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Vienna University of Technology

# **Dynamic technological diversification under consideration of business model design – Evidence from Austrian young technology-based firms**

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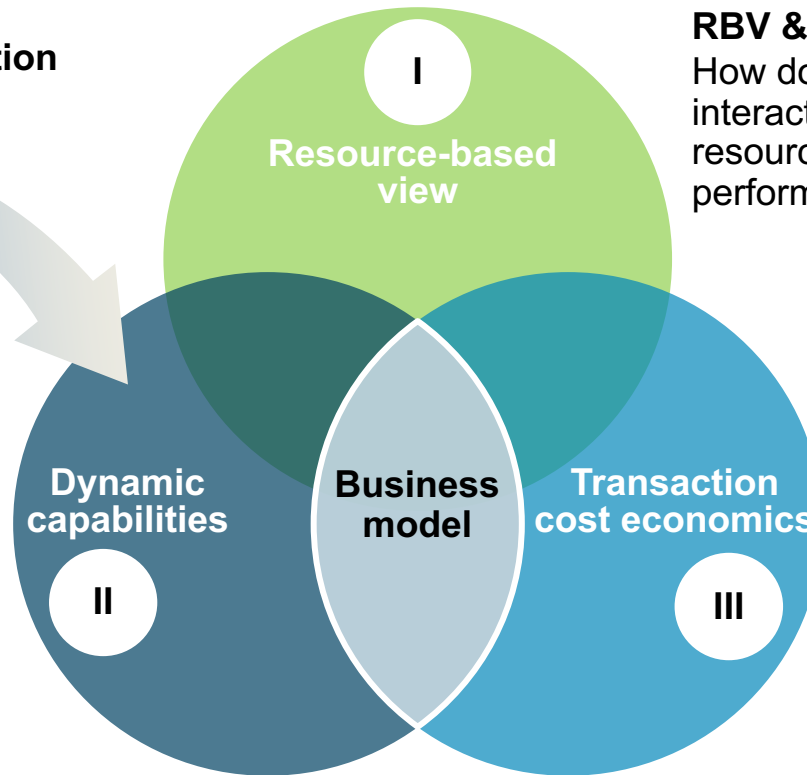
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## Explaining performance in entrepreneurial firms – The concept of business model in the context of other strategic management theories

Focus of this presentation lies on Part II

### RBV, DC & BM

How does technology, absorptive capacity and business model design interact to impact firm performance?



### RBV & BM

How do business models interact with their underlying resource base to impact firm performance?

### BM & TCE

How do a firm's alliances interact with business model design to impact performance?

**So far, there is paucity in research examining the role of technology in the growth of young technology-based firms (YTBFs)**

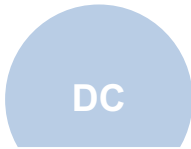


RBV

### Technological diversity

- The importance of **YTBFs** in regard to stimulating local economies, job creation, and structural change is well understood globally (Ganotakis & Love, 2012)
- Undoubtedly, the **accumulation of resources** is crucial in defining success (Wu, 2007)
- Specifically **technological diversification** is frequently referenced as a critical resource and predictor of firm performance (e.g. Gambardella & Torrisi, 1998; Garcia-Vega, 2006)
- Technological diversity is defined as “the expansion of a firm's technology base into a wide range of technology fields” (Leten et al., 2007: 567)
- **Many studies** have been undertaken in **large organizations**, mostly confirming positive relationship; in **YTBFs**, the relationship remains **poorly researched** (e.g. Tischler, 2014)

## Absorptive capacity necessary to derive innovation benefits from a YTBFs' underlying resource base



### Absorptive capacity

- However, in **high-velocity environments** with technological changes, the application of the **RBV** in predicting firm performance might be **overly simplistic** (Eisenhardt & Martin, 2000)
- In such environments, **dynamic capabilities** are known to provide firms opportunity to thrive by acquiring and assimilating external knowledge flows (Zahra & George, 2002)
- Firms that are able to “**acquire, assimilate, transform, and exploit**” new external knowledge enabled by their **absorptive capacity** will derive innovation benefits (Zahra & George, 2002: 186)
- **Many studies** have examined the relationship between technology and AC in large organizations, mostly confirming a **positive relationship** (e.g. Lin & Chang, 2015; Kostopoulos, 2011; Escribano et al., 2009; Toole et al., 2015; Ferreras-Mendéz et al., 2015)
- However, so far, while the importance of dynamic capabilities in YTBFs has been highlighted, **no previous study** has empirically investigated the link between TD \* AC in YTBFs

**Technology solely might be insufficient to guarantee business success, even when regarded through a dynamic lens (Teece, 1986)**



BM

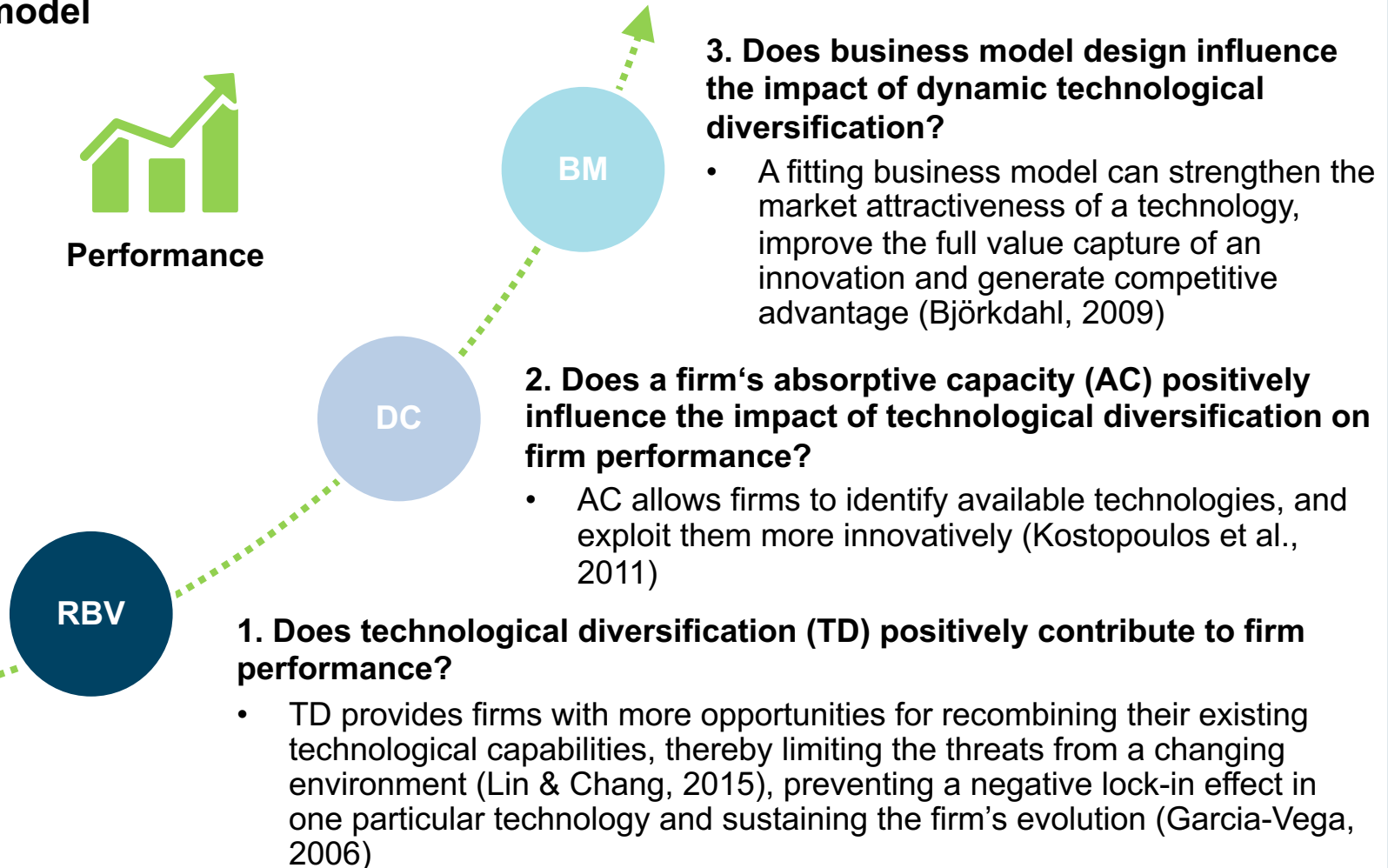
BM design

- Firms that apply **different technologies** are simultaneously concerned with setting up and growing their businesses, requiring **innovative development of business models** (Chesbrough & Rosenbloom, 2002; Onetti et al., 2012)
- Chesbrough and Rosenbloom (2002: 529) consider the business model as a construct that mediates between technological inputs and economic output, defining the business model as the “heuristic logic that **connects technical potential with the realization of economic value**,” emphasizing its role in linking technology to market outcomes
- **Limited previous research** examining the link between technology and business model design available (e.g. Wei et al., 2014; Calia et al., 2007)

## Understanding growth in young technology-based firms (YTBFs) by interlinking resources, dynamic capabilities and the concept of business model



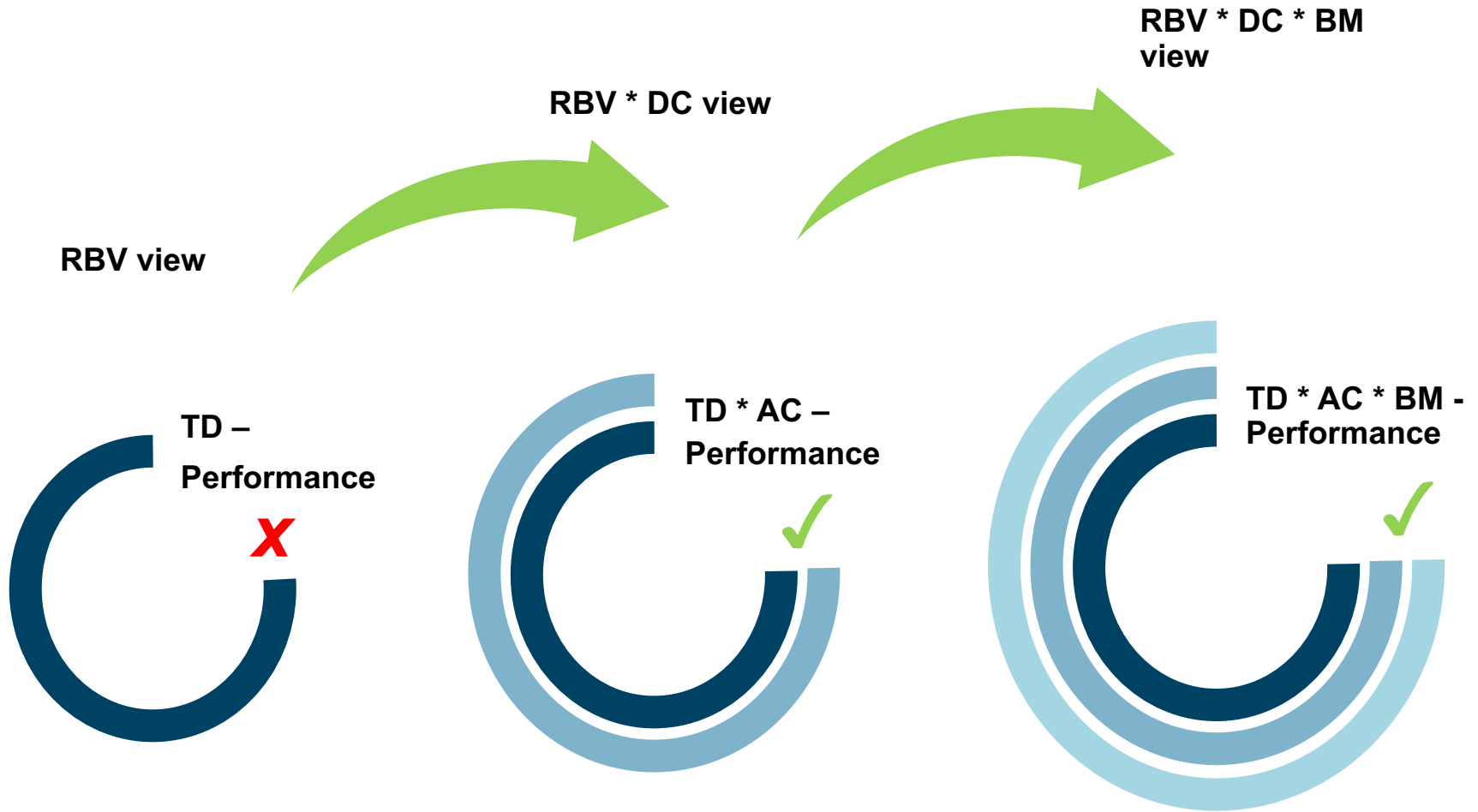
Performance



## Various methods applied within study – Index creation, creation of composite proxy based on principal components, hierarchical multilinear regression

- **Data:** Online-Survey among 1,900 startups with more than >500 Austrian startups participating (Leitner et al., 2019); additionally, manual evaluation of business model designs of sample YTBFs (n= 178)
- **Measures:**
  - **Technological diversification:** Measured based on six key emerging technologies
  - **Absorptive capacity:** Composite proxy of absorptive capacity based on principal components (founding experience; network orientation; product development); validation via CFA
  - **Business model design:** Measured based on two factors with 8 and 10 underlying items respectively; since original scale was enriched with additional items based on literature review, validation via EFA, convergent and discriminant validity, reliability, and overall model fit checks
  - **Control variables:** Firm age, number of founders, location-specific effects, spinoff, IT sector affiliation, life science sector affiliation
  - **Dependent variables:** Average annual sales growth rate; average annual employment growth rate
- **Methodology:** Multilinear hierarchical regression; estimations using generalized linear models; Model comparison via ANOVA

Dynamic technological diversification under consideration of business model explains performance in young entrepreneurial firms



## Hierarchical regression (standardized coefficients) Performance = Yearly sales growth rate

Regression Results

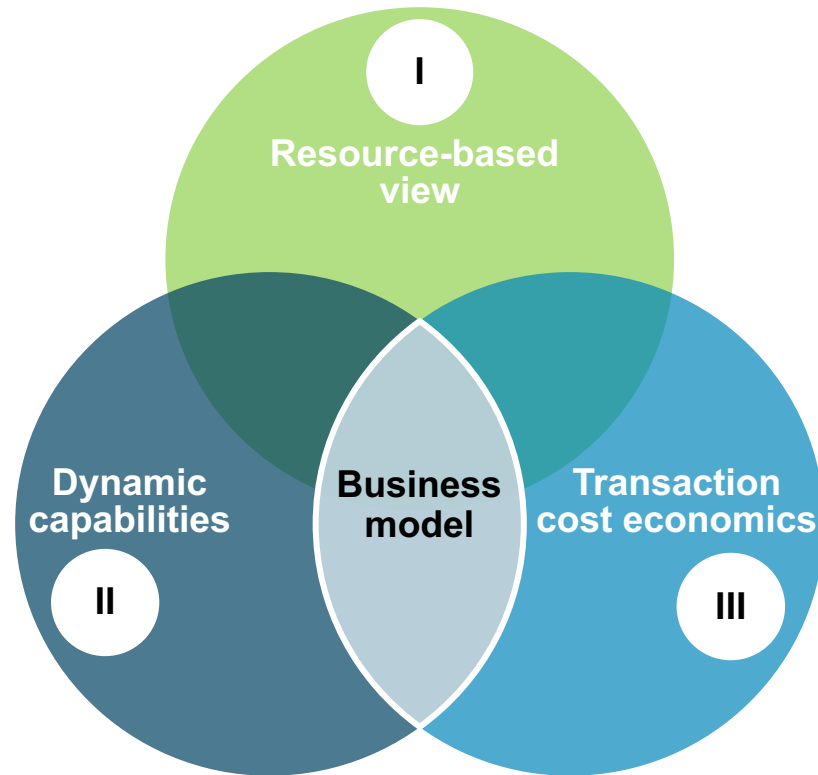
	Dependent variable:			
	(1)	(2)	(3)	(4)
Firmenalter_c	-1.113*** (0.298)	-1.119*** (0.295)	-1.167*** (0.292)	-1.205*** (0.289)
AnzahlGruender_c	0.004 (0.277)	-0.036 (0.274)	-0.078 (0.273)	0.049 (0.269)
Spinoff_c	-0.084 (0.283)	-0.029 (0.285)	0.010 (0.283)	0.067 (0.285)
Wien_c	0.116 (0.279)	0.120 (0.277)	0.204 (0.278)	0.116 (0.271)
Branche_IT_c	0.054 (0.289)	0.080 (0.286)	0.019 (0.297)	0.147 (0.298)
Branche_Life_c	-0.189 (0.292)	-0.199 (0.289)	-0.078 (0.288)	-0.133 (0.283)
Technological_diversification_c	-0.024 (0.306)	0.072 (0.312)	-0.034 (0.311)	-0.294 (0.323)
AC		0.176 (0.283)	0.084 (0.295)	0.129 (0.293)
Efficiency_score_c			0.081 (0.302)	0.079 (0.299)
Novelty_score_c			-0.164 (0.298)	-0.379 (0.305)
Technological_diversification_c:AC		0.814** (0.322)	0.676** (0.328)	0.643* (0.341)
AC:Efficiency_score_c			0.628** (0.260)	
Technological_diversification_c:Efficiency_score_c			0.479 (0.324)	
Technological_diversification_c:AC:Efficiency_score_c			0.592* (0.354)	
AC:Novelty_score_c				0.910*** (0.279)
Technological_diversification_c:Novelty_score_c				-0.404 (0.311)
Technological_diversification_c:AC:Novelty_score_c				0.830** (0.362)
Observations	178	178	178	178
Log Likelihood	-480.368	-477.039	-471.921	-469.221
Akaike Inf. Crit.	974.736	972.078	971.841	966.442

Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

## Entrepreneurs need to be creative in the face of the complex interplay between technology, absorptive capacity, and business model elements

Research field	Literature gap	Contribution
<b>Entrepreneurship research, RBV</b>	<ul style="list-style-type: none"> <li>• <b>Paucity in research linking technology to the performance</b> in YTBFs (e.g. Saemundsson, 2005; Tischler, 2014)</li> </ul>	<ul style="list-style-type: none"> <li>• Sole consideration of resources in the form of <b>TD</b> does <b>not relate to performance</b> in YTBFs</li> <li>• <b>RBV is too static and lacks validity in dynamic markets</b> (Teece et al., 1997; Eisenhardt &amp; Martin, 2000)</li> </ul>
<b>Entrepreneurship research, dynamic capabilities</b>	<ul style="list-style-type: none"> <li>• /</li> </ul>	<ul style="list-style-type: none"> <li>• <b>DC</b> are important for value creation in YTBFs</li> <li>• <b>AC positively moderates</b> the impact of <b>TD</b> on firm performance</li> </ul>
<b>Entrepreneurship research, business model</b>	<ul style="list-style-type: none"> <li>• <b>Further research necessary</b> in exploring the role of <b>BM</b> in context of other <b>strategic management theories</b> (Ritter &amp; Lettl, 2018)</li> </ul>	<ul style="list-style-type: none"> <li>• Addition of <b>BM design</b> significantly <b>improves</b> the interpretability of the model</li> <li>• <b>BM design</b> can further <b>accentuate the benefits</b> of a company leveraging dynamic technological diversification</li> <li>• In our study, <b>BM is complementary to RBV*DC</b> and it is worthwhile to investigate the theories jointly</li> </ul>

The concept of business model can be regarded as complementary to dynamic capabilities



**RBV, DC & BM**

→ BM can further accentuate gains from dynamic capabilities but does not change “the rules of the game”

$$\frac{dN}{dt} = \frac{1}{q_{\text{fact}}} - \sigma_p(N - N_0)(1 - \epsilon S)S + \frac{N_e}{T_n} - \frac{N}{T_p}$$

$$\frac{dS}{dt} = T_0 \sigma_p(N - N_0)(1 - \epsilon S)S + \frac{f_{\text{ps}} N}{T_n} - \frac{S}{T_p}$$

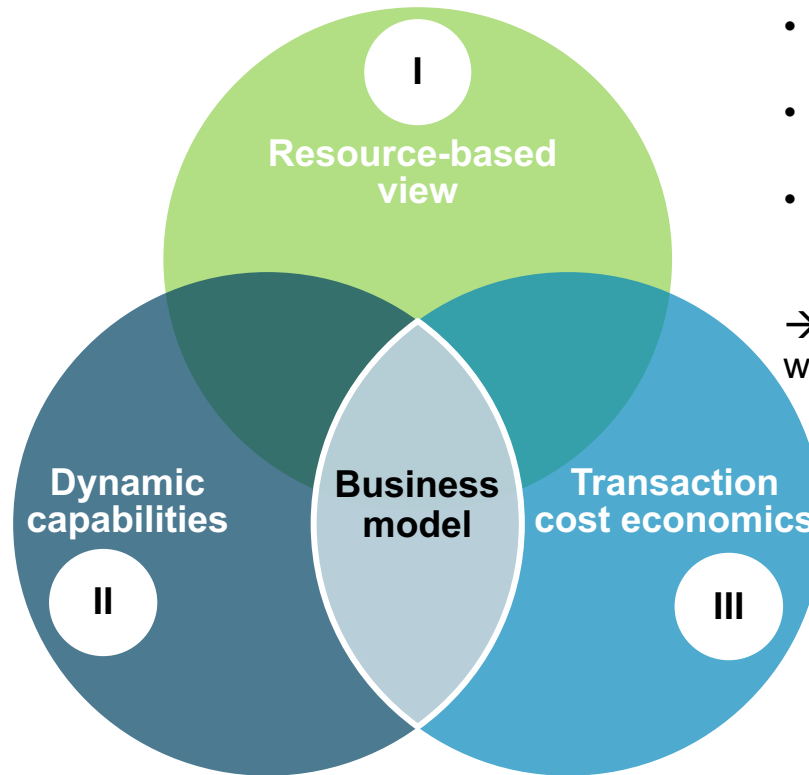
$$\frac{S}{P_t} = \frac{T_p \lambda_0}{T} = \text{const}$$

$$S \leq \frac{1}{\epsilon}$$

$$\left. \begin{aligned} N &= N_0 \\ P_t &= (m) \end{aligned} \right\}$$

Thank you.

**Overall findings –  
The concept of business model in the context of other strategic management theories to explain performance in entrepreneurial firms**



**RBV, DC & BM**

→ BM can further accentuate gains from dynamic capabilities but does not change “the rules of the game”

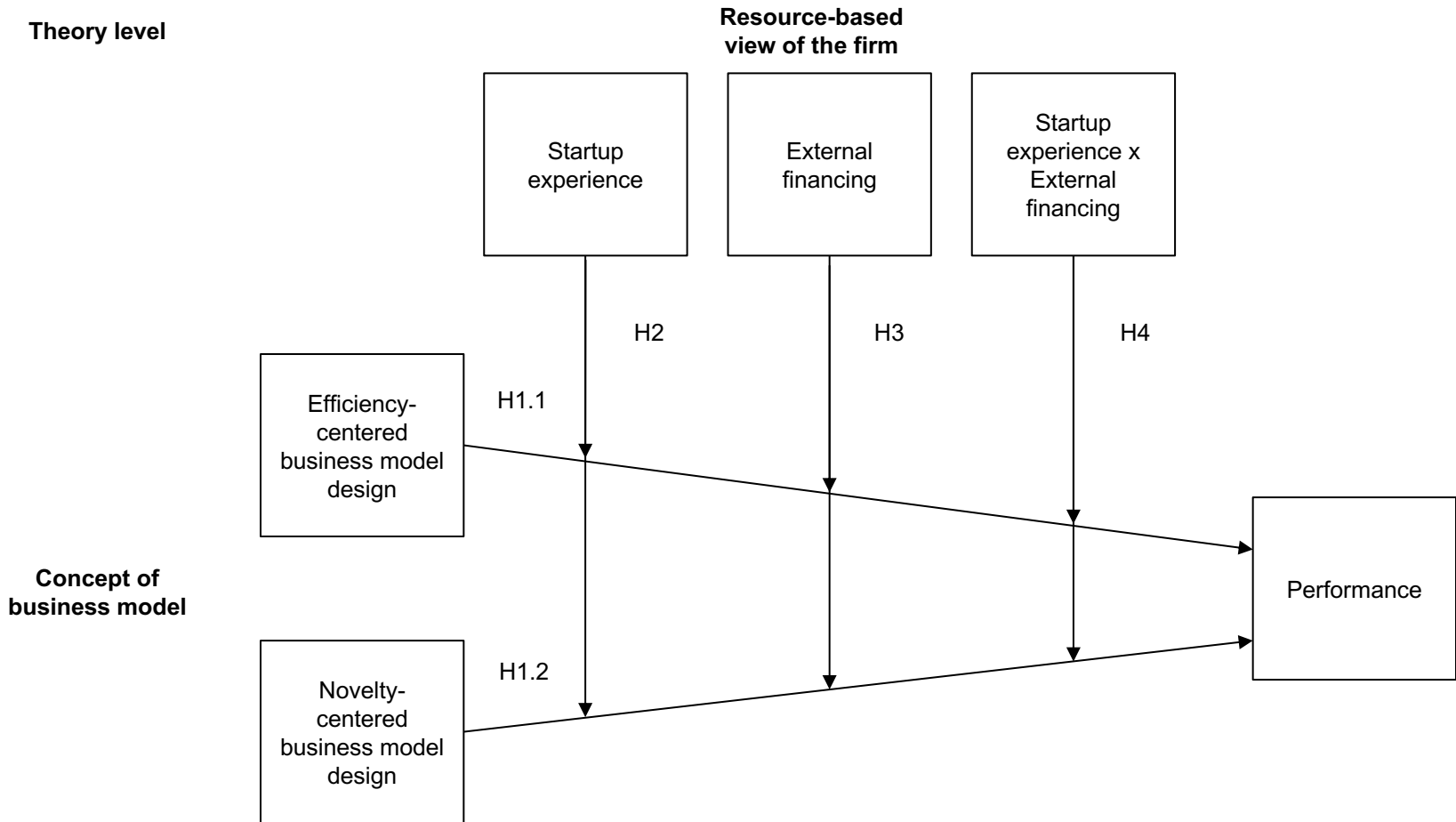
**RBV & BM**

- BM interacts with its underlying resource base
  - Efficiency-centered BMs can explain performance
  - Novelty-centered BMs rely on underlying resources to realize performance
- BM needs to be considered with resource base

**BM & TCE**

- Differentiated BMs perform better, regardless of underlying alliance structure
  - Alliance network diversity strengthens performance gains from BM
- BM suited to explain performance

# Conceptual model – BM & RBV



# Conceptual model – RBV, DC & BM

Theory level

Concept of business model

Level 3  
Moderator effect

Business model design –  
Efficiency-centered  
and novelty-centered

H3.1, H  
3.2

Level 2  
Moderator effect

Absorptive capacity

H2

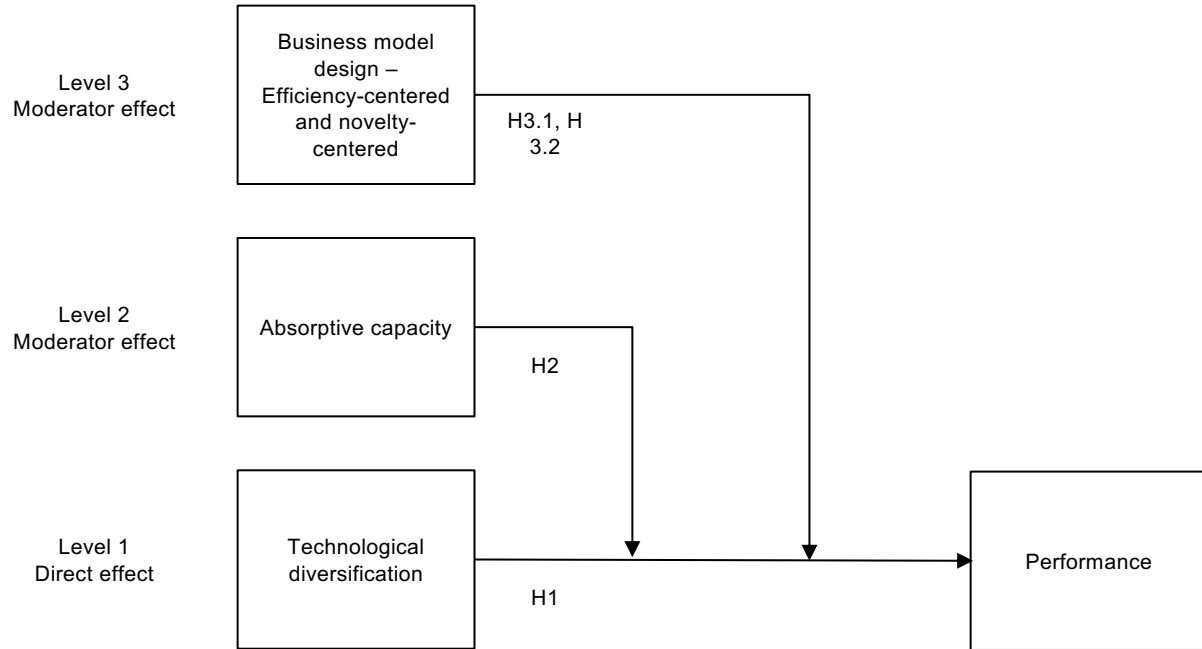
Dynamic capabilities

Level 1  
Direct effect

Technological diversification

H1

Performance

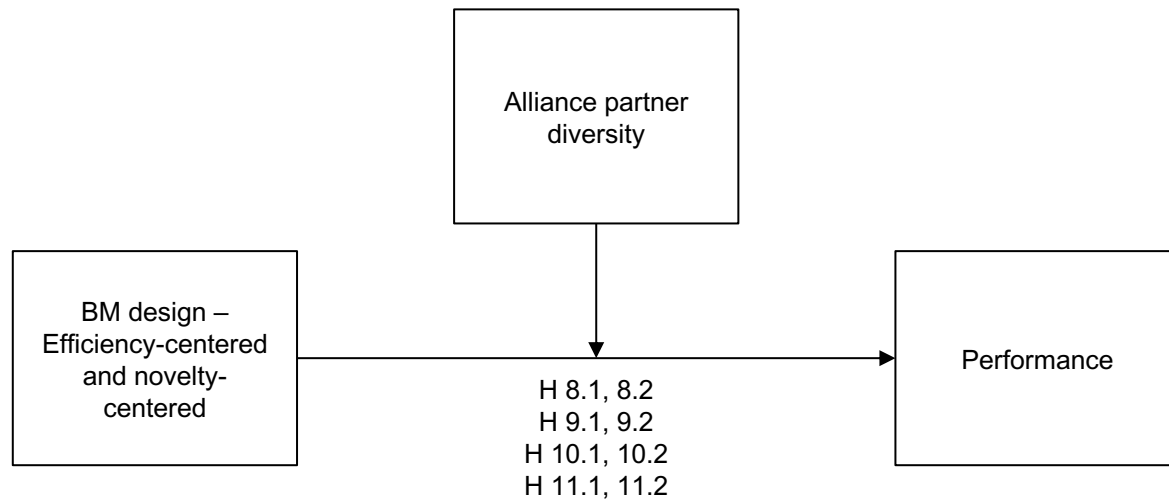


# Conceptual model – BM & TCE

Theory level

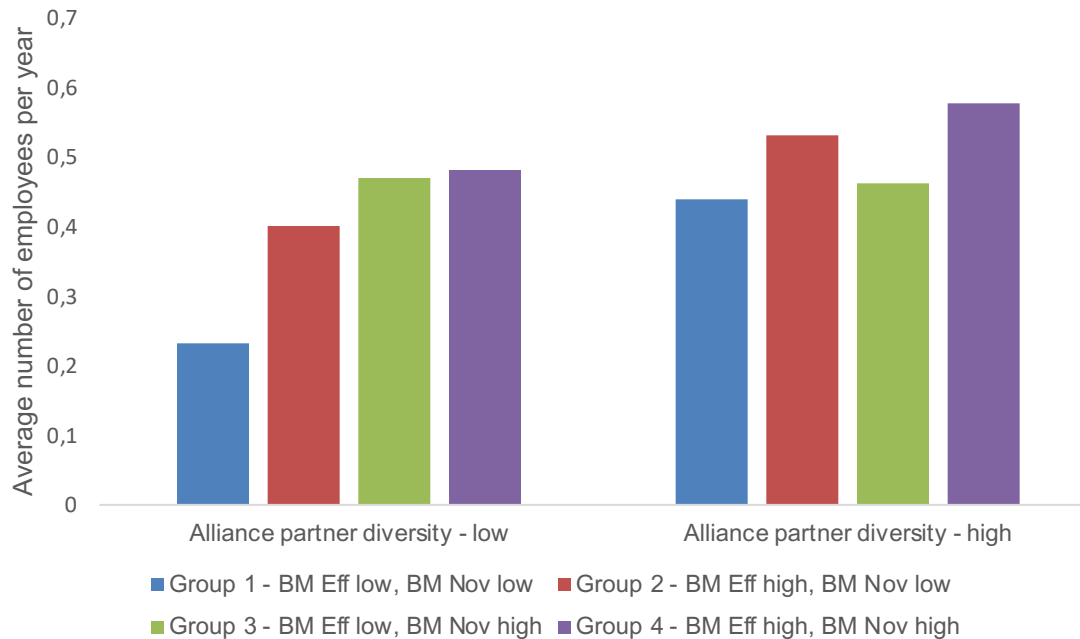
Concept of  
business model

Transaction cost  
economics



## The concept of business model in context of transaction cost economics – Business models interact with alliance partner diversity

### Median value of performance – comparison of four strategic groups



# Questionnaire – Business model operationalization

Survey business model design (Likert-Scale „0 – I do not agree“ to „4 – I totally agree“)

Type	#	Operationalization	Source	Final item loading
Efficiency-based business model	1	Transactions are simple from the user's point of view (=Trans_simple).	Zott & Amit, 2007	0.83
	2	The business model offers high transaction efficiency (=Trans_efficiency).	Zott & Amit, 2007; Brettel et al., 2012	0.90
	3	The business model avoids or reduces existing transaction costs for the customer and its partners (e.g. inventory, marketing and sales, transaction processing, and communication costs) (=Avoid_transcost).	Zott & Amit, 2007; Brettel et al., 2012	0.78
	4	The business model reduces the uncertainty or the information asymmetry among participants through increased transparency (=Avoid_uncertainty).	Zott & Amit, 2007; Brettel et al., 2012	0.64
	5	The business model is scalable (i.e., can handle small as well as large number of transactions) (=Scalability).	Zott & Amit, 2007	0.68
	6	There is a strong emphasis on the marketing of tried-and-true products or services (=Emphasis_tried_and_true).	Wiklund & Shepherd, 2005	0.76
	7	The business model allows for replication in suitable geographical locations (=Replication).	Aspara et al., 2010	Eliminated during scale purification process
	8	The startup develops capabilities to routinize knowledge transfer (=Routinize_knowledge).	Aspara et al., 2010	Eliminated during scale purification process

Type	#	Operationalization	Source	Final item loading
Novelty-based business model	1	Overall, the company's business model is novel (=Business_model_novel).	Zott et al., 2007	0.86
	2	The business model introduces novel ways to conduct economic exchange (e.g. new combinations of products, services and information) (=Novel_economic_exchange).	Zott & Amit, 2007; Brettel et al., 2012	0.93
	3	The business model links participants to transactions in novel ways (=New_link_participants).	Zott & Amit, 2007	0.93
	4	The business model brings together new participants (=Connect_new_participants).	Zott & Amit, 2007	0.84
	5	Incentives offered to participants in transactions are novel (=Novel_incentives).	Zott & Amit, 2007; Wei et al., 2014	0.92
	6	The firm has continuously introduced innovations in its business model (=Business_model_innovation).	Zott & Amit, 2007; Brettel et al., 2012	0.64
	7	There is a strong emphasis on R&D, technological leadership and innovations (=RD_technology_innovation).	Wiklund & Shepherd, 2005	Eliminated during scale purification process
	8	In its industry, the company is a pioneer with its business model (=Pioneer_business_model).	Zott & Amit, 2007; Brettel et al., 2012	Eliminated during scale purification process
	9	The business model is difficult to imitate (=Difficult_imitate).	Teece, 2010	Eliminated during scale purification process
	10	Extent to which the business model relies on trade secrets and/or copyrights (=Trade_secrets_copyrights).	Zott & Amit, 2007	Eliminated during scale purification process

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