

Financial Feasibility Assessment of the Smart Eco-Friendly Backpacks Project in Mexico

Martínez-Cruz, Ramiro^{1*}; Núñez-Betancourt, Ernest Y.¹; Ruiz-Hernández, Jaime A.²; Martínez-Velázquez, Adriana¹; Hilario-Aguilar, Viviana¹

¹ Universidad Politécnica de Texcoco. San Miguel Coatlinchán, Texcoco, Estado de México, México. C. P. 56250.

² Universidad Juárez del Estado de Durango. Zona Centro, Durango. Durango, México. C. P. 34113.

* Correspondence: inden.rmtz@gmail.com

ABSTRACT

Objective: To determine the financial feasibility of the smart eco-friendly backpack project by calculating the discount rate and the internal rate of return, in order to support the decision to accept or reject the investment proposal.

Design/methodology/approach: Financial project evaluation based on a five-step methodology and the weighted average cost of capital.

Results: An initial investment of \$564,420.00 with an 8-year analysis horizon; a discount rate of 12.32%; an internal rate of return of 147.12%; a net present value of \$5,588,559.15; a benefit-cost ratio of 1.20; a benefit-to-initial-investment ratio of 10.90; and a payback period of 0.92 years.

Limitations of the study/implications: The results are based on the assumptions made and may not hold true under different conditions.

Findings/conclusions: All indicators meet the acceptance criteria; the financial assessment is positive, and project implementation is recommended, as it represents an attractive investment opportunity. The project not only demonstrates financial profitability but also contributes to environmental sustainability by promoting the use of biodegradable materials.

Keywords: investment, evaluation, net present value, profitability, eco-friendly backpack.

Citation: Martínez-Cruz, R., Núñez-Betancourt, E. Y., Ruiz-Hernández, J. A., Martínez-Velázquez, A., & Hilario-Aguilar, V. (2025). Financial Feasibility Assessment of the Smart Eco-Friendly Backpacks Project in Mexico. *Agro Productividad*. <https://doi.org/10.32854/qw8cd076>

Academic Editor: Jorge Cadena Iñiguez

Associate Editor: Dra. Lucero del Mar Ruiz Posadas

Guest Editor: Juan Francisco Aguirre Medina

Received: June 4, 2025.

Accepted: September 22, 2025.

Published on-line: November XX, 2025.

Agro Productividad, 18(10), October, 2025. pp: 133-143.

This work is licensed under a Creative Commons Attribution-Non-Commercial 4.0 International license.



INTRODUCTION

According to the most recent data from the National Institute of Statistics and Geography (2025), during the second half of 2024, 8.7% of households in urban areas of Mexico reported that at least one of their members had been a victim of robbery or assault either on the street or in public transportation. This type of crime commonly involves the theft of personal belongings such as cell phones, laptops, and backpacks.

The theft of personal belongings represents a serious urban security crisis in Mexico, as thousands of people experience this situation daily, often without reliable records. Therefore, the design of this backpack will contribute to improving localization and



safety. However, conventional backpacks, typically made from materials such as synthetic blends, have a considerable environmental impact due to their slow decomposition process and the resources used in their production (Fundación Bosque Sagrado Dominicana, 2023). Furthermore, the time it takes for a conventional backpack to break down in the environment depends on its specific composition.

Backpacks made from synthetic blends (such as polyester or nylon) can take between 30 and 100 years to fully decompose, as they are not biodegradable and their decomposition process is very slow. Moreover, during decomposition, synthetic fibers break down into small particles that can be ingested by marine and terrestrial organisms, affecting wildlife and entering the human food chain. Additionally, their production requires non-renewable resources and generates higher greenhouse gas emissions (Fábrica de Bolsas Plásticas, 2023).

According to Vogo (2024), conventional backpacks, mostly made from synthetic materials such as polyester, PVC, and synthetic leather, have a significant environmental impact when discarded. These petroleum-derived materials are highly resistant to degradation, contributing to the accumulation of waste in landfills and natural ecosystems. Moreover, during their degradation, backpacks can release microplastics and toxic chemicals, such as persistent organic pollutants, which affect soil and water quality and pose a threat to wildlife and human health (IPEN, 2021).

For this reason, to mitigate these impacts, Gómez, Rodríguez, and Ochaga (2023) recommend choosing backpacks made from recycled or biodegradable materials, reusing and repairing backpacks instead of discarding them, and participating in recycling programs and proper waste management. By adopting these practices, individuals contribute to reducing environmental pollution and promoting more responsible consumption. Therefore, the smart eco-friendly backpack project was developed with the aim of providing security and confidence to all individuals seeking stability in a social environment and protection from theft that could compromise personal safety. The backpack features a global positioning system (GPS), designed to facilitate the easy location of people or belongings, thereby enhancing personal protection. Additionally, the backpack offers high-quality fabric that is eco-friendly, resulting in a 85.72% neutral environmental impact and a 14.28% moderately negative impact. It does not harm the environment, as the product uses sustainable leather made from cactus fiber. According to Rey (2021), cactus-based vegetable leather is revolutionizing the fashion industry; discussing vegetable leather no longer implies a material exclusively for vegans, but rather a sustainable alternative to animal and synthetic leather suitable for anyone seeking an environmentally friendly option.

Nowadays, it is well known that the production of animal-derived leather is highly polluting, in addition to involving animal cruelty. The tanning and finishing processes use chemicals that are often discharged into water, damaging ecosystems and everything within them. Rey (2021) states that bio-based materials, particularly regenerative ones, are part of the sustainable trends of 2021 and represent the best alternative to animal-derived or plastic-based materials. Cactus-based vegetable leather is among the most sought-after by brands and designers aiming to steer their products toward sustainability.

The project involves the production, commercialization, and distribution of backpacks made from cactus-based leather, featuring an internal GPS device, with the aim of providing a high-quality product. The project belongs to the manufacturing industry (secondary sector of the national economy) under the classification Transformation 111108.323003: Manufacture of leather, hide, and substitute products (Secretaría de Economía, 2024). The project also falls within the tertiary sector through the commercialization of its product, classified as 72: Retail trade of leather, hide, and substitute products 623026 (Secretaría de Economía, 2024).

The problem consists of a series of factors that influence the feasibility and sustainability of the project. Concerns begin with the need to conduct a comprehensive financial analysis capable of determining whether the project's business model can generate sufficient revenue to cover its costs at the start of operations. This also involves the creation of a solid financial structure that ensures the feasibility and sustainability of the project in the short, medium, and long term. Its background lies in the initial investment required for the project to commence operations, as there is uncertainty regarding the project's profitability. The generated revenue must be sufficient to cover operating costs and yield an attractive profit margin. If proper financial planning is not carried out, the long-term economic feasibility of the project is put at risk. Moreover, the project depends on securing external sources of financing to cover the initial investment and operating costs. While the project may have some internal resources, it is advisable to rely on loans, investors, grants, or credits that can ensure financial leverage and contribute to increased profitability.

MATERIALS AND METHODS

The research methodology was conducted in three phases: office, field, and office. In the office phase, project planning was carried out through research using confidential primary and secondary sources, in order to define the business idea. In the field phase, the necessary data and information were collected to support the development of the investment project based on the FISH business model (Martínez, Portillo & Del Valle, 2018). In the final office phase, the information was analyzed and processed using the following models and indicators: five-step project financial evaluation, weighted average cost of capital, discount rate (DR), internal rate of return (IRR), net present value (NPV), benefit–cost ratio (BCR), benefit-to-initial-investment ratio (BIR), and payback period (PP).

Step 1. Economic Analysis

Economic analysis aims to determine whether a project contributes positively to the economic well-being of an organization by evaluating benefits and costs from a financial perspective (Sapag & Sapag, 2014). Additionally, Martínez, Portillo & Del Valle (2019) indicate that economic analysis is the process of structuring the operating cost budget and the revenue budget in order to study and understand the project's economic status.

The project's economic status was analyzed, represented by the investment cost budget, the operating cost budget, and the revenue budget. An initial investment of \$564,420.00 was estimated, of which 79.53% corresponds to fixed assets (\$448,870.00), 10.45% to deferred assets (\$59,000.00), and 10.02% to working capital (\$56,550.00) (Table 1). An investment

program of 6 months was proposed in year 0. Using the straight-line depreciation method, it was determined that the project loses value by \$27,369.00 annually, of which \$19,994.00 corresponds to the depreciation of fixed assets and \$7,375.00 to the amortization of deferred assets. Based on the average useful life method for fixed assets, the analysis horizon was calculated to be 8 years. It was estimated that in year 5, a reinvestment of \$42,856.00 will be required for the replacement of fixed assets.

Using the monthly revenue and cost budgets for the first year of operation, the project's cash flow and working capital were determined. The operating cost budget and the project revenue budget were projected over the 8-year analysis horizon. During this period, the established operation schedule was 50% in the first year, 60% in the second year, 70% in the third year, 80% in the fourth year, 90% in the fifth year, and 100% in the sixth, seventh, and eighth years.

Step 2. Financing Analysis

Financing analysis is crucial in project evaluation because it determines how costs will be covered and what impact the cost of capital will have on the project's profitability. A proper financial analysis allows for the identification of the most efficient capital structure, minimizing risks and ensuring that the project is financially viable. It also enables the projection of the project's capacity to generate sufficient cash flows to cover debts and other financial obligations (Cano, 2017).

Table 1. Investment Cost Budget.

No.	CONCEPT	UNIT	AMOUNT	UNIT PRICE (\$)	TOTAL INVESTMENT (\$)
A. FIXED ASSETS					448,870.00
1	Land	m ²	120	2,000.00	240,000.00
2	Building	Unit	1	125,000.00	125,000.00
3	Computer equipment	Part	5	10,000.00	50,000.00
4	Desk	Part	5	1,900.00	9,500.00
5	Printer	Part	1	3,570.00	3,570.00
6	Straight sewing machine	Part	2	8,000.00	16,000.00
7	Desk	Part	1	1,000.00	1,000.00
8	Chairs	Part	6	400.00	2,400.00
9	Shelf	Part	1	1,400.00	1,400.00
B. DEFERRED ASSETS					59,000.00
1	Company constitution	Service	1	15,000.00	15,000.00
2	Operating license	Service	1	3,500.00	3,500.00
3	Patents	Service	1	5,000.00	5,000.00
4	Office 365 package	Service	1	4,000.00	4,000.00
5	Training	Service	1	1,500.00	1,500.00
6	Plant and equipment insurance	Service	1	30,000.00	30,000.00
C. WORKING CAPITAL					56,550.00
D. TOTAL INVESTMENT					564,420.00

Source: Prepared with project data (2025).

Based on the financing needs of the investment project, the capital financing structure was defined by integrating resources from three financial sources: \$296,550.00 of equity, representing 52.54% participation, with an annual return of 15.68%; \$142,870.00 of subsidies, representing 25.31% participation, with an opportunity cost of 10.00% per year; and \$125,000.00 of loans, representing 22.15% participation, with an annual interest rate of 7%. Using the weighted average cost of capital method, the project's discount rate was determined to be 12.32% per year (Table 2).

Using the constant total amortization method, a loan repayment schedule was proposed with a term of 5 years and an interest rate of 7% per year on the outstanding balance, resulting in a constant annual payment of \$30,486.34.

Step 3. Analysis of Pro Forma Financial Statements

Pro forma financial statements are projected financial statements that show the financial effects of hypothetical events or transactions, helping management plan and make decisions based on future financial estimates (Weygandt, Kimmel & Kieso, 2019). Step 3 of the five-step financial evaluation involves defining the income statement, the balance sheet, the cash flow statement, and the sources and uses of funds over the project's analysis horizon.

This step encompasses the income statement, the cash flow statement, the statement of sources and uses of funds, the statement of financial position, the calculation of complementary financial ratios for investment projects, the debt service capacity or coverage ratio, the payback period, and the break-even point.

The structuring and analysis of three pro forma financial statements were carried out: the income statement, the cash flow statement, and the balance sheet. The income statement showed net profits in all years of the analysis horizon. The cash flow statement showed positive results in all years of the horizon. In the balance sheet, the two previous financial statements were consolidated in report form (Table 3). It was estimated that, at the end of the analysis horizon, the project's salvage value is \$433,463.83, of which \$331,774.00 corresponds to the recovery of fixed assets and \$101,689.83 to the recovery of working capital.

Step 4. Financial Analysis

Martínez, Portillo & Del Valle (2019) define financial analysis as the process of calculating the Net Present Value, Internal Rate of Return, Benefit/Cost Ratio, and Benefit/Initial Investment Ratio, which determine the project's profitability over the analysis horizon.

Table 2. Financing Structure and Weighted Average Cost of Capital.

No.	CONCEPT	TOTAL	SHARE (%)	FINANCIAL COST (%)	WEIGHTED AVERAGE (%)
1	Partner contribution	296,550.00	52.54	15.68	8.24
2	Subsidy	142,870.00	25.31	10.00	2.53
3	Long term credit	125,000.00	22.15	7.00	1.55
A	Total investment	564,420.00	100.00		12.32

Source: Prepared with project data (2025).

Table 3. Pro forma Balance Sheet.

No.	CONCEPT	0 %		50 %		60 %		70 %		80 %		90 %		100 %	
		Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6 al 8							
	ASSETS	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)
A	FIXED ASSETS	448,870.00	428,876.00	408,882.00	388,888.00	368,894.00	348,894.00	328,894.00	308,894.00	288,894.00	268,894.00	248,894.00	228,894.00	208,894.00	188,894.00
	1 SUBTOTAL	448,870.00	448,870.00	448,870.00	448,870.00	448,870.00	448,870.00	448,870.00	448,870.00	448,870.00	448,870.00	448,870.00	448,870.00	448,870.00	448,870.00
	2 Depreciation	0.00	19,994.00	39,988.00	59,982.00	79,976.00	99,970.00	119,964.00	139,958.00	159,952.00	179,946.00	199,940.00	219,934.00	239,928.00	259,922.00
B	DEFERRED ASSETS	59,000.00	51,625.00	44,250.00	36,875.00	29,500.00	22,125.00	14,750.00	7,375.00	0.00	0.00	0.00	0.00	0.00	0.00
	1 SUBTOTAL	59,000.00	59,000.00	59,000.00	59,000.00	59,000.00	59,000.00	59,000.00	59,000.00	59,000.00	59,000.00	59,000.00	59,000.00	59,000.00	59,000.00
	2 Amortization	0.00	7,375.00	14,750.00	22,125.00	29,500.00	36,875.00	44,250.00	51,625.00	59,000.00	66,375.00	73,750.00	81,125.00	88,500.00	95,875.00
C	WORKING CAPITAL	56,550.00	716,660.73	1,592,824.75	2,684,999.43	3,993,139.20	5,480,767.69	7,251,174.23	9,251,174.23	11,251,174.23	13,251,174.23	15,251,174.23	17,251,174.23	19,251,174.23	21,251,174.23
	1 Working capital	56,550.00	56,550.00	65,577.97	74,605.93	83,633.90	92,661.87	101,689.83	110,717.79	119,745.75	128,773.71	137,801.67	146,829.63	155,857.59	164,885.55
	2 Cash flow	0.00	660,110.73	1,527,246.78	2,610,393.50	3,909,505.30	5,388,105.82	7,149,484.40	8,909,856.44	10,670,228.08	12,430,600.72	14,190,973.36	15,951,346.00	17,711,718.64	19,472,091.28
D	TOTAL ASSETS LIABILITIES	564,420.00	1,197,161.73	2,045,956.75	3,110,762.43	4,391,533.20	5,894,648.69	7,637,686.23	9,251,174.23	10,864,661.73	12,478,147.23	14,091,632.73	15,719,118.23	17,346,603.73	18,974,089.23
E	SHORT-TERM LIABILITIES														
F	LONG-TERM LIABILITIES	125,000.00	103,263.66	80,005.78	55,119.85	28,491.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1 Final unpaid balance of credit	125,000.00	103,263.66	80,005.78	55,119.85	28,491.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G	TOTAL LIABILITIES	125,000.00	103,263.66	80,005.78	55,119.85	28,491.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	SHAREHOLDERS' EQUITY														
	1 Share capital	296,550.00	296,550.00	296,550.00	296,550.00	296,550.00	296,550.00	296,550.00	296,550.00	296,550.00	296,550.00	296,550.00	296,550.00	296,550.00	296,550.00
	2 Other capital accounts	142,870.00	142,870.00	142,870.00	142,870.00	142,870.00	142,870.00	142,870.00	142,870.00	142,870.00	142,870.00	142,870.00	142,870.00	142,870.00	142,870.00
	3 Results from previous years	0.00	0.00	654,478.07	1,526,530.96	2,616,222.58	3,923,621.30	5,455,228.69	7,251,174.23	9,251,174.23	11,251,174.23	13,251,174.23	15,251,174.23	17,251,174.23	19,251,174.23
	4 Exercise result	0.00	654,478.07	872,052.89	1,089,691.62	1,307,398.72	1,531,607.39	1,743,037.54	1,955,246.69	2,172,895.84	2,390,545.09	2,608,194.34	2,825,843.59	3,043,492.84	3,261,142.09
H	TOTAL SHAREHOLDERS' EQUITY	439,420.00	1,093,898.07	1,965,950.96	3,055,642.58	4,363,041.30	5,894,648.69	7,637,686.23	9,251,174.23	10,864,661.73	12,478,147.23	14,091,632.73	15,719,118.23	17,346,603.73	18,974,089.23

Source: Prepared with project data (2025).

The project’s cash flow was structured over an 8-year horizon, on which the profitability indicators were calculated.

To test the proposal, the calculation of profitability indicators was carried out using the project’s financial information, evaluating an investment of \$564,420.00 at a discount rate of 12.32%, with cash flows occurring annually over an 8-year analysis horizon.

Step 5. Sensitivity Analysis

According to Gutiérrez & Serrano (2016), sensitivity analysis is used to evaluate the stability of a project’s results in response to changes in the main variables, providing valuable information for risk management and decision-making. The project’s sensitivity analysis was conducted considering the product’s selling price as the risk variable, given that it is the most unstable throughout the year. Three scenarios of price reduction were evaluated: 5%, 10%, and 15%. Within this range, the project does not show sensitivity to these decreases, as it still generates profits; even with a price reduction of up to 15%, the company remains profitable. The project can withstand a price decrease of up to 27.61% while remaining profitable; below this threshold, the project ceases to be viable.

Table 4. Cash Flow Discounted at 12.32 %.

YEAR	TB (\$)	TC (\$)	UTB (\$)	UTC (\$)	UCF (\$)	CUCF (\$)
0	0.00	564,420.00	0.00	564,420.00	-564,420.00	-564,420.00
1	4,490,129.16	3,799,532.09	3,997,625.29	3,382,776.99	614,848.31	50,428.31
2	5,388,154.99	4,490,532.61	4,270,970.59	3,559,461.96	711,508.63	761,936.94
3	6,286,180.82	5,172,547.77	4,436,256.22	3,650,347.94	785,908.28	1,547,845.22
4	7,184,206.66	5,854,608.51	4,513,898.80	3,678,500.86	835,397.94	2,383,243.17
5	8,092,946.49	6,583,859.63	4,527,129.54	3,682,958.42	844,171.12	3,227,414.28
6	8,980,258.32	7,218,879.74	4,472,479.23	3,595,251.78	877,227.45	4,104,641.73
7	8,980,258.32	7,209,851.78	3,981,911.31	3,196,900.28	785,011.03	4,889,652.76
8	8,980,258.32	7,209,851.78	3,545,151.78	2,846,245.39	698,906.39	5,588,559.15
TOTAL			33,745,422.76	28,156,863.61	5,588,559.15	

Source: Prepared with project data (2025).

TB=Total Benefits. TC=Total Costs. UTB=Updated Total Benefits. UTC=Updated Total Costs. UCF=Updated Cash Flow. CUCF=Cumulative Updated Cash Flow.

Table 5. Project Profitability Indicators.

No.	INDICATOR	ACRONYM	VALUE	OBSERVATION
1	Discount Rate	DR	12.32 %	Annually
2	Internal Rate of Return	IRR	147.12 %	Annually
3	Net Present Value	NPV	\$ 5,588,559.15	Horizon
4	Benefit–Cost Ratio	BCR	1.20	Horizon
5	Benefit-to-Initial-Investment Ratio	BIR	10.90	Horizon
6	Payback Period	PP	0.92	Years

Source: Prepared with project data (2025).

Table 6. Sensitivity Analysis Based on Product Price.

What happens if the price decreases by:	PRICE (\$)	IIR	NPV (\$)	BCR	BIR	PP
0 %	2,867.26	147.12 %	5,588,559.15	1.20	10.90	0.92
5 %	2,723.90	123.80 %	4,576,376.27	1.17	9.11	1.12
10 %	2,580.53	100.51 %	3,564,193.38	1.13	7.31	1.42
15 %	2,437.17	77.13 %	2,552,010.50	1.10	5.52	1.95
-27.61 %	2,075.71	12.32 %	0.00	1.00	1.00	8.00

Source: Project data elaboration (2025).

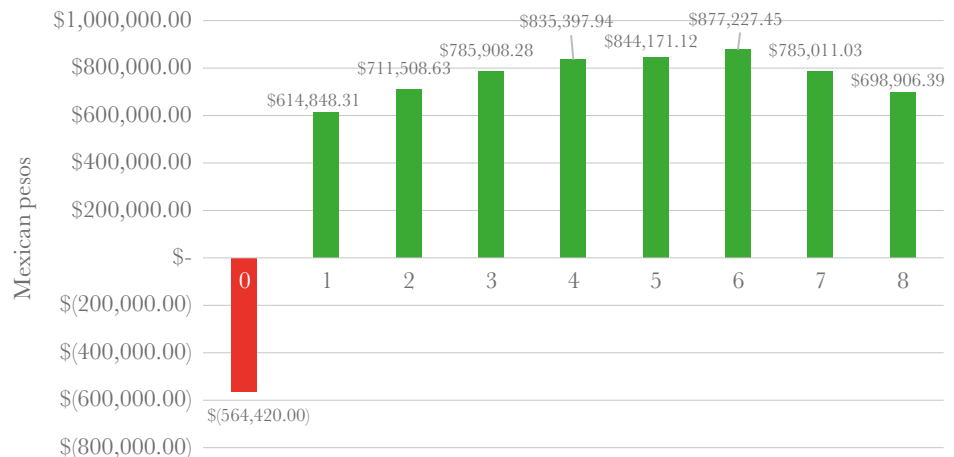
RESULTS AND DISCUSSION

According to the five-step financial project evaluation, conducted with a discount rate of 12.32 % over an 8-year horizon, the results obtained were: 147.12 % IRR, \$5,588,559.15 NPV, 1.20 B/C ratio, 10.90 B/II ratio, and 0.92 years payback period.

The ecological backpack project is unique due to its innovative design, which includes a GPS that allows easy tracking of the item in case of theft or loss. Other backpacks already on the market are also made from biodegradable nopal leather; however, instead of a GPS, their distinguishing feature is that they are solar-powered (Fernández, 2021).

Discount Rate

DR=12.32 %. For every \$100.00 of annual investment in the project, a financial cost of \$12.32 is estimated per year, with cash flows occurring annually over the 8-year analysis horizon. Since the DR is lower than the 147.12 % IRR, which is its critical point, the project is accepted and the evaluation is positive. It is recommended to proceed with the project, as it will generate net profits after covering the initial investment, operating costs, and the financial cost of capital.



IIR=147.12 %, NPV=\$ 5,588,559.15, BCR=1.20, BIR=10.98, PP=0.92

Figure 1. Cash flow discounted at 12.32 %. Source: Own elaboration with project data (2025).

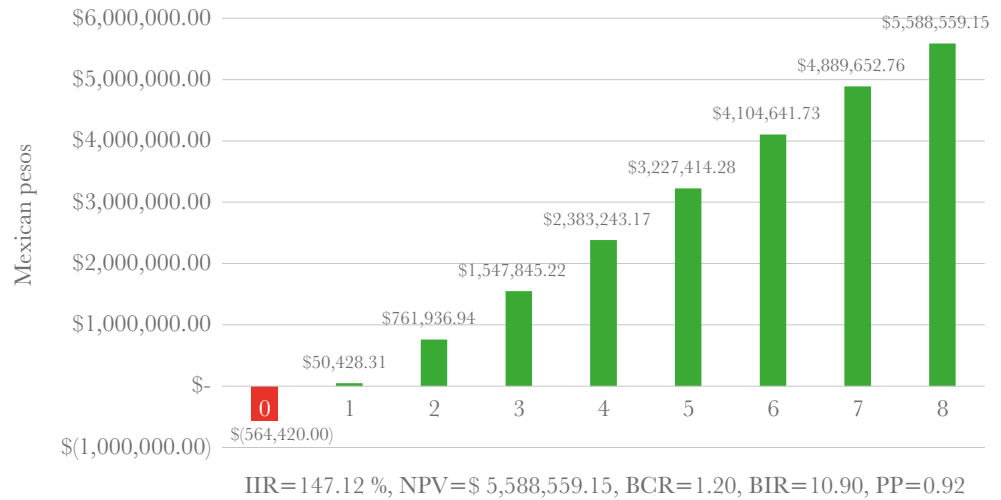


Figure 2. Cumulative discounted cash flow at 12.32 %. Source: Own elaboration with project data (2025).

Internal Rate of Return

IRR=147.12%. For every \$100.00 of annual initial capital investment in the project, \$147.12 of net profit is generated annually, with cash flows occurring each year over the 8-year analysis horizon. Since the IRR is higher than the 12.32% discount rate (DR), which is its critical point, it is accepted and the evaluation is positive. It is recommended to proceed with the project because it will generate net profits after covering the initial investment, operating costs, and the financial cost of capital.

Net Present Value

NPV=\$5,588,559.15. The initial capital investment of \$564,420.00 in the project will generate a net profit of \$5,588,559.15 at a 12.32% discount rate, with cash flows occurring annually over the 8-year analysis horizon. Since the NPV is greater than 0, with 0 as its critical point, it is accepted and the evaluation is positive. It is recommended to proceed with the project because it will generate net profits after covering the initial investment, operating costs, and the financial cost of capital.

Benefit/Cost Ratio

BCR=1.20. For every \$1.00 invested in the project’s total costs, \$1.20 of total benefits will be generated at a 12.32% discount rate, with cash flows occurring annually over the 8-year analysis horizon. Since the BCR is greater than 1, with 1 as its critical point, it is accepted and the evaluation is positive. It is recommended to proceed with the project because it will generate net profits after covering the initial investment, operating costs, and the financial cost of capital.

Benefit/Initial Investment Ratio

BIR = 10.90. For every \$1.00 of initial investment in the project, \$10.90 of total benefits will be generated at a 12.32% discount rate, with cash flows occurring annually over the

8-year analysis horizon. Since the BIR is greater than 1, with 1 as its critical point, it is accepted and the evaluation is positive. It is recommended to proceed with the project because it will generate net profits after covering the initial investment, operating costs, and the financial cost of capital.

Payback Period (PP)

PP=0.92 years. The initial investment of \$564,420.00 in the project is estimated to be recovered by December 2 of the first year of operation, with cash flows occurring annually, discounted at 12.32% over the 8-year analysis horizon. Since the PP is less than 8 years, with 8 years as its critical point, it is accepted and the evaluation is positive. It is recommended to proceed with the project because it will generate net profits after covering the initial investment, operating costs, and the financial cost of capital.

CONCLUSIONS

It is concluded that the project is financially feasible, as all profitability indicators meet the acceptance criteria; therefore, the project is profitable, accepted, and the evaluation is positive. The IRR of 147.12% is higher than the 12.32% discount rate (DR), the NPV of \$5,588,559.15 is greater than \$0.00, the B/C ratio is 1.20 (greater than 1), the B/IC ratio is 10.90 (greater than 1), and the payback period (PBP) is 0.92 years (less than the 8-year analysis horizon).

It is recommended to carry out the project, as it is profitable, generating net profits after covering operating costs each year of the analysis horizon, recovering the initial investment, and paying the financial cost of capital.

The project generates a positive environmental impact, as the backpacks are eco-friendly and made from biodegradable materials that are environmentally friendly, contributing to the reduction of the ecological footprint. Furthermore, it provides a sustainable option for young people and the target population in meeting their needs.

ACKNOWLEDGMENTS

We thank Jimena Pérez Ramírez, América Itzel Guzmán Jasso, Giselle Estefanía Anaya Núñez, and Dana Sharleyd Santana Juárez, students of the Universidad Politécnica de Texcoco, for their contribution to the completion of this research.

REFERENCES

- Cano, C. (2017). Evaluación financiera de proyectos de inversión. Eumed.net. <https://www.eumed.net/libros-gratis/>
- Fábrica de Bolsas Plásticas. (2023). ¿Cuánto tarda en degradarse una bolsa de nylon? <https://fabricadebolsasplasticas.com/cuanto-tarda-en-degradarse-una-bolsa-de-nylon/>
- Fernández, M. (2021, 3 septiembre). Orgullo mexicano: egresado de Chapingo crea mochila solar hecha con piel de nopal | CC News. CC News. <https://news.culturacolectiva.com/noticias/mexico/joven-egresado-chapingo-crea-mochila-solar-hecha-con-piel-de-nopal/>
- Fundación Bosque Sagrado Dominicana. (2023). ¿Cuánto demora en degradarse? <https://www.fundacionbosquesagrado.org/cuanto-demora-en-degradarse/>
- Gómez Salgado, Y., Rodríguez Ramírez, O., & Ochaga Mangué, D. L. (2023). Impacto del plástico en los diferentes ecosistemas. Universidad Rey Juan Carlos. <https://urjc.shorthandstories.com/impacto-del-plastico-en-los-diferentes-ecosistemas/>

- Gutiérrez, H., & Serrano, J. (2016). Evaluación de proyectos de inversión: Enfoque práctico. McGraw-Hill.
- Instituto Nacional de Estadística y Geografía. (2025). Encuesta Nacional de Seguridad Pública Urbana (ENSU), cuarto trimestre de 2024. https://www.inegi.org.mx/contenidos/saladeprensa/boletines/2025/ensu/ENSU20205_01_RR.pdf
- IPEN. (2021). Plásticos: Una amenaza para la salud humana y el medio ambiente (Folleto en español). https://ipen.org/sites/default/files/documents/ipen-plastics_booklet-spanish.pdf
- Martínez-Cruz, R., Portillo-Vázquez, M., & Del Valle Sánchez, M. (2019). Propuesta metodológica para la evaluación de proyectos en cinco pasos. *Agro Productividad*, 12(3). <https://doi.org/10.32854/agrop.v0i0.1372>
- Martínez-Cruz, R., Portillo-Vázquez, M., & Del Valle-Sánchez, M. (2018). El modelo del pez: herramienta de apoyo en formulación de proyectos. *Agro Productividad*, 11(3). Recuperado a partir de <https://revista-agroproductividad.org/index.php/agroproductividad/article/view/228>
- Rey, P. (2021, 13 mayo). Piel de nopal: el cuero vegetal es el material sustentable en boga. Vogue. <https://www.vogue.mx/sustentabilidad/articulo/piel-de-nopal-porque-el-cuero-vegetal-es-el-material-sustentable-en-boga>
- Sapag Chain, N., & Sapag Chain, R. (2014). Preparación y evaluación de proyectos (7.ª ed.). McGraw-Hill Education.
- Secretaría de Economía. (2024). Industria manufacturera 2024. <https://www.gob.mx/se/Vogo>. (2024). El impacto ambiental de las mochilas sostenibles: ¿Por qué elegir Vogo? <https://vogo.cl/blogs/noticias/el-impacto-ambiental-de-las-mochilas-sostenibles-por-que-elegir-vogo>
- Weygandt, J. J., Kimmel, P. D., & Kieso, D. E. (2019). Contabilidad financiera (9.ª ed.). McGraw-Hill Education

