Mergers and Acquisitions in the Software Industry

Research Results in the Area of Success Determinants

Success determinants of Mergers & Acquisitions in the software industry have scarcely been discussed so far. This is astonishing in the light of the large number of corporate takeovers. Especially with respect to the specific economic properties of the software industry, the question arises which success drivers are of particular importance. This study provides a literature overview and reveals areas for further research.

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1 Introduction

Mergers and Acquisitions (M&A) are central elements of strategic management. While the number of global M&A (2007: 77,679) and the cumulated transaction volume (2007: US$ 5.6bn) reached a peak level before the onset of the financial crisis, M&A activity dropped afterwards (Bureau von Dijk 2012, p. 1). In 2011, the level of M&A activity stabilized at 60,914 transactions and a cumulated transaction volume of US$ 3.2bn (Bureau von Dijk 2012, p. 1). This trend accentuates the correlation between M&A transaction intensity and stock market development (Bouwman et al. 2009, p. 634). A historical analysis of M&A transactions reveals that they often occur in waves and concentrate on specific sectors within these waves (Andrade and Stafford 2004, p. 104). Firms' liquidity is strengthened in times of economic prosperity as well as in highly profitable industries and builds the foundation for M&A intensity (Harford 2005, p. 530).

In recent years, a growing maturity and sector consolidation of the software industry can be observed (Léger and Quach 2009, p. 704). A comparison among 49 industries discloses that the number of M&A transactions in the software industry exceeds all other sectors in the U.S. and in Europe. In terms of cumulated transaction volume the software industry ranks second in the U.S. and sixth in Europe (Buxmann et al. 2013, pp. 68–70; Mergerstat 2009). Particularly, recent takeovers of industry giants have reached a remarkable level. This is illustrated by the takeover of Autonomy by Hewlett-Packard for US$ 10.3bn, Skype by Microsoft for US$ 8.5bn, and Cognos by IBM for US$ 4.9bn. These acquisitions accentuate the practical relevance of M&A transactions in the software industry. The importance of the software industry for the global economy needs also to be considered in this light. It represents a significant part of the information and communication technology sector, which contributes 5.4 percent to the global gross domestic product (Dutta and Mia 2010, p. 12).

Considering the high practical relevance of M&A in the software industry, the question arises which scientific findings have been provided so far and which research gaps need to be addressed. Over the last 50 years, M&A research has developed multifaceted results that can be classified into four main areas (Wirtz 2003, pp. 8–13). Beyond motives, due diligence, and post-merger integration, the success of M&A transactions is examined and determinants are analyzed. The latter constitutes the object of investigation for this study. Extensive M&A literature reviews prove that the study context is highly important (Bruner 2004, p. 69), as the choice and the effect of success determinants are context-specific (King et al. 2004, p. 187). Through its specific economic properties, the software industry provides an interesting research setting.

The specific economic properties of the software industry are to be found in the properties of software products and markets (Hess et al. 2012, p. 371). Potential motives for the high number of takeovers in the software industry can be derived from these economic properties (Buxmann et al. 2013, pp. 68–70). The most important ones and their relevance for M&A transactions are outlined in the following section.

Entry barriers to software development are comparably low. High innovation

rates and short product lifecycles foster high sector dynamics (Klosterberg 2011, p. 258). Incumbent software firms need to be agile and innovative in order to sustain their position against a high number of start-ups. In this light, corporate takeovers can be considered a source of innovation.

Furthermore, software is an immaterial good that can be replicated easily and distributed via the Internet. With economies of scale, fix costs of software development can thus be balanced by low variable production and distribution costs (Stelzer 2004, p. 243). The successful penetration of a broad user basis hence allows exponential profit potentials (Buxmann et al. 2013, pp. 23–32). M&A transactions are a means to increase the user basis accordingly.

Finally, software markets are characterized by network effects (Katz and Shapiro 1985, p. 424). Compatibility and industry standard highly determine software's market penetration (Messerschmitt and Szyperski 2005, pp. 54–55). While direct network effects are based on standardization and compatibility, indirect network effects can be yielded through complementarity. Products benefit from the market penetration of their complementary products (Gao and Iyer 2006, p. 122). For instance, a broad user basis of Microsoft Windows supports the diffusion of Microsoft Office. Network effects finally lead to oligopoly or monopoly structures on software markets ("Winner-takes-it-all" markets) including lock-in effects (Buxmann et al. 2013, p. 21). M&A transactions can establish industry standards and hence increase direct and indirect network effects. Through takeovers incumbent software firms, in particular, aim to tap into new markets and to increase the user basis and network effects of their products.

With regard to the practical relevance and the industry-specific properties the question arises, how the software industry specific M&A success compares to the generic M&A success and which success drivers determine them. Accordingly, three research questions are examined in the following study:

(1) How successful are M&A transactions in general and which success drivers determine the transaction success?
(2) How successful are M&A transactions in the software industry and which success drivers determine the transaction success?
(3) Which M&A success drivers can explain additional performance variances in the lights of the software industry specific properties?

This study is structured as follows. Section 2 defines the research context for the classification of M&A success drivers. Accordingly, success factors of M&A research are classified in Sects. 3 and 4 based on well-recognized state-of-the-art methods (Fettke 2006, pp. 260–261). While Sect. 3 summarizes success factors of generic M&A research, Sect. 4 reviews success drivers of software industry specific studies. In Sect. 5, both research streams are consolidated and open research gaps presented in the light of economic properties specific to the software industry. Section 6, finally, concludes the major findings.

2 Research Scope and Definition of Terms

The evaluation of M&A success can be carried out from an acquirer, a target, or a combined perspective. While targets strive for high returns, acquirers aim at a transaction price that is lower than the value potential expected through the acquisition. The value potential corresponds to the isolated value of the target firm and additional potentials (e.g., synergy effects) attributed to the takeover (Klosterberg 2011, p. 264). Buyers are challenged to assess both values to derive a purchase price. For the isolated assessment of a target software firm, various methods are available (Klosterberg 2011, p. 264). Additional potentials as well as the costs for their implementation are assessed within the due diligence process.

For the success evaluation of an M&A transaction various success measures can be analyzed that possess specific advantages and disadvantages. An evaluation of multiple success measures hence provides a differentiated perspective. Meglio and Risberg (2011, pp. 422–427) conduct a literature review of M&A success studies and report which measures have been applied for success analysis. They differentiate four classes based on the assessment base: capital market, accounting, operational, and overall performance measures (Meglio and Risberg 2011, p. 422). All performance measures can be further differentiated in terms of the examination interval and the definition of a control group. Short-term analyses can better reflect the specific effect of a transaction, as it is less diluted with other effects. Long-term analyses, in contrast, allow evaluations of the (integration) success over time. The application of control groups permits to adjust results for non-transaction based effects (Beitel and Schiereck 2003, p. 505).

Capital market performance measures reflect a firm's market capitalization or its risk. Cumulative abnormal returns (CAR) based on the event study method by Fama et al. (1969, pp. 3–7) are predominantly applied in M&A literature. The method examines the impact of a takeover on the stock market performance in a defined event window that typically spans a couple of days before as well as after the transaction announcement. Abnormal returns are calculated on every single day within the event window and represent the difference between the actual and the expected stock performance. The latter is calculated based on the development of a stock price in comparison to a reference value during an estimation period (e.g., 200 days). For the calculation of the reference value (e.g., S&P 500) the market model is commonly applied (MacKinlay 1997, p. 15). The abnormal return finally sums up cumulatively the results of each day during the event window. In case of positive CARs M&A transactions can be considered successful as the realized stock price exceeds the expected price. Advantages of capital market based studies are the data availability and the homogeneous assessment base. However, analyses are restricted to publically listed companies and require an adequate assessment by market participants according to the efficient capital market theory (Datta et al. 1992, p. 73; King et al. 2004, p. 196).

Accounting performance measures comprise measures in the areas profitability, growth, leverage, liquidity, and cash flow. For success evaluation, an analysis is conducted if measures have significantly changed through an M&A transaction. The advantage is that these types of measures capture a firm's realized financial results. Disadvantages are that the availability of accounting information depends on publication regulations and that measures may be affected by the applied accounting standard (Thanos and Papadakis 2011, pp. 113–114).

Operational measures capture indicators in the field of marketing, innova-

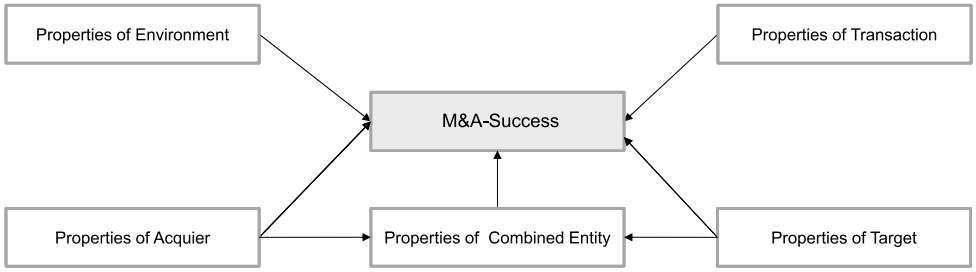

Fig. 1 Categories of M&A success drivers

tion, and productivity (Meglio and Risberg 2011, p. 422). Measures are again analyzed over time. An advantage of these measures is that specific M&A targets, such as market share or number of patents, can be examined. Disadvantages, however, are that the operationalization of indicators may be heterogeneous and the availability of data limited (Meglio and Risberg 2011, pp. 425–427).

Finally, overall performance measures capture subjective assessments of an M&A transaction and the analysis of the target's survival within the new organization. The subjective assessment of corporate takeovers is typically based on management interviews allowing for specific insights (e.g., achievement of M&A targets), but might be biased (Bruner 2001, p. 12). In contrast, a target's survival can be objectively analyzed, but may not constitute a proper measure for the transaction success (Haleblian et al. 2009, p. 491).

While the presented measures support the assessment of transaction success, they also build the foundation for the analysis of success factors. For the analysis of success determinants the analysis framework in **Fig. 1** is applied, based on the work of Haleblian et al. (2009, p. 473). Success drivers are classified into five categories: Properties of environment cover exogenous factors (e.g., legal regulations) that can be considered constants for merging companies. Transaction properties describe characteristics specific to an M&A deal (e.g., payment type). Properties of the acquirer consist of characteristics that are specific to the transaction's acquirer (e.g., acquisition experience). Likewise, properties of the target are specific to the target (e.g., form of organization). Properties of the combined entity, finally, specify characteristics that emerge when comparing acquirers' and targets' properties (e.g., relative size).

3 State of the Art: M&A Success

3.1 Method

As foundation for software industry specific M&A success analyses a comprehensive review of generic (i.e. non industry specific) empirical research is conducted. Since the amount of M&A research is enormous, this literature review examines only the effects proposed in literature reviews. The goal is to identify publications which summarize the results of M&A success studies without limiting their focus to a specific aspect (such as a certain region, section, or success driver). The literature search process is based on generally accepted methods (Vom Brocke et al. 2009, pp. 7–10; Webster and Watson 2002, pp. 15–18). A title search for the key words "and(or(review, survey, state, Studie, Umfrage, Befragung, Stand, synthes*, literatur*, meta, SOTA), or(acquisition, merger, takeover, M&A, Übernahme, Fusion, Akquisition, Firmenkauf, Firmenzusammenschluss))" in the Ebscohost Business Premier and Econlit databases resulted in 386 hits. This result list was restricted to publications that have been published in peer reviewed academic journals since 1990. Titles and abstracts were analyzed in order to identify relevant studies. The majority of publications did not deal with M&A (198) or was limited to a specific aspect such as geography (57), legal regulations (41), or industry (28). The potential number of relevant studies was thus reduced to 41 and a detailed content analysis was conducted. Six publications (see **Table 1**) were identified which met the goal of the present literature review. The other publications (35) again were limited to a specific aspect such as annual (12), methodological (5), or industry (3) analysis. Finally, a reference-based forward and backward search was conducted in the Web of Knowledge database, but without revealing additional studies.

3.2 Summary of Results

Table 1 summarizes the findings of each of the six literature reviews in terms of investigated factors and effects. Two of the six studies conduct quantitative meta studies that analytically evaluate other M&A studies. In contrast, the four qualitative meta studies interpret the results without performing an aggregated calculation of the results. While the results of the quantitative studies are hence based on statistically significant findings, qualitative studies only report an interpreting tendency. As the number of examined success drivers is far lower in the quantitative meta studies, only the qualitative assessments can be referred to for most determinants. Further, it needs to be considered that all six literature reviews provide an aggregated view on M&A studies that can apply heterogeneous methods and success measures (see Sect. 2).

M&A success can be analyzed from three perspectives: the success of the acquirer, of the target, and the combined success. While the latter two are positive according to the six literature reviews, the success of acquirers is subject to debate. Interestingly, none of the meta studies reports a clearly positive result. Therefore, it remains unclear if buyers can realize the expected value potential (see Sect. 2) of takeovers. The resulting assumption is, that the M&A success for acquirers depends on various success factors (Datta et al. 1992, p. 79). By analyzing these success drivers it can be concluded which transactions yield positive effects for acquirers. In this light, literature reviews analyze the effects of success factors examined in various studies to derive generally accepted success factors for acquirers.

Nonetheless, the meta studies often evaluate success drivers controversially so that no generally accepted conclusions can be derived. This finding indicates that success factors depend on the specific research context. Consequently, in this section, only root causes of those factors

Table 1 Literature reviews of M&A success

			Datta et al. (1992)	King et al. (2004)	Bruner (2001)	Bruner (2004)	Tuch and O'Sullivan (2009)	Haleblian et al. (2009)	Summary
Data and method	Timeframe		1975-1990	1921-2002	1971-2001	n.n.	1977-2006	1992-2009	
	Number of studies in sample		41	93	128	>100	78	167	
	Method of analysis		quantitative[1]	quantitative[1]	qualitative	qualitative	qualitative	qualitative	
M&A success	Effect on acquirer		neutral	neutral/ negative	neutral	heterogeneous results[2]	heterogeneous results[2]	neutral/ negative	inconsistent[3]
	Effect on target		positive	positive	positive	positive		positive	**positive**
	Combined effect				positive	positive		positive	**positive**
Environment	*M&A intensity (waves)*	Low					low rather preferable	low rather preferable	**low rather preferable**
		High				negative			
	Legal regulations	Low	n.s.					low rather preferable	inconsistent[3]
		High			negative				
Properties of transaction	Payment type	Cash	n.s.	n.s.	neutral	neutral	cash rather preferable	cash rather preferable	inconsistent[3]
		Stocks	negative		negative	negative			
	Multiple bidders	Yes	negative						**negative**
		No							
	Transaction mood	Friendly				hostile rather preferable	hostile rather preferable		**hostile rather preferable**
		Hostile			positive				
	Merger vs. acquisition	Acquisition	n.s.					takeover rather preferable	inconsistent[3]
		Merger							
	Use of earnouts	Yes				positive			**positive**
		No							
Properties of acquirer	Acquisition experience	Low		n.s.				heterogeneous results[2]	inconsistent[3]
		High							
	Buyer's ex-ante performance	Low			low rather preferable	low rather preferable	low rather preferable	high rather preferable	inconsistent[3]
		High							
	Initiation of M&A programs	Yes			positive	positive			**positive**
		No							
	Manager' stake	Low				high rather preferable		heterogeneous results[2]	inconsistent[3]
		High			positive				
	Usage of excess cash	Yes			heterogeneous results[2]	heterogeneous results[2]			inconsistent[3]
		No							
Properties of target	Target's ex-ante performance	Low				heterogeneous results[2]		low rather preferable	inconsistent[3]
		High							
	Form of organization	Private				positive			**positive**
		Public							
Properties of combined entity	Relative size	Big target			big targets rather preferable	positive	positive	heterogeneous results[2]	inconsistent[3]
		Small target							
	Geographic scope	National				neutral			**neutral**
		International							
	Managers' perception of cultural differences	Low						low rather preferable	**low rather preferable**
		High							
	Increase market power	Yes			neutral	neutral			**neutral**
		No							
	Synergies	Revenue			cost rather preferable	cost rather preferable			**cost rather preferable**
		Cost							
	Strategic fit	Focus	positive	n.s.	positive	focus rather preferable	focus rather preferable		inconsistent[3]
		Diversification	n.s.	n.s.	negative				
		max R^2	41.40%	n.a.[1]					

Factors are analyzed with respect to their impact on buyers.
Italic factors are only analyzed in M&A meta studies, not in software industry specific studies.
For quantitative studies only significant effects are reported. "n.s." implies non significant results.
1) "n.a." implies that no R^2 is reported.
2) "heterogeneous results" implies that within one meta study no clear result is reported .
3) "inconsistent" implies that accross the six meta studies no clear result is reported.

(printed in bold) can be discussed that are evaluated consistently in the literature reviews. For these factors it can be assumed that effects are independent of the respective research context. However, we must bear in mind that some factors have only been evaluated in one meta study so that reliable results are missing.

With respect to properties of the environment, three qualitative studies report that a low M&A intensity in the market is beneficial. Haleblian et al. (2009, p. 485) argue that managers are less inclined to overpay premiums in such times in particular.

In terms of properties of the transaction, three qualitative studies conclude that hostile takeovers are preferable for

buyers. Bruner (2001, p. 10) claims that in these cases acquirers retain value for themselves, rather than give it up in a negotiation. Further, Datta et al. (1992, pp. 75–80) state that the presence of multiple bidders has a negative impact on the stockholder gains of bidding firms, as the level of competitiveness and thus deal prices increase. Finally, Bruner (2004, pp. 72–73) considers the use of earnouts (i.e. when the payment is contingent on meeting future performance benchmarks) beneficial. He argues that this constitutes a risk management device for the buyer as it ensures that selling managers contribute to the M&A success.

With respect to properties of the acquirer, two qualitative studies assess the initiation of M&A programs as beneficial. Bruner (2004, p. 70) reasons that investors positively assess it as a nimble corporate response to evolving conditions. In terms of target properties Bruner (2004, p. 71) finds that private target firms are more lucrative than public ones. As rationale he exemplarily cites acquirers' discounts due to the lack of marketability of private firm securities.

With regard to properties of the combined entity, Bruner (2004, p. 71) concludes that geographical scope of a transaction is irrelevant. Haleblian et al. (2009, p. 481) emphasize the positive effect when managers perceive low cultural differences between the acquiring and the target firm. Strategic similarity increases the chance of enhanced synergy realization during integration and hence long-term M&A success. Besides, Bruner states in his two qualitative literature reviews that M&A to build market power does not pay. In terms of synergies, cost synergies are rather preferable than revenue synergies since the sources of gains from M&A do not derive from an anticompetitive combination of firms (Bruner 2001, p. 9). This goes in line with his observation that synergies through efficiency outperform revenue synergies. Expected efficiency gains hence drive M&A success (Bruner 2004, p. 70). He argues that efficiency gains can be realized more easily. In the light of the specific economic properties of the software industry it seems advisable to analyze, if this assumption holds true or if synergies through revenues are higher due to network effects (see Sect. 5).

4 State of the Art: M&A Success in the Software Industry

4.1 Method

This section reviews publications that analyze M&A success in the software industry. The literature search process is in line with the method presented in Sect. 3.1. Goal is to identify studies that analyze the success of corporate takeovers in the software industry. In addition to the Ebscohost databases Business Premier and Econlit, the information systems database AISeL was included to reflect the software focus. A title search for the key words "and(or(*software*), or(acquisition, merger, takeover, M&A, Übernahme, Fusion, Akquisition, Firmenkauf, Firmenzusammenschluss))" resulted in 51 hits. The result list was restricted to publications that were published after peer reviews in academic journals. Titles, abstracts, and content were analyzed in order to identify relevant studies. The majority of publications did not deal with M&A (48), but with other aspects such as organizational learning (11) or software acquisition (10). Three publications (see **Table 2**) were identified that correspond to the goal of the present literature review. A forward and backward search in these papers revealed two further relevant publications.

4.2 Summary of Results

For the software industry specific studies, the number of examined success measures (see Sect. 2) is low. All studies conduct event studies based on the market model and calculate the cumulated abnormal return as success measure. Only two studies analyze the long-term success in terms of annual performance figures (Léger and Quach 2009, p. 710) and market capitalization (Laamanen et al. 2013, p. 22). These two studies hence provide an additional long-term perspective beyond the short-term one (separate depiction in **Table 2**).

While the targets' success is positive according to the CAR studies, success of acquirers is subject to debate. As a result, it also remains unclear if buyers in the software industry can realize the expected value (see Sect. 2) of takeovers. Anticipated value such as through network effects is not automatically realized. The telecommunication industry, which is also characterized by network effects, likewise shows negative results for buyers (Izci and Schiereck 2010, p. 69). A rationale for this contradictive effect may be the aggressive bidding behavior and resulting high acquisition premiums (Jope et al. 2010, pp. 369–386). In this light, it turns out that M&A success in the software industry also depends on various success drivers (Datta et al. 1992, p. 79). The analysis of these success drivers can indicate which transaction yield positive effects for acquirers.

For most of the examined determinants, an insufficient number of studies or non-significant or controversial results are available so that no generally accepted conclusions can be derived. Analogous to the procedure in Sect. 3.2 only root-causes and implications of those factors are discussed that show significant and non-controversial results (printed in bold). It should be noted that some factors have only been evaluated in one study so that confirming results in these cases are missing.

Environmental factors are not analyzed in the present studies. With respect to transaction properties, high price-book ratios have a negative impact according to Léger and Quach (2009, p. 709). This puts the transaction price and the target's book value into proportion. The higher the price-book ratio, the higher is the acquisition premium and hence the risk to realize the synergy potentials.

In terms of the acquirers' properties, Laamanen et al. (2013, p. 21) and Gao and Iyer (2006, p. 134) identify a negative stock price impact for acquisitions of large acquirers. According to Gao and Iyer (2006, p. 129) one root cause is that managers of larger firms may be more prone to hubris. Further, Laamanen et al. (2013, p. 21) report positive effects for diversified acquirers. This effect may be caused by the increased realization of indirect network effects through complementary offerings.

With respect to the targets' properties Laamanen et al. (2013, p. 21) report that takeovers of private firms lead to positive short-term capital market reactions. They argue that the marketability of privately held firms is quite low (Laamanen et al. 2013, p. 4). Besides, Laamanen et al. (2013, pp. 21–22) show that the acquisition of divested assets yields positive results in the short and long run. A rationale for this may refer to acquirers' bargaining advantages due to sellers' distress.

Table 2 M&A success studies of the software industry

				Leger and Yang (2005)	Gao and Iyer (2006)		Laamanen et al. (2013)	Leger and Quach (2009)	Izci and Schiereck (2010)	Summary	Laamanen et al. (2013)	Leger and Quach (2009)				Summary
Data and method	Timeframe			1980-2002	1999-2004		1988-2008	1990-2003	2000-2007		1988-2005					
	Number of M&As			10033	193		5079	60	81		435					
	Success measure			CAR	CAR*	CAR**	CAR	CAR	CAR		Market capitalization	Revenue growth	Return on assets	Return on equity	Margin	
M&A success	Effect on acquirer			positive	negative		heterogeneous results[2]	target performs better	negative	inconsistent[3]						
	Effect on target			positive	positive				positive	**positive**						
	Combined effect				n.s.					n.s.						
Properties of transaction	Payment type	Cash			positive		n.s.		positive	inconsistent[3]	n.s.					n.s.
		Stocks														
	Price-book ratio	Low										n.s.			hetero-geneous results[2]	inconsistent[3]
		High						negative		**negative**			positive	positive		
	Year						n.s.			n.s.	n.s.					n.s.
	Transaction volume	Low							n.s.	n.s.						
		High														
	Transaction price disclosure	Yes					n.s.			n.s.	n.s.					n.s.
		No														
	Percentage acquired	Low							n.s.	inconsistent[3]						
		High		positive												
Properties of acquirer	Acquisition experience	Low					n.s.			n.s.	n.s.					n.s.
		High														
	Size of acquirer	Low														
		High			negative		negative			**negative**	negative					**negative**
	Degree of diversification	Low														
		High					positive			**positive**	positive					**positive**
Properties of target	Target's ex-ante performance	Low						n.s.		inconsistent[3]		n.s.			hetero-geneous results[2]	inconsistent[3]
		High							negative				positive	positive		
	Form of organization	Private					private preferable			**private preferable**	n.s.					n.s.
		Public														
	Acquisition of divested assets	Yes					positive			**positive**	positive					**positive**
		No														
Properties of combined entity	Relative size	Big Target				positive			negative	inconsistent[3]						
		Small Target														
	Geographic scope	National							n.s.	n.s.						
		Inter-national					n.s.				n.s.					n.s.
	Synergies: Market power							n.s.		n.s.		positive	n.s.	negative	negative	inconsistent[3]
	Synergies: Economies of scale							n.s.		n.s.		positive	n.s.	n.s.	n.s.	inconsistent[3]
	Synergies: Economies of scope							n.s.		n.s.		n.s.	negative	negative	hetero-geneous results[2]	inconsistent[3]
	Strategic fit	Focus		n.s.			negative		n.s.	inconsistent[3]	n.s.					n.s.
		Diversi-fication		positive												
	Strategic fit: *Stoftware stack layers*	Same stack layer			negative	negative				**negative**						
		Adjacent stack layer			negative	positive				inconsistent[3]						
		Detached stack layer				negative				**negative**						
	Strategic fit: *Compatibility of software*							n.s.		n.s.		positive	n.s.	n.s.	negative	inconsistent[3]
	Strategic fit: *Complemen-tarity of software*							negative		**negative**		n.s.	positive	negative	positive	inconsistent[3]
	Strategic fit: *Acquisition of competencies*							hetero-geneous results[2]		inconsistent[3]		n.s.	negative	n.s.	negative	inconsistent[3]
		max R^2		n.a.[1]	9.2%	39.9%	2%	12.1%	21.0%		10%	34.3%	57.8%	57.6%	60.1%	

Drivers are analyzed with respect to their impact on buyers.
Italic drivers are only analyzed in software industry specific studies, not in M&A meta studies.
*Study based on three layer product stack
**Study based on five layer product stack
"n.s." implies non significant results.
1) "n.a." implies that no R^2 is reported.
2) "heterogeneous results" implies that within one study no clear result is reported .
3) "inconsistent" implies that accross the studies no clear result is reported.

In terms of properties of the combined entity, the strategic fit is analyzed. Gao and Iyer (2006, pp. 124–128) examine the underlying products by introducing a five-layer software stack consisting of hardware, systems software, middleware, application software, and services. Takeovers in the same layer or in layers that are further apart yield negative results (Gao and Iyer 2006, p. 141). The main cause is seen in scarce complementarities and associated indirect network effects (Gao and Iyer 2006, p. 123). Léger and Quach (2009, p. 709) also investigate complementary effects based, however, on qualitative judgments in press releases. In one analysis model they report negative effects for transactions with high complementarities. This result is surprising in the light of the industry's economic properties. It remains subject to debate if this is caused by the applied method or if indirect network effects cannot be realized in complementary takeovers.

5 Discussion and Research Opportunities

5.1 Comparison of Generic and Software Industry Specific Results

The success of acquisition targets is assessed positively in generic as well as software industry specific studies. Acquisition premiums are cited as root cause as they are generally paid by acquirers and benefit target shareholders (Haleblian et al. 2009, p. 470). While the success, measured as short-term returns, is hence consistently assessed to be beneficial, an evaluation of further success analyses remains subject to research, since target firms no longer exist independently after a takeover (King et al. 2004, p. 192). Further, with respect to the high industry dynamics and innovation rates it would be of interest to investigate if acquisition premiums and hence targets' success in the software industry outperforms other sectors.

In contrast to the consistently positive evaluation of targets' success, success of acquirers is evaluated inconsistently. The presented results accentuate that acquirers' success depends on various determinants. **Table 3** compares the results of both research streams. It reveals that the majority of the 32 examined determinants is only analyzed either in the meta studies (12) or in the software industry studies (12). Merely eight factors are analyzed in both research streams and allow for a comparison of results.

Those factors that have been only examined in the meta studies reveal research gaps. Of these, seven determinants are evaluated consistently in the literature reviews. Thus, it needs to be investigated if these effects also hold true for the software industry. Five further determinants are assessed inconsistently in the meta studies and require a context specific evaluation.

With respect to the factors that have only been investigated in software industry specific studies further investigation seems necessary, if these results are due to the specific research context or if they can be generally accepted. Further, for eight of these determinants no significant or consistent results were reported across different success measures. Although the number of reliable results is still low, it must be recognized that the studies of the software industry apply context-specific approaches. They examine factors of specific relevance to the software industry. For example, the factor 'size of acquirers' reflects the transaction intensity of the industry giants. Likewise, highly specific analyses of the strategic fit between buyers and targets are conducted (Gao and Iyer 2006; Laamanen et al. 2013; Léger and Quach 2009). This is of particular relevance in the software industry as software is a complex product and synergies, e.g., through network effects, need to be thoroughly investigated.

Eight factors are examined in both research streams. Of these, the results of six drivers (**Table 3**: "relevance questionable") are inconsistent or insignificant across generic and software industry specific studies. The relevance of these factors for generic and industry-specific M&A success analysis hence remains questionable. Two determinants (**Table 3**: "relevance for software industry?") are assessed to be relevant in the generic M&A meta studies, but have not revealed consistent results in the software industry studies. Nonetheless, it cannot be concluded that these factors are not relevant to M&A in the software industry as they have so far only been examined in few studies. With respect to the form of the targets' organization, it can be noted that Laamanen et al. (2013, p. 21) in their event study confirm the positive effects of private targets, as proposed by Bruner (2004, p. 70), for the software industry. This result indicates that acquirers can also benefit in the software industry from bargaining advantages due to the low marketability of private firm securities.

The current state of software industry specific research allows only limited comparisons with the generic research on M&A success drivers. Beyond increasing the number of studies, implications of different study settings should be investigated. The high number of heterogeneous results within the studies and the inconsistent findings across the studies may refer to different study settings and limits comparison opportunities.

Further, the number of examined success measures, in particular, needs to be increased and their implications analyzed. The focus on CAR analyses omits other potentially meaningful success measures (see Sect. 2). Annual performance figures as well as operational and overall performance measures should be examined in order to achieve a comprehensive assessment of M&A success in the software industry (Haleblian et al. 2009, p. 493). Besides, a combined analysis of short- and long-term success measures can, for instance, provide interesting insights with respect to a firm's integration competency. The challenge for success measure selection is to identify those that are of particular relevance to the software industry. While capital market returns are relevant in the short run, in the long run growth, profitability, and innovation are of decisive importance as acquisitions should foster the software firms' network effects and agility. Léger and Quach (2009, p. 711) conclude in their analysis that software firm takeovers underperform in their short-term reaction on capital markets and that synergies, e.g., through network effects, can be better realized and evaluated in the long run. A comprehensive assessment of M&A transactions in the software industry hence requires a proper selection of success measures and a discussion of their results.

Just as the success measures, the number of investigated success factors should be enlarged, as, many determinants have not yet been sufficiently evaluated. Particularly, an analysis is necessary if there are factors which are only relevant to the software industry or that have different effects in the software industry. The economic properties of the software industry can serve as starting point for these analyses. Their impact is discussed in the following section.

Table 3 Comparison of generic and software industry specific results

			Summary literature reviews	Summary software industry studies (CAR)	Summary software industry studies (long term)	Comparison	Specifics of software industry
Environment	M&A intensity (waves)	Low	low rather preferable			meta studies only	x
		High					
	Legal regulations	Low	inconsistent[3]				x
		High					
Properties of transaction	Payment type	Cash	inconsistent[3]	inconsistent[3]	n.s.	relevance questionable	
		Stocks					
	Price-book ratio	Low			inconsistent[3]	software industry only	x
		High		negative			
	Year			n.s.	n.s.		
	Transaction volume	Low		n.s.			
		High					
	Transaction price disclosure	Yes		n.s.	n.s.		
		No					
	Percentage acquired	Low		inconsistent[3]			
		High					
	Multiple bidders	Yes	negative			meta studies only	x
		No					
	Transaction mood	Friendly	hostile rather preferable				
		Hostile					
	Merger vs. acquisition	Acquisition	inconsistent[3]				
		Merger					
	Use of earnouts	Yes	positive				
		No					
	Acquisition experience	Low	inconsistent[3]	n.s.	n.s.	relevance questionable	x
		High					
	Size of acquirer	Low				software industry only	x
		High		negative	negative		
	Degree of diversification	Low					
		High		positive			
	Buyer's ex-ante performance	Low	inconsistent[3]			meta studies only	
		High					
	Initiate M&A program	Yes	positive				
		No					
	Managers' stake	Low	inconsistent[3]				
		High					
	Use excess cash	Yes	inconsistent[3]				
		No					
Properties of target	Target's ex-ante performance	Low	inconsistent[3]	inconsistent[3]	inconsistent[3]	relevance questionable	x
		High					
	Form of organization	Private	positive	private preferable	n.s.	relevant for software industry?	x
		Public					
	Acquisition of divested assets	Yes		positive	positive	software industry only	
		No					
Properties of combined entity	Relative size	Big target	inconsistent[3]	inconsistent[3]		relevance questionable	
		Small target					
	Geographic scope	National	neutral	n.s.			
		International			n.s.		
	Managers' perception of cultural differences	Low	low rather preferable			meta studies only	
		High					
	Market power	Yes	neutral				x
		No					
	Synergies	Revenue	cost rather preferable	n.s.	inconsistent[3]	relevant for software industry?	x
		Cost					
		Economies of scale		n.s.	inconsistent[3]		
		Economies of scope		n.s.	inconsistent[3]		
	Strategic fit	Focus	inconsistent[3]	inconsistent[3]	n.s.	relevance questionable	x
		Diversification					
	Software stack layers	Same stack layer		negative		software industry only	x
		Adjacent stack layer		inconsistent[3]			
		Detached stack layer		negative			
	Compatibility of software			n.s.	inconsistent[3]		x
	Complementarity of software			negative	inconsistent[3]		x
	Acquisition of competencies			inconsistent[3]	inconsistent[3]		x

Drivers are analyzed with respect to their impact on acquirers.
1) For quantitative studies only significant effects are reported. "n.s." implies non significant results.
2) "heterogeneous results" implies that within one study no clear result is reported.
3) "inconsistent" implies that accross the studies no clear result is reported.

5.2 Economic Properties of the Software Industry

The meta studies emphasize that success factors are highly dependent on the specific research context. M&A success factors offer interesting research areas in the light of the specific economic properties of the software industry which build the theoretical foundation for the relevance and effect of M&A success factors. In the following, those success drivers (see the last column in **Table 3**) are discussed that appear to be of high relevance for the specific economic properties of the software industry. Although these factors have been scarcely examined in empirical research so far, a theoretical reasoning and a description of potential effects is presented.

Environmental factors, surprisingly, have not yet been investigated in software industry specific studies, even though they also may be relevant. Particularly, the impact of transaction waves should be analyzed since multiple intertemporal occurrences could be observed (Schiff 2007, p. 1). The consolidation in the area of Business Intelligence software, for instance, provides an application scenario. In 2007, multiple large acquisitions occurred in short time windows. Hyperion was acquired by Oracle, Business Objects by SAP, and Cognos by IBM. The high dynamics in the software industry develop new innovation fields in which, with increasing maturity, a consolidation takes place. Software's network effect character often leads to lock-in effects. Consequently, early acquirers in a transaction wave may expect above-average returns (Mcnamara et al. 2008, p. 113) as they can enlarge their customer base and establish market power through network effects. An increase in market power, however, may also confront legal regulations. Skype's takeover by Microsoft, for instance, was thoroughly examined by cartel authorities. Acquirers hence need to try to achieve market power to generate network effects without occupying an evident monopoly position (Budzinski and Christiansen 2007, pp. 9–10). In case of a confrontation with legal regulations, constraints can be issued that may reduce expected synergies. Consequently, we can expect takeovers that cause legal examinations to be less beneficial.

In terms of transaction properties, the impact of multiple bidders should be examined. Due to an intense rivalry for innovation and for a large user basis, often several software firms compete for attractive targets. In 2005, for instance, Oracle outbid SAP during the takeover of Retec. It can be assumed that offers of multiple bidders have a negative impact on software acquirers' M&A success as buyers' management may be more prone to hubris in these cases (Datta et al. 1992, p. 70). Furthermore, the industry-specific influence of acquisition premiums (e.g., measured as price-book ratio) on M&A success should be examined. Especially in dynamic innovation sectors with high growth rates, premiums are difficult to calculate and imply a high risk (see calculation of synergies in Sect. 2). Consequently, negative M&A returns can be expected due to the risk associated with high acquisition premiums (Léger and Quach 2009, p. 704).

In view of the great number of M&A deals by large industry giants, the impact of acquisition experience needs to be further analyzed (Léger and Quach 2009, p. 704). Large firms strive to acquire innovations and to foster their market power through direct and indirect network effects. Based on the theory of organizational learning it can be assumed that acquisition experience is beneficial in a dynamic sector such as the software industry (Barkema and Schijven 2008, p. 594). In addition, the acquirers' size is important to realize network effects. Large firms often have a broad user basis and can utilize it for acquired products. It is hence likely that big acquirers can realize above-average revenue synergies through network effects. Surprisingly, Gao and Iyer (2006, p. 134) and Laamanen et al. (2013, p. 21) evaluate acquirers' size negatively. Corporate takeovers by industry giants hence offer further areas for research.

Moreover, target firms' ex-ante performance should be evaluated. The question arises, if innovations can be acquired successfully in a dynamic sector such as the software industry. Takeover timing is important as innovative firms often are not profitable in the beginning, but then grow rapidly (e.g., through network effects). Thus it should be preferable to acquire young software firms, before their growth and success make the deal price rise exorbitantly. Many of the firms are private in the beginning and list at capital markets with growing size. Takeover prices for private firms are often lower due to the more difficult marketability of private securities. Thus, the acquisition of private targets should be beneficial for software acquirers' success.

For properties of the combined entity, revenue synergies are of particular interest in the light of the industry-specific network effects. While generic meta studies point out that cost synergies outperform revenue synergies, low production cost and revenue-stimulating network effects can lead to diametrical synergy effects in the software industry. Particularly market power is important to software firms. A theoretically positive effect of network effects for software M&A can be concluded, even though the present studies have not sufficiently confirmed them and further investigations are hence required.

Strategic accuracy of fit plays a major role regarding the network effect theory, for which factors such as compatibility and complementarity are decisive. First results in the area of complementarities by Gao and Iyer (2006, pp. 124–128) accentuate the potential indirect network effects in the industry. To increase the explanatory power of a strategic fit, a detailed examination and specific operationalization of factors is required. A prerequisite for this is that firms can be described and classified in a standardized manner. Approaches of the business model research may offer valuable support here. Business models describe the strategic positioning of a firm (Osterwalder 2004, p. 11) and can impact firm performance (Lambert and Davidson 2012, p. 8). Building upon an industry-specific business model definition, Schief et al. (2013, pp. 4–8) classify software firms based on their annual reports. These variables can make factors such as compatibility and complementarity more specific. For instance, revenue models can be applied as specific parameters for compatibility or product focus for complementarity. Finally, specific classification schemes also allow evaluations in terms of inter- vs. intra-industrial diversification that are more precise than analyses based on the commonly applied Standard Industrial Classification (SIC) scheme. In view of direct and indirect network effects it can be assumed that M&A deals are beneficial if business model characteristics are compatible and products are complementary.

6 Summary and Outlook

This literature review examines the success determinants of Mergers & Acquisitions in the software industry. Be-

Abstract

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Mergers and Acquisitions in the Software Industry

Research Results in the Area of Success Determinants

This paper analyzes approaches investigating success drivers of mergers and acquisitions (M&A) in the software industry. The literature review covers a classification of research papers in the generic and software industry specific M&A research discipline. The results accentuate that the impact of success factors depends on the research context and that many factors have not been examined so far with respect to the software industry. Building on these insights, the resulting areas for research are pointed out. The investigation of software industry specific factors, in particular, promises to contribute to the analysis of variance in M&A performance.

Keywords: M&A, Merger, Acquisition, Software industry, State of the art, Literature review

yond a summary of generic M&A research, software industry specific studies are analyzed and classified. Generic and industry-specific research is then compared and thoroughly assessed while accounting for the specific economic properties of the software industry. Thus, various areas for further research are highlighted in the field of software industry specific M&A research.

The results of the first research question point out that acquirers' M&A success is inconsistent and depends on various success factors. The results of the meta studies prove that most factors depend on the specific research context. In line with this finding, King et al. (2004, p. 195) criticize that generic determinants have no sufficient explanatory power on M&A success, and the authors hence emphasize the need to identify additional context-specific factors. Though the results of Sect. 3 are based on meta studies, by that factors' effects are compared covering different research settings. Thus, conclusions can be drawn with respect to the general relevance of success factors. However, detailed inferences are limited regarding to the specific research settings of the underlying studies. For example, revealed effects can refer to varying methods and success measures.

With respect to the second research question it is found out that acquirers' M&A success in the software industry depends on, similar to the generic M&A research, various success factors. The number of significant results is, however, comparably low as the software industry M&A research has only lately increased in importance. Only few M&A success factors have so far been examined in the software industry context. Their relevance for the software industry is hence subject to research. Additionally, effects for investigated factors are partly evaluated controversially (e.g., targets' ex-ante performance) or only analyzed in one study (e.g., price-book ratio). Only rarely are effects (e.g., acquirers' size) evaluated consistently across multiple studies. The implications of different research settings need to be analyzed, in particular, with respect to the selection of success measures. Further research is hence required to derive reliable results.

The third research question discusses which determinants explain additional performance variances with regard to the software industry specific properties. In this light, the studies report first interesting starting points. Some of the examined M&A success drivers (e.g., analysis of complementarity) point out effects on M&A success. They indicate that some success factors may support the realization of above-average returns in the software industry. Nevertheless, various factors seem to be interesting in the light of the specific economic properties of the software industry, but have so far only been insufficiently (e.g., revenue synergies) or not investigated (e.g., M&A intensity). Besides, the design of the industry-specific studies at hand often resulted in the fact that a comprehensive and simultaneous evaluation of multiple factors was not conducted. This is emphasized by the studies' reported coefficient of determination R^2 in **Table 2**. The degree of explained variance varies between 3.7 % and 60.1 % depending on the examined determinants. Consequently, a need for integrative research can be derived that includes generic M&A success factors as well as determinants representing the specific economic properties of the software industry.

This study is the first structured literature review of M&A success research in the software industry and provides added value for research and practice. Researchers can use the research framework in **Fig. 1** and the classification results in **Tables 1**, **2**, and **3** as a base for conceptualizing research activities. M&A research requires a context-specific analysis and the software industry offers a promising research setting. An industry-specific examination of success factors can provide specific conclusions for the software industry as well as inferences in terms of the factors' relevance to the generic M&A research. The relevant specific economic properties of the software industry are presented and their impact on M&A success factors is discussed. The topic is also relevant to practitioners and investors in the light of the high number of M&A deals in the software industry. Decision makers should be aware that M&A success depends on context-specific factors. However, to date, an insufficient number of consistent results could be reported for the factors' effects. Thus, managers need to carefully analyze and communicate the advantages of each corporate takeover. Finally, also investors can benefit when attempting a proper assessment of M&A deals.

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