

M5L24. Ford Motor EV Portfolio Decision Metrics

Slide #1

The slide cover is split into two main sections. The left section is a dark grey rectangle containing the Texas A&M University Engineering logo at the top, followed by the title "Ford Motor EV Portfolio Decision Metrics" in white, the presenter's name "Dr. Xiaomin Yang", and the course information "TCMT 612 | Technical Management Decision Making" and "MASTERS OF ENGINEERING TECHNICAL MANAGEMENT" at the bottom. The right section is a light grey image showing a person from behind, looking at a large, futuristic digital display. The display features a complex network diagram of nodes and lines, several hexagonal icons containing bar charts and line graphs, and a large arrow pointing to the right. The overall theme is technological and data-driven.

ATM
TEXAS A&M UNIVERSITY
Engineering

Ford Motor EV
Portfolio Decision Metrics

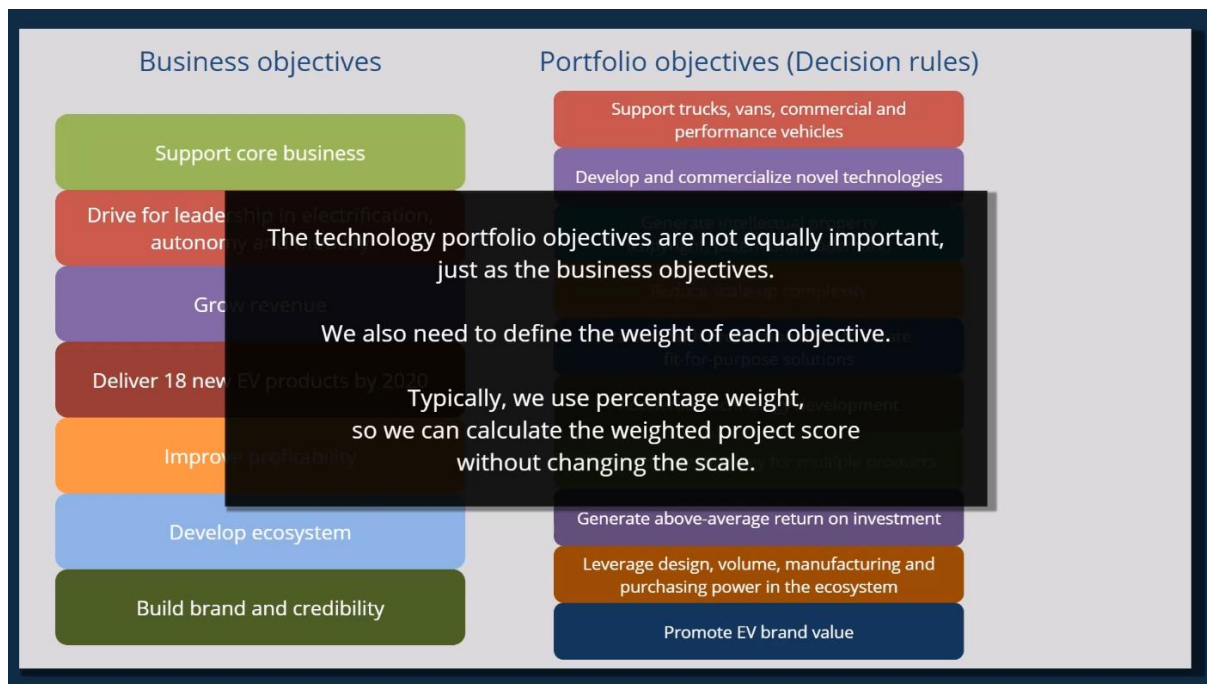
Dr. Xiaomin Yang

TCMT 612 | Technical Management
Decision Making

MASTERS OF ENGINEERING TECHNICAL MANAGEMENT

In this topic, we will discuss how to quantitatively evaluate technology projects using as an example the Ford Motor Electric Vehicle Division.

Slide #2

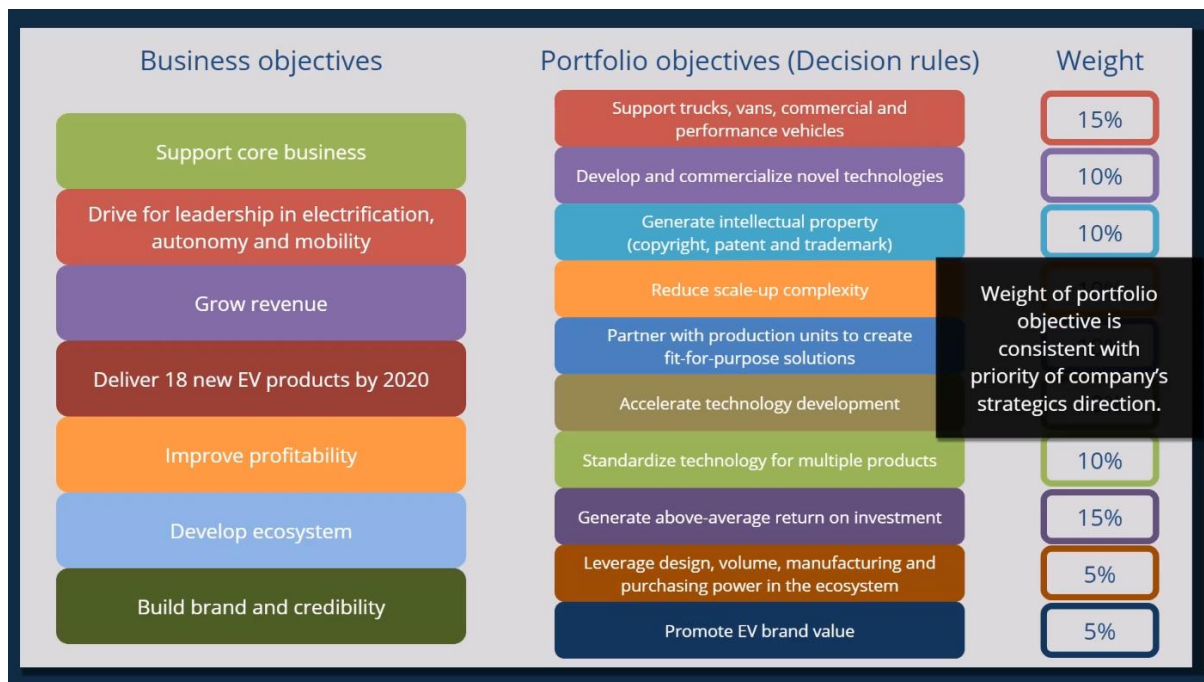


The technology portfolio objectives are not equally important, just as the business objectives.

We also need to define the weight of each objective.

Typically, we use percentage weight so that we can calculate the weighted project score without changing the scale.

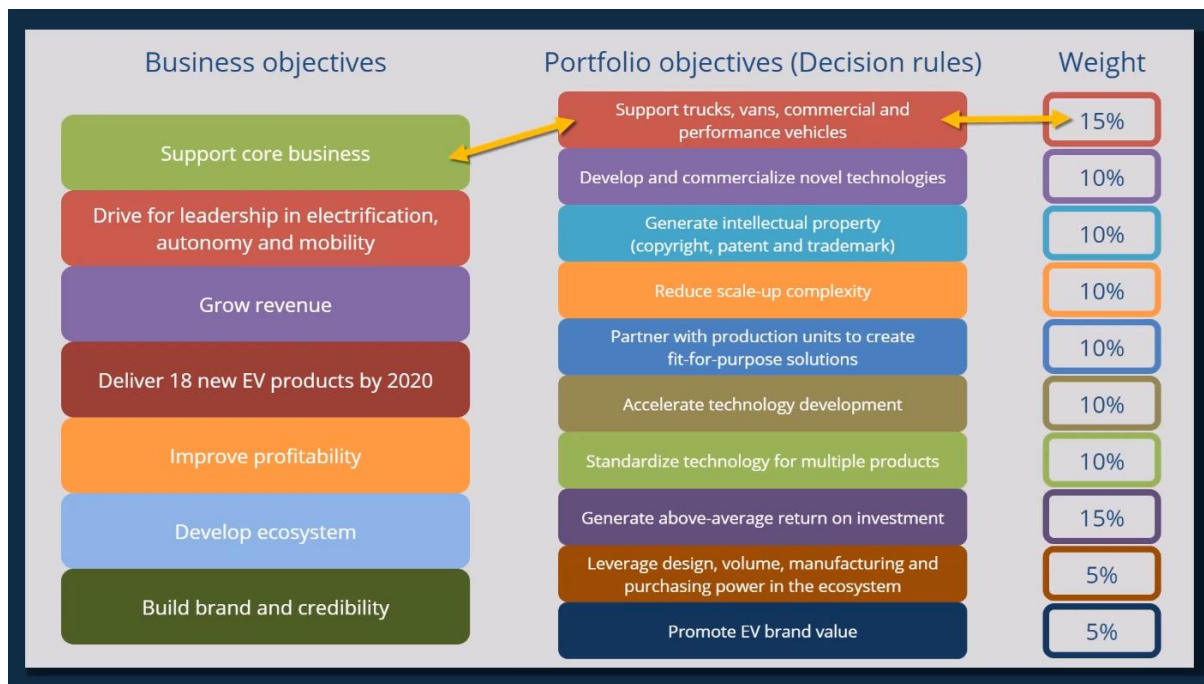
Slide #3



The last column is just an example of the portfolio objective weights.

The weight of portfolio objective is consistent with the priority of company's strategic direction.

Slide #4



For example, the weight of supporting core business is 15%.

It is higher than other weights because the company set the core business as a priority.

The company wants to focus on the core profitable vehicles.

Also, in the company's strategy statement, it is a priority for a company to boost its profit margin.

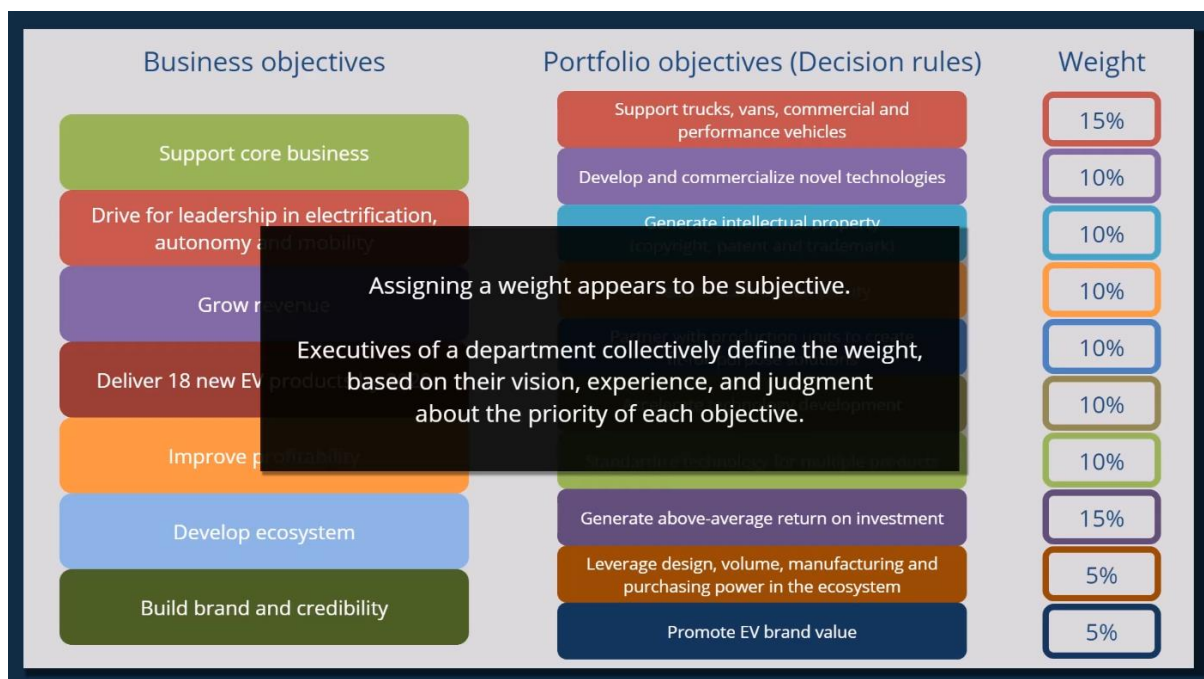
Slide #5



Accordingly, we gave the project financial return a higher rate, a 15% weight.

For each of the remaining portfolio objectives, we gave either 5% or 10 % weight.

Slide #6



I want to point out that assigning a weight appears to be subjective.

We typically have executives of a department collectively define the weight based on their vision, experience, and judgment about the priority of each objective.

Slide #7



To accomplish our set of portfolio objectives, we will have a set of alternative projects.

How do we choose the most appropriate project?

This is done through a two-step process.

Slide #8

Step #1 - Decision Evaluation Matrix			
	Points: 5	Points: 3	Points: 1
Support trucks, vans, commercial and performance vehicles	high/complete attainment of this portfolio objective	medium/partial attainment of this portfolio objective	low/minimal attainment of this portfolio objective
Develop and commercialize novel technologies	high/complete attainment of this portfolio objective	medium/partial attainment of this portfolio objective	low/minimal attainment of this portfolio objective
Generate intellectual property (copyright, patent and trademark)	high/complete attainment of this portfolio objective	medium/partial attainment of this portfolio objective	low/minimal attainment of this portfolio objective
Reduce scale-up complexity	high/complete attainment of this portfolio objective	medium/partial attainment of this portfolio objective	low/minimal attainment of this portfolio objective
Partner with production units to create fit-for-purpose solutions	high/complete attainment of this portfolio objective	medium/partial attainment of this portfolio objective	low/minimal attainment of this portfolio objective
Accelerate technology development	high/complete attainment of this portfolio objective	medium/partial attainment of this portfolio objective	low/minimal attainment of this portfolio objective
Standardize technology for multiple products	high/complete attainment of this portfolio objective	medium/partial attainment of this portfolio objective	low/minimal attainment of this portfolio objective
Generate above-average return on investment	high/complete attainment of this portfolio objective	medium/partial attainment of this portfolio objective	low/minimal attainment of this portfolio objective
Leverage design, volume, manufacturing and purchasing power in the ecosystem	high/complete attainment of this portfolio objective	medium/partial attainment of this portfolio objective	low/minimal attainment of this portfolio objective
Promote EV brand value	high/complete attainment of this portfolio objective	medium/partial attainment of this portfolio objective	low/minimal attainment of this portfolio objective

First, we create a decision evaluation matrix.

In this matrix, each row corresponds to a portfolio objective and each column to a level of accomplishment.

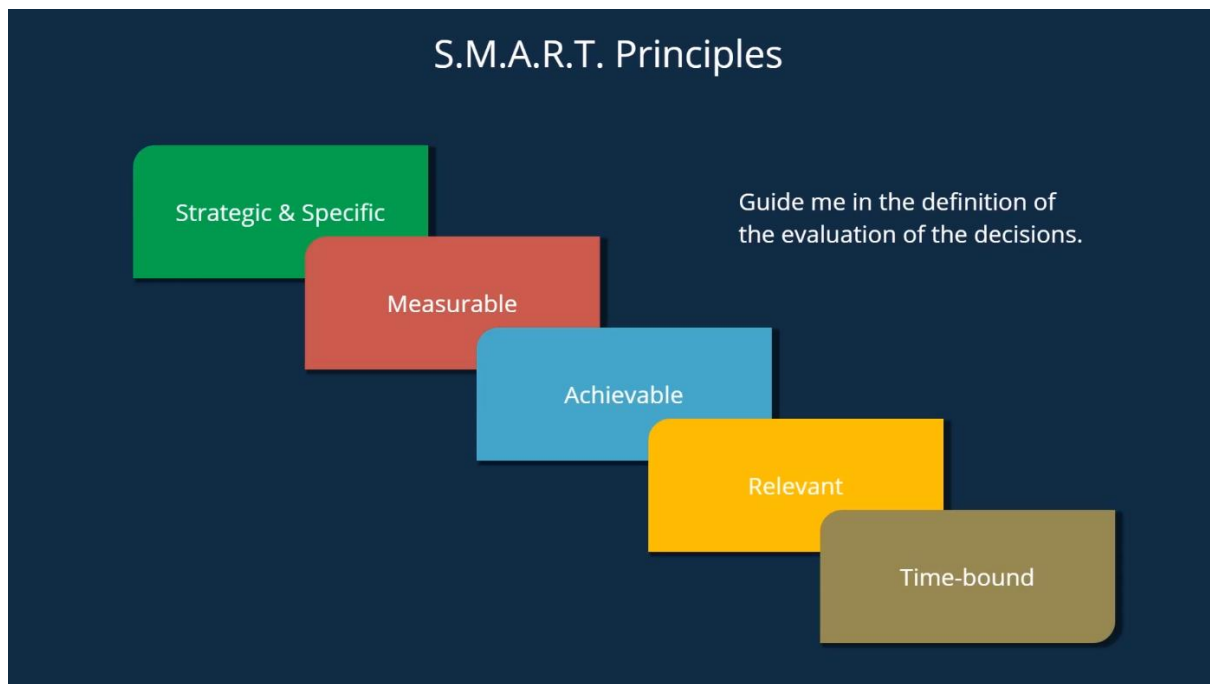
We will have three levels, the highest corresponding to high or complete attainment of the objective, then a medium level where the objective is only partially met.

At the lowest level, the level of attainment is low or minimal.

We assign a score to these three levels.

In our case, we assign a 5 to the highest level, a 3 to the medium level, and a 1 to the lowest level.

Slide #9



I followed the S.M.A.R.T. principles to guide me in the definition of the evaluation of the decisions.

In this case, S.M.A.R.T. means strategic and specific, measurable, achievable, relevant, and time-bound.

Slide #10

Step #2 - Project Evaluation Matrix

Portfolio objective	Objective #1	Objective #2	Objective #3	Objective #4	Objective #5	Objective #6	Objective #7	Objective #8	Objective #9	Objective #10
Weight	15%	10%	10%	10%	10%	10%	10%	15%	5%	5%
Project #1	3	1	5	3	3	1	3	5	1	3
Project #2	5	3	5	1	3	3	5	3	3	3
Project #3	1	1	1	1	3	3	3	1	3	5
Project #4	3	3	3	3	5	3	3	5	1	1

$$\text{Project score} = \sum (\text{objective score}) \times (\text{objective weight})$$

Thus, we can rank these alternative projects

Second, we create a project evaluation matrix.

In this second matrix, each row corresponds to a project alternative and each column corresponds to a portfolio objective.

We also have a row for the portfolio objective weights.

Then, we use the first matrix, the Decision Evaluation Matrix, to assign a score to each of the cells of the Project Evaluation Matrix.

At this point, we calculate the weighted sum of the scores for each project.

Thus, we can rank these alternative projects.

Slide #11

	Objective #1	Objective #2	Objective #3	Objective #4	Objective #5	Objective #6	Objective #7	Objective #8	Objective #9	Objective #10	Project score	Rank
	15%	10%	10%	10%	10%	10%	10%	15%	5%	5%		
Project #1	3	1	5	3	3	1	3	5	1	3	3	3
Project #2	5	3	5	1	3	3	5	3	3	3	3.5	1
Project #3	1	1	1	1	3	3	3	1	3	5	1.9	4
Project #4	3	3	3	3	5	3	3	5	1	1	3.3	2

Please, carefully examine the spreadsheet for the decision evaluation matrix and the project evaluation matrix that I have created for the Ford Motor Electric Vehicle Division example.

You will find the link to this spreadsheet on Canvas just below this video lesson.

Please carefully examine the spreadsheet for the Decision Evaluation Matrix and the Project Evaluation Matrix that I have created for the Ford Motor Electric Vehicle Division example.

You will find the link to this spreadsheet on Canvas just below this video lesson.

This table lists the detailed matrix of each objective.

Slide #12

Quantitative Criteria for Portfolio Objectives					
Business objectives	Portfolio Objectives (Decision Rules)	Weight	Criteria (score)		
			5	3	1
Support core business	Support trucks, vans, commercial and performance vehicles	15%	Strengthen leadership in trucks, vans, commercial and performance vehicles	Applicable to trucks, commercial and performance vehicles as well as contribute to utility vehicle growth or small and luxury vehicle transformation.	Applicable to trucks, commercial and performance vehicles
			Obvious competitive advantage (>3 yrs ahead of competitor)	Modest advantage (1-3 yrs ahead)	Somewhat advantage (<1 ahead)
Drive for leadership in electrification, autonomy and mobility	Create advantage against competitors	10%	Strong patents expected	Copyright	Trademark
	Generate intellectual property (copyright, patent and trademark)	10%	>90% compatible with current platform	70-90% compatible with current platform (significant engineering design required)	70-90% compatible with current platform (engineering redesign required)
Grow revenue	Reduce scale-up complexity	10%	>70% production units support	50-70%	<50%
	Partner with production units to accelerate fit-for-purpose applications	10%	< 1 yr	1-3 yrs	> 3 years
18 new EV product offers by 2020	Accelerate technology development	10%	applicable to > 10 products	5-10 products	<5
	Standardize technology for multiple products	10%	>10%	7-10%	5-7%
Improve profitability	Generate above-average return on investment	15%	70% resource/capability/parts from the ecosystems	50%-70%	<50%
Develop ecosystem	leverage design, volume, manufacturing and purchasing power in the ecosystem	5%	Active public promotion	Active promotion within ecosystem	Active internal promotion
Build brand and credibility	Promote EV brand value	5%			

Let me give you some examples of the criteria. For example, technology leadership.

Slide #13

Quantitative Criteria for Portfolio Objectives					
Portfolio Objectives (Decision Rules)	Weight		Criteria (score)		
			5	3	1
Support trucks, vans, commercial and performance vehicles	15%		Strengthen leadership in trucks, vans, commercial and performance vehicles	Applicable to trucks, commercial and performance vehicles as well as contribute to utility vehicle growth or small and luxury vehicle transformation.	Applicable to trucks, commercial and performance vehicles
Create advantage against competitors	10%		Obvious competitive advantage (>3 yrs ahead of competitor)	Modest advantage (1-3 yrs ahead)	Somewhat advantage (<1 ahead)
Generate intellectual property (copyright, patent and trademark)	10%		Strong patents expected	Copyright	Trademark
Reduce scale-up complexity	10%		>90% compatible with current platform	70-90% compatible with current platform (significant engineering design required)	70-90% compatible with current platform (engineering redesign required)
Partner with production units to accelerate fit-for-purpose applications	10%		>70% production units support	50-70%	<50%
Accelerate technology development	10%		< 1 yr	1-3 yrs	> 3 years
Standardize technology for multiple products	10%		applicable to > 10 products	5-10 products	<5

If a technology can provide obvious competitive advantage, which means that our technical advance is three years ahead of our competitors, they give this project a score of five.

If our company and competitors have a similar technical advance level, we give a score of only one.

Patents also provide a strong protection.

Slide #14

Quantitative Criteria for Portfolio Objectives				
Portfolio Objectives (Decision Rules)	Weight	Criteria (score)		
		5	3	1
Support trucks, vans, commercial and performance vehicles	15%	Strengthen leadership in trucks, vans, commercial and performance vehicles	Applicable to trucks, commercial and performance vehicles as well as contribute to utility vehicle growth or small and luxury vehicle transformation.	Applicable to trucks, commercial and performance vehicles
Create advantage against competitors	10%	Obvious competitive advantage (>3 yrs ahead of competitor)	Modest advantage (1-3 yrs ahead)	Somewhat advantage (<1 ahead)
Generate intellectual property (copyright, patent and trademark)	10%	Strong patents expected	Copyright	Trademark
Reduce scale-up complexity	10%	>90% compatible with current platform	70-90% compatible with current platform (significant engineering design required)	70-90% compatible with current platform (engineering redesign required)
Partner with production units to accelerate fit-for-purpose applications	10%	>70% production units support	50-70%	<50%
Accelerate technology development	10%	< 1 yr	1-3 yrs	> 3 years
Standardize technology for multiple products	10%	applicable to > 10 products	5-10 products	<5

If we expect a strong patent coming out of a technology development project, we will give a score of 5 to this objective.

Please take some time to study the criterion table and let me know if you have any questions.

Slide #15

Quantitative Criteria for Portfolio Objectives

Business objectives	Portfolio Objectives (Portfolio 8.1-1)	Weight	Criteria (score)
Support core business	It is crucial to set quantitative criteria to gauge the specific value of a project from different perspectives.		1
Drive for leadership in electrification, autonomy and mobility	Generate intellectual property (copyright, patent and trademark)	10%	Applicable to trucks, commercial and performance vehicles as well as applicable to utility vehicle growth in small and heavy vehicle transformation
Grow revenue	Partner with production units to accelerate fit-for-purpose applications	10%	Active advantage (> 3 yrs ahead)
18 new EV product offers by 2020	Generate above-average return on investment	10%	Somewhat advantage (<1 ahead)
Improve profitability	Generate above-average return on investment	10%	Trademark
Develop ecosystem	Generate above-average return on investment	10%	70-90% compatible with current platform (engineering redesign required)
Build brand and credibility	Promote EV brand value	5%	<50%
			> 3 years
			<5
			5-7%
			<50%
			Active internal promotion

It is crucial to set quantitative criteria to gauge the specific value of a project from different perspectives.

Quantifying objectives not only enables us to make data driven decisions but also allows us to measure the progress of a project and performance, so that we can review and adjust portfolio in a systematic and consistent manner.