name.
Someone decides to sue Combi for a particular reason	legal	moderate/high	• Work out contracts, safety issues, etc. with legal staff beforehand.

8. Further Development Plans

8.1 Prototype to Final Model

The present prototype needs improvements in order for the child to ride comfortably and safely. Further development plans include: a five point harness, a better seat, a locking design, and tapered screws that prevent injury.

The final model will also feature T-pins for the telescoping arms for easier insertion and removal, a larger storage compartment, and a longer telescoping arm to meet the needs of taller parents.

8.2 Future Models

The current weGO™ represents the base model upon which we hope to add additional features and make improvements. Next generation ideas include comfort enhancements for the child such as a sunshade, a reclining seat, a foot rest, and limited edition models similar to Maclaren's Burberry and Kate Spade editions. [9]

9. The Next Step

The weGO™ Stroller is a logical next step for Combi USA. The weGO™ features an innovative new design, a level of compactness and portability that has yet to be seen on the US market, and solves the problems of today's busy parents. It fits well with Combi's long-term goal that aims to make the company into a lead innovator in baby products and

[9] See Appendix VIII for a sketch of a proposed future model

one that caters to the lifestyles of families. The weGO™ also enables the company to reach new market segments while capitalizing on the growing trend of distinctive and unique strollers. An in-depth market and economic analysis also reveals that the project is profitable and could position the company as the leader in a market segment that has yet to be dominated by any one firm. Finally, the weGO™ enables Combi to expand without compromising its core customer base or cannibalizing its existing sales. As is the tradition at Combi, the weGO™ truly brings the parent and child together.

10. Appendices

Appendix I: Staff, Budget and Task Outlays

Project staffing for stroller development:

Position	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
Team Leader/Scheduler	100	100	100	100	100	100
Customer Liason 1	100	25	25	25	25	25
Customer Liason 2	100	25	25	25	25	25
Art Designer	25	50	100	100	50	50
Mechanical Designer 1	25	50	100	100	50	50
Mechanical Designer 2	25	50	100	100	50	50
Assembly Tool Designer	25	50	50	100	100	100
Manufacturing Engineer	25	50	50	100	100	100

*Numbers shown are approximate percentages of full time

Budget:

Item	Amount($)
Staff salaries, 121 person weeks @$2000/week	$ 242,000.00
Materials and Services	$ 5,000.00
Prototype Molds	$ 5,000.00
Testing	$ 33,600.00
Subtotal	$ 272,000.00
Contingency (15%)	$ 40,800.00
Total	$ 326,400.00

Task List:

Task	Estimated Person-weeks
Concept Development	
Interviews/ Identifying Customer Needs	4
Competitive Benchmarking	4
Establish Product Specifications	5
Concept Generation/Selection	8
Detail Design	
Design beta strollers	8
Produce beta strollers	12
Develop testing program	8
Testing and Refinement	
Test beta strollers	16
Review results/make adjustments	16
Design production stroller	10
Design Assembly Tooling	10

Production Ramp-up	
Initial Production Run	20
Total	121

Appendix II: Interview Format

The following is the survey used to identify customer needs. It uses open-ended questions which avoid biasing the sample and allow the person to talk at length about their experiences using the product as well as features and performance. The team repressed initial end product ideas during questioning so as not to lead the interviewee. Most importantly, interviews took place on location while strollers were in use. This allowed customers to physically demonstrate specific needs and concern, while enabling the team to undertake passive observation of the subject.

1. How many children do you have? How old are they? Do they still use strollers?

2. What are the manufacturer, model, and cost of your primary stroller? How many do you have in addition to this one?

3. What do you like about your current stroller? Did any particular features draw you in? Which features do you consider essential when purchasing a stroller?

* *Encourage subject to demonstrate features. Be sure to examine them and diagram them. Consider possible improvements.*

4. What do you dislike about your current stroller? What improvements would you make? Can you point them out?

5. What are top attributes that you look for when choosing a quality stroller?

6. Are there places that you wish you could take a stroller, but are often hesitant to?

Appendix III: Sample Interviews

* *Note: during the transcription process interviews were reformatted to help better identify customer needs, and do not directly reflect the original question format*

A. Doyle Park, UTC

- Caucasian female who is potentially a lead user
- Children: 14 month child that weighs 24-25 pounds
- 1 stroller: Graco ($100), lightweight, huge basket (storage), front tray pops off easily so it is easy to put the child in, makes feeding more convenient

Suggestions:

- Full seat recline (Graco only went down ¾ of the way)
- Design allows for one handed snap and fold of stroller
- Make weight, size, ability to fit in car, and then price be your design considerations in that order

- Design a stroller that is usable in restaurants and other constricted areas, or when you need one of your hands such as at a grocery store
- Backpack stroller with good shoulder and back support so parent doesn't get tired

B. Wal-Mart, Clairmont Mesa

- Caucasian female, mid 30s
- Children: 6 weeks and 2 years
- Six strollers
  a. Graco umbrella
  b. Carters umbrella
  c. InStep 10K Jogger
  d. Graco double
  e. Baby Trend frame
  f. Graco single, integrates with car seat

Suggestions:

- Seat recline
- Lightweight and compact as possible
- Cup holders
- Jogging stroller with sunshade
- Design it to be usable in sand
- Make stroller usable for as wide an age range as possible

C. Mira Mesa Apartments, UTC

- Caucasian female
- Children: 4 1/3 and 2 ¾
- 6 strollers
  a. Second hand Graco, her husband broke the tray so they don't use it
  b. Combi ($40 knockoff), broke quickly
  c. Combi ($150)
  d. McLaren ($150), loves it
  e. McLaren
  f. Graco tandem stroller, it weighs 30 lbs which is too heavy

Suggestions:

- She wants something that is light and strong/rigged
- Wheels should be made of metal (not plastic)
- Five-point harness to make sure the kid doesn't fall out
- The center of gravity is in the child's head so they need to be able to sit up
- McLaren has a "cross v" framing made of metal which ensures the stroller's stability

Necessities:

- Wheel lock
- Rust proof materials for frame
- Must fit into an automobile trunk easily

D. Doyle Park, UTC

- White male, 38 years old
- Children: 1 child, boy, 2 years old
- Time out of stroller on day trips: 60%+
- 2 strollers:
    a. Brand unknown, high end ($300), infant car seat fits in it, very large, doubles as a crib, handle bar flips front to back so it can be pushed from either side
    b. Baby Trend brand, cheap one ($50), this is the "travel stroller", umbrella style

Suggestions:

- Would love to be able to fold up and put on his back (I did not lead him on this)
- Could you add a seat for the parent somehow (like a collapsible camp stool)?
- Entertainment things for the child: steering wheel
- Lots of parents are having twins or children one after another: way to link side by side two single strollers?
- Willing to give up cup holders/trays (parent and child) for increased portability
- Swing bar as handle so you can push stroller and walk beside it

Necessity:

- Sun shade: babies burn easily and the shade lets them sleep
- Basket or other storage space
- Reclining seat not absolutely necessity but VERY nice

Appendix IV: Customer Needs Matrix

	Metric	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Test during different times of the day (7am, noon, 5pm)																							
	Lock wheels and attempt to push the stroller																							
	Put in up to 20 kilograms of weight and push 100m in all directions																							
	Seat area size																							
	Storage area sizes																							
	Time to access all storage space compartments																							
	Time it takes to reach and take out/put in item in storage place																							
	Time it takes to collapse/set up																							
	Total mass (kilograms)																							
	Take it to the airport and see if it fits in the bin by the security gates																							
	Moves in 360 degrees																							
	Walk for 30 minutes in carrying form and look for problems																							
	Time it takes to put in/take out child in/from stroller																							
	Fits in the trunk of a small car (sedan)																							
	Model stroller capatability																							
	Car seat compatibility																							
	Size and carrying capacity of stroller																							
	Japan Industrial Standards Test?																							
	Use in all weather conditions in San Diego (sun, rain, wind)																							
	Put in child and see if he/she is comfortable																							
	Show child accessories and see if they please him/her																							
	Unit manufacturing cost																							
	Show parents the design and colors and ask them if it looks good																							
1	Shields child from sun when necessary	•																						
2	Wheel/s can be immobilized		•																					
3	Is sturdy			•																				
4	Can support children of various sizes				•																			
5	Has places to put immediate use items					•																		
6	Storage space is compartmentalized						•																	
7	Storage space is easily accessible at all times							•																
8	Is easily collapsible/set up								•															
9	Is lightweight									•														
10	Fits airline carry on item specs when folded										•													
11	Can be transformed into carrying form								•															
12	Has free range of motion											•												
13	Is easy/comfortable to carry												•											
14	Is easy to place child in stroller													•										
15	Is easy to store														•									
16	Is comfortable to maneuver											•												
17	Fits in small spaces (i.e. trunk of car)														•									
18	Can be linked to like model stroller															•								
19	Has compatibility with car seats																•							
20	Can be pushed from side											•												
21	Can be pushed from front or back											•												
22	Has place for parent to sit																	•						
23	Operates normally after repeated use																		•					
24	Operates normally in all weather conditions																			•				
25	Is comfortable for child to sleep in																				•			
26	Has accessories to entertain child																					•		
27	Is reasonably priced																						•	
28	Is aesthetically pleasing																							•

Appendix V: Prototype Specifications

Initial Specifications	Revised Specifications		Final Specifications
	P1 – Folding Parts	P2 – Collapsible	
Stroller is sturdy	+	+	Able to support up to 50 lbs weight
Stroller can support various children sizes	+	+	Seat back size of 10” x 19” accommodates wide range of heights
Stroller is easily collapsible/setup	0	+	Takes 4 seconds to assemble with minimal construction
Stroller is lightweight	+	+	Total Weight: 5.3 lbs
Stroller is easy/comfortable to carry	+	+	Backpack straps with reinforced seat cushioning provide parental comfort
Stroller is comfortable to maneuver	-	+	Locked rear wheels give stability; 360 degrees of freedom for front wheels
Stroller is easy to store	+	+	Closed dimensions: 30” x 11” x 6”
Stroller wheels/swivel can be immobilized	+	+	Final product to utilize rear wheel brakes
Stroller is aesthetically pleasing	+	0	Earth-tone brown gives stylish feel for male/female; black/silver bars provide tech motif
Manufacturing Ease	-	+	Easy assemble allows for mass production
	Sum +’s: 7 Sum 0’s: 1 Sum –‘s: 2	Sum +’s: 9 Sum 0’s: 1 Sum –‘s: 0	
	Net score: +5 Rank: 2	Net score: +9 Rank: 1	
	No	Yes	

Appendix VI: Competitive Benchmarking

Metrics

No.	Need	Metric	Imp	Units	InStep	Kelty	Kool Stop	Quicksmart	weGO****
1	1	Harness system	3	pts	5	5	5	5	5
2	1A	Sun Shade*	3	y/n/o	y	y	y	y	o
3	1B	Wheel Immobilization	2	y/n	n	n	n	y	y
4	2	Storage Space Size	2	s/m/l	l	m	s	s	s
5	3	Fully Functioning Stroller	2	y/n	y	y	n	y	y
6	3A	Compactness**	2	p/g/e	57	82	58	44	49
7	3B	Weight	2	lbs	11	9	11	9	5
8	4	Lasts a long time***	2	y/n/av	na	av	na	na	na
9	5	Child Comfort**	2	p/g/e	e	e	na	g	g
10	6	Price	2	$	$ 75.00	$ 160.00	$ 240.00	$ 75.00	$ 137.00

Importance: 1=lowest; 3=highest
* yes/no/optional
** poor, good, excellent; based on reviews
*** based on consumer reviews
**** projected

Appendix VII: Detailed Prototype Process

Cutting the Aluminum Tubes

1) Correct lengths of each part were measured and marked with a sharpie pen.
2) A hand powered metal cutter was used to cut the tubes at the marks.
3) Ends were polished with appropriate machinery for smoothness

Drilling holes in Aluminum Tubes

1) Hole diameter and position on aluminum tubing were identified using marker.
2) Drilling was accomplished with a high precision machine accurate to 4 decimal places on positioning. Diameter was determined by the drill bit.
3) This process took a little bit of trial and error as preliminary sketches did not reveal problems with certain connections and the uprightness of the chair. As such, more holes were drilled than initially planned.

Connecting parts

1) Connections between tubes were made using a screw, a washer, and a bolt. Two sizes of screws were utilized for the construction of this prototype. Screws that needed to go through two tubes were ¼ ” (diameter) by 2”(length) while single tubes used 3/16” by 1” screws.
2) Front wheels were locked into position through two fasteners, one below the wheel tubing and one above it. Rear wheels were locked into position with a screw that went through the wheel and aluminum tubes, restricting movement. For front wheels to have 360 degree free movement, the aluminum tubing needs to be exactly perpendicular to the ground.
3) The above two processes were repeated iteratively when amendments had to be made that required disassembly and assembly.

Following frame completion the stroller seat was fabricated using a sewing machine. A pouch was sewn and straps were taken from a backpack and attached, amounting to a total work time of 3 hours. For the production prototype, a seat belt will also be a necessary safety attachment. The seat slips onto the side bars and the front wheel bar for snug fitting. Brown denim was selected for the seat material because of its breathablilty and comfortable. Finally, painting of the frame was completed on November 15, 2005 using Rustoleum Brand spray paint. Painting took 20 minutes for two applications, given 1 hour of drying time in between each session.

Appendix VIII: Sketch of Proposed Future Model