

Bachelor's Programme in Management

Span of Control: manager skills and growing team sizes

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Title of thesis Span of Control: manager skills and growing team sizes

Programme Bachelor in Economics and Business Administration

Major Management

Thesis supervisor Prof. Taija Turunen

Date 29.12.2025

Number of pages 37

Language English

Abstract

This thesis discusses themes around span of control – factors affecting the span, the implications of span and ultimately how manager’s required skillset is affected by growing team sizes. The thesis is a literature review based on existing studies during the past hundred years. Main findings include 30 factors related to effective spans, how current management roles, especially in chief-levels, are getting more complex and fast-paced and which skills have heavier emphasis as the number of subordinates grow.

Keywords Span of control, management ratio, manager responsibilities, manager skills.

Tiivistelmä

Tämä kandidaatintyö selvittää teemoja valvontajänteen ympärillä – mitkä tekijät vaikuttavat jänteen suuruuteen, mitä vaikutuksia jänteen koolla on ja kuinka johtajalta vaadittavat taidot muuttuvat kasvavan tiimikoon yhteydessä. Tutkielma on kirjallisuuskatsaus, joka perustuu viimeisen sadan vuoden aikana tehtyihin tutkimuksiin. Päälöytöinä pidettäkään noin kolmeakymmentä tehokkaaseen valvontajänteeseen liittyvää tekijää, johtaja-tason tehtävien kompleksisuuden ja vaativuuden kasvua ja kasvaviin tiimikokoihin liittyviä taitovaatimuksia.

Avainsanat Valvontajänne, esihenkilön vastuut, esihenkilön velvollisuudet.

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Preface and acknowledgements

I want to thank my family for their loving support.

Helsinki, 29 December 2025
Joonas Heloterä

Abbreviations

CEO	Chief Executive Officer
COO	Chief Operating Officer
HR	Human Relations
LMX	Leader-Member-Exchange (leadership theory)

1 Introduction

Organizations have been studied effectively for about a century (Van Fleet & Bedeian, 1977; Anand & Daft, 2006). By organization we can mean a team, department, a division or an entire company. (Burton et. al., 2020) defines an organization as “a consciously coordinated social entity, with a relatively identifiable boundary, which functions on a relatively continuous basis to achieve a common goal or a set of goals”. An organization can also be defined as an administrative and functional structure, as the personnel of such structure or as a legal body (Merriam-Webster, 2025). If we look into the administrative and functional matter, the organization can be formed by its processes, products, functions, departments, divisions, clientele, geography et cetera. A common way of forming an organization is to use the classic organization design configurations of simple, functional, divisional and matrix types, but very often organizations are formed as a combination of the mentioned elements, whichever suits best the needs and the complexity of the given organization (Williams, 2015; Burton et. al., 2020). The studies point out different eras where a specific type has trended (Anand & Daft, 2006). What unites all organizations is that they are formed of the people and their relationships. According to the Finnish Employment Contracts Act, an employee works for the employer under the employer’s management and supervision, but the law does not require a single person acting as an employee’s manager (Finlex, 2001). Still, even here in Finland, organizations are usually formed with specific superior-subordinate-relationships: a named manager supervising their corresponding number of subordinates, subordinates reporting to a named manager (or more). Managers are chosen by specific skills and qualities, but do we know how the required skills or qualities change depending on the number of subordinates the manager has to manage?

If we peer into how an organization is formed by its chain of command and number of superiors and their subordinates, we can start understanding the “personnel pyramid” of an organization. The depth or height of an organization describes its tallness, how many levels of hierarchy exist, for example with the CEO on top, followed by management, middle management, team leaders and employees. The width of an organization describes its **span of control** – how many subordinates a manager is responsible for – in other words how many subordinates directly report to one manager. Span of control has synonyms and related terms, that very often are used interchangeably but sometimes meaning a slightly different metric. Span of control, span of supervision, span of management or management ratio are common terms. Span of control is perhaps the most used one. Per some sources the *average span of control in an organization* is called the management ratio (Davison, 2003). In this paper, I use span of control as the umbrella term and its use in the text is defined by context. “Organization” and “company” are

used interchangeably, although in a wider perspective organization can mean any organized set of people with a common goal.

The span of control varies within an organization. For example, on the top level a 10-people management team might report directly to the CEO but lower in the hierarchy a team leader might only have 5 workers. As we return to the “personnel pyramid”, we can start seeing if some levels are bloated or if some managers have more personnel responsibility than others. We can also start analyzing different hierarchical aspects like bureaucracy or inertia in decision making. If an organization has several levels of management, the chain of command includes several managers, information travels along a longer chain and decision-making is slower. In general, a flat organization has less bureaucracy and is faster in decision making than a tall organization, but the managers in a flat organization also have more subordinates per manager, which gives them less time to manage individual team members. This gives the subordinates more autonomy, which suits some people better than others. It seems the span has been increasing in the past decades. (Davison, 2003; Neilson & Wulf, 2012)

Returning to the Finnish Employment Contracts Act, the law requires an employer to improve its relationship with all employees and between employees (Finlex, 2001). This raises interesting questions related to the span, which I will study in this thesis. After defining the basics, I will start looking into which factors affect span of control and what implications does span of control have. Next, managers’ responsibilities and skills have their own pages and then I’ll move to my research question: how does the increasing span affect the required manager skillset? And ultimately, for later studies and not answered in this thesis, we would like to know how many subordinates a manager can effectively manage.

In this thesis I will study different contexts based on the available literature. Some chapters focus more on chief-level management, others are more general. The structure of this thesis is as follows: Chapter 1 is the introduction to the topic. Chapter 2 introduces organizational structure, span of control and management levels, which factors affect span of control and how the span differs in different environments. In Chapter 3 I will have a look at managers’ responsibilities and skills. This will be followed by implications on manager skills as the span of control increases. In the end of Chapter 3 I will talk about managers’ time allocation and if an ideal span of control can be found. Chapter 4 is for the conclusion, limitations and ideas for further study.

2 Organization design and span of control

2.1 Organizational structure

Organizations can be formed in various ways, given their goal, processes, amount of people, how decisions are made, complexity, function, product, location, market, clientele etc. There is no perfect organization for every situation, but organizations change form based on need – how the organizations are divided into subunits and how by working on their own tasks the subunits are made to realize the bigger goal of the organization is called a *fit* (Burton et al., 2020). A company can expand organically by hiring more people as its business grows or inorganically by merging with other companies or acquiring them. As the business grows, shrinks or changes, a company can rearrange its organizational structure, division, functions and units as needed.

Organizational structure can be seen as the vertical and horizontal form or configuration of company's departments, authority and tasks. It answers to questions like “who does what?”, “who reports to whom?” and “where is it done?”. This traditionally comes with departmentalization, where specific units are founded by the subdivision of work and workers responsible for particular tasks (Williams, 2015). Based on Burton, Obel & Håkonsson (2020) the basic configurations are divided based on their functional specialization and product/customization orientation. The configurations are 1) simple configuration 2) functional configuration 3) divisional configuration 4) matrix configuration. Number 5) could be seen as the combination of these configurations. Functional specialization means that the business or department is focused on specific task area, e.g., production, while product / customization orientation implies that the business or department focuses on creating customized products or services. Figure 1 discusses the relationship of mentioned elements and configurations.

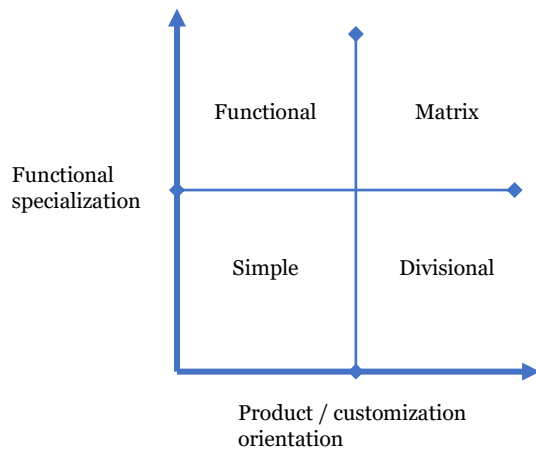


Figure 1: quadrant chart of increasing functional specialization and product / customization orientation by Burton et al. (2020)

A small organization usually starts with a simple configuration, where one leads on top and others report to this person. As the organization grows in complexity, functional and divisional configurations usually come into play and very often big companies implement some kind of matrix configuration. Below you can find an example of 5) combination of configurations in Figure 2. It can be interpreted as a corporation where a CEO is leading independent geographical divisions (e.g. Asia, Europe, America), where the first division has a matrix configuration with separate product lines (e.g. computers, phones, software) that are sold in different markets or customer segments (e.g. personal, small companies, corporate). In this matrix, some units can be co-led although they report to two managers (product & market). The CEO square could also be interpreted as a top-management unit, which includes e.g., financial, legal, HR and cybersecurity departments, which govern all divisions' processes related to their knowledge.

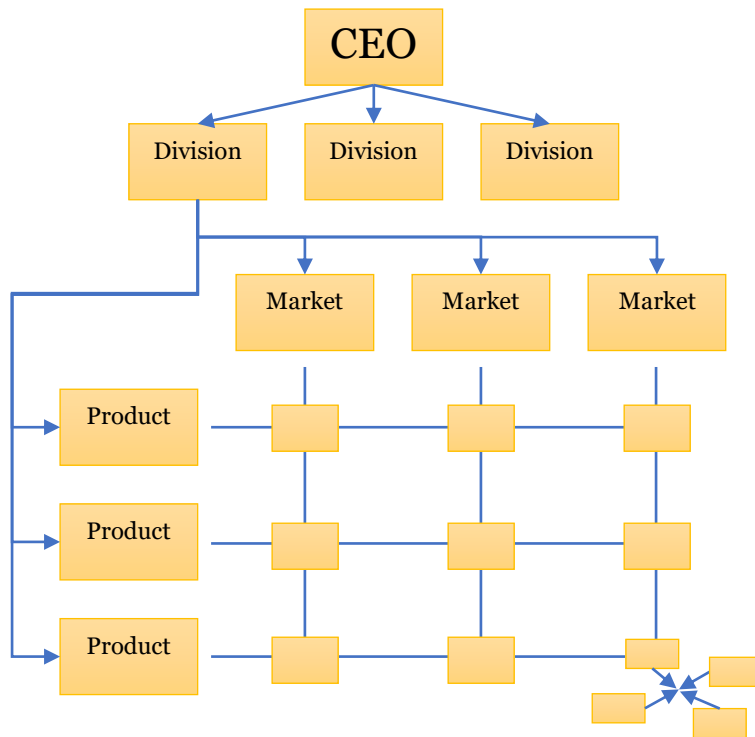


Figure 2: combination of configurations.

Large corporations can be expanded overseas and be a mix of various product lines, customer segments, language areas, cultures, factories, offices, acquired and merged companies and the corporation might have gone through several structural reorganizations and change management, so it is natural that the company structure does not stay static but changes over time as needed.

(Burton et. al., 2020; Turunen & Mäkkeli, 2025)

As a response to the classic organizational configurations presented on the previous pages, newer organization models exist, like **holacracy**, where different self-managed teams (or circles) work together with chosen links communicating between circles and coordinating the goals of the “super circle” to “sub-circle” level (Martela, 2023). **Network organizations** work in a similar decentralized way, where autonomous teams or departments or external partners are connected and linked together for a common goal. A **virtual organization** is a noun for a geographically decentralized collaboration, where communication is mainly maintained with remote technologies (more common now in post-covid work life). (Williams, 2015). An organization can form itself pretty much as it needs, but in this thesis, I will focus on units with an actual manager.

2.2 Span of control and layers of hierarchy

Span of control can be studied per entire organization or team level. The span of control per manager is calculated simply by formula:

$$\text{Span of control} = \frac{\text{Regular team members}}{\text{Manager (1)}}$$

If a manager has 5 subordinates, the manager's span of control is 5. The *average span of control* (*management ratio* in some sources) of the entire organization is calculated by similar formula:

$$\text{Average span of control} = \frac{\text{Regular employee headcount}}{\text{Management headcount}}$$

, where *regular headcount* includes the average of full-time and part-time *regular employees* and management headcount includes all officers and managers (excluding project managers, as their power is project-related and not direct superior-subordinate-relation). Span of control focuses more on individual manager's workload, number of direct reports and the manager's effectiveness of supervision, while average span of control focuses on organization's management structure's costs and efficiency. (Davison, 2003)

If we delve deeper into authority and hierarchy, we can analyse an organization with other tools: height and width. Height of an organization means its levels of hierarchy and chain of command – how many distinct levels of management exist, who reports to whom and how the line of reporting moves up and down in the company. Width means span of control – how many people report to a manager, how many workers per manager. If we put this information together in an entire organization or specific department, we can draw a “personnel pyramid”, analogous to a population pyramid. It shows both the levels, their population and relative sizes. If one manager has a team of five people reporting, the span of control is 5. If a department has 10 managers on a couple of levels and 100 specialists, the average span of control is 10. Figure 3 shows an organization with seven levels of hierarchy and their width within a company or department.

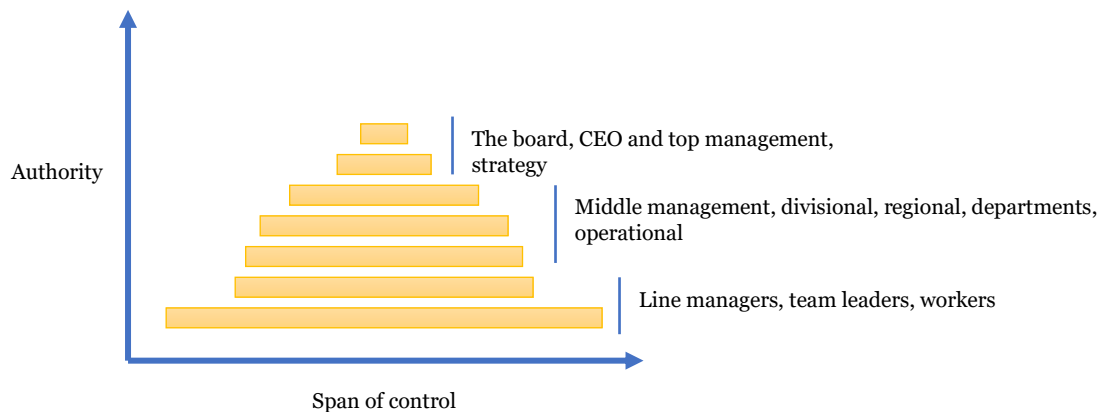


Figure 3: personnel pyramid, authority and span of control.

An organization with a flatter structure means less levels of hierarchy and a high organization means more levels. A narrow organization means a small span of control and a wide organization means more subordinates per supervisor. A personnel pyramid is a crafty tool as it shows the levels in sheer personnel numbers, e.g., if middle management levels are bloated or how the personnel structure has changed over time. The layers don't always increase in size when moving down the pyramid but can vary.

2.3 Which factors affect span of control?

To realize the length of context, I'll go briefly into history. Span of control is an ancient concept. The Roman army during 2nd century BCE had a clear span related to the size of centuries, cohorts, legions and their relations. It is suggested that even older civilizations like ancient Egyptians and Babylonians had a notion of organization. For the academics and war officers, it took until the Industrial Revolution and beginning of 1800's to start researching span of control. Napoleon Bonaparte said that the maximum span of control in war is 5, some other military officers voted for 3–6 and Carl von Clausewitz set the maximum to 10. (Van Fleet & Bedeian, 1977). Discussion regarding the span can be summarized in the following table:

Table 1: Collection of statements on the span of control, summarized from Van Fleet & Bedeian, 1977

Year	Authors	Theme	Span
1800–	Napoleon, Clausewitz	War officers	5–10
1909–1916	Mason, Fayol	Upper levels Lower levels, factory	4 15–60
1921–1946	Hamilton, Moreland, White, Graicunas, Urwick, Dennison	Cognitive, executive	3–6...12
1949–1954	Balderston, Karabasz, Davis, Newman	Executive Common labor	3–9 10–30...50
1955, 1970	Koontz, O'Donnel, Haimann, Scott	No definite, fixed span. Depends on the complexity and relationships	

Next, we'll investigate what affects team size. From my own experience it seems that when a company or department grows, both in a startup or an international corporation, managers hire more people, which causes units to grow. The number of managers does not grow in the same respect, as workers or specialists bring customer or product value and managers as the coordinators are more or less an expense. The number of subordinates per manager increases and span of control increases. Companies are interested in optimizing the span of control and levels of hierarchy based on several elements, for example efficiency, needs and available skillsets. Of course, span of control cannot increase to infinity, but there must be some kind of tipping point in team size where a manager cannot control, support or coordinate their team efficiently.

It is said that building, managing and developing qualified teams is one of the most challenging tasks in modern management (Eubanks et. al., 2016; Klug & Bagrow, 2016). Within an organization, the span of control can vary in different levels of management, but it can also vary between units in the same level of management. The *actual* span of control in a team or unit may differ from *optimal* span of control, which depends on the manager's physical and mental capabilities of effectively managing a team. Manager's capabilities are one factor, and as different subordinates have different needs, the team composition also affects the optimal span. It is also argued that team performance and organizational efficiency can be estimated through span of control. (Remenova et. al., 2018; Oksman, 2024)

If seen through **relationship management**, a manager must manage their relationship with their subordinates, but also between subordinates themselves. In 1933 V. A. Graicunas (Delbecq, 1968) calculated in his classic essay that the number of *direct* relationships or connections in a group increases geometrically with a formula:

$$C = \frac{n(n-1)}{2}$$

, where the C is the number of direct connections in a group of n people. With a small team size of 3, the number of connections is 3, but already a team of 5 people has 10 unique connections, and a team of 7 people has 21 connections. Based on this Graicunas recommended a span of control of 5 people, but we need to consider the level of management and other context related to span – it is quite different if a manager is supervising 5 people or directing 5 divisions. Graicunas himself stated that the span doesn't only depend on direct relations, but also between groups of subordinates and superiors (Davison, 2003). Several American companies consider a team of 5–7 people to be optimal (Urwick, 1974). How the direct connections grow by the formula are presented in the Table 2:

Table 2: number of direct connections with a team size from 1 to 100 as formulated by Graicunas.

Team size	Connections	Team size	Connections	Team size	Connections
1	0	6	15	15	105
2	1	7	21	20	190
3	3	8	28	30	435
4	6	9	36	50	1225
5	10	10	45	100	4950

I have to point out that relationship management is not the only tool to measure team or management complexity, but it gives some perspective into relationship management. Nikolowa (2015) also discusses how a large membership brings complexity into team relationships and coordination is needed to affect communication time, work efficiency and team performance.

If we return to Table 1, we can see that the recommended span stays rather consistent within 3 to 12 for executive or cognitive work, whereas in common labor or factory setting the span can be larger, 10 to even 60. The suggested number within near history has still been closely the same. Henry Fayol, a French manager and consultant in the late 1800's and early 1900's thought that the optimal span depends on the management level, being only 4 on top levels and 15 for lower levels. Dennison on the other hand emphasized leadership and warned against unusually large or small spans. Urwick built upon Graicunas' work but clarified that his suggested span of 6 relates to people with interlocked work. (Van Fleet & Bedeian, 1977). In my opinion this makes sense, because if a manager, e.g., is managing a team of specialists or consultants on different projects or products, and their work is independent, their direct connections don't have as much emphasis as in a directly task-related team.

Based on several studies, factors affecting the span include but are not limited to, divided by me into categories:

Table 3: factors affecting span of control

Organization	Manager	Team	Operation
Size	Capabilities	Relationships	Industry
Structure	Leadership style	Personalities	Diversification
Management level	Personality	Experience	Amount of routine
Performance, organizational and individual	Use of an assistant	Skills	Formalization
	Experience	Training	Automation of tasks
	Time in the position	Knowledge	Operation stableness
Strategy		Motivation	Quality of work
Change		Innovation	Need for supervision
		Location, time zone	Amount of work, deadlines
		Expectations	Interdependency
		Average tenure	

Table 3 presents factors that affect an effective span. It is not clear from the table which factors increase, and which decrease the effective span, but some examples can be given. A bigger organization tends to have bigger teams. If work is highly formalized and automated and the operation is stable, a bigger span can be managed effectively. If relationships are good and workers are highly trained, skillful, motivated and take responsibility, a big span is possible. And if the manager has the qualities and experience in managing a big team, he is more likely to succeed. These factors affect the size of an effective span, but they don't sum up completely. It seems that the span sizes shown in Table 1 still hold value today.

Table 4: factors that are affected by span of control

	→	→
Span of control	Effectiveness of supervision	Overall evaluation of organizational effectiveness
	Productivity	
	Job satisfaction (both managers and subordinates)	
	Number of hierarchy levels	
	Administrative costs	

Table 4 presents factors that are affected by the span. One big factor is administrative costs. Team sizes must be optimized in a way in which a capable manager can bring out the potential and productivity of as many people as possible but still being able to manage the team and handle possible problems and disturbances. Having too few subordinates makes manager's position inefficient and having too many subordinates makes it difficult or impossible to manage efficiently. This can be called the effectiveness of supervision. The team size also affects job satisfaction, both in managers and

subordinates. All these factors affect the overall evaluation of organizational effectiveness. (Van Fleet & Bedeian, 1977; Peltokorpi & Hasu, 2014; Remenova et. al., 2018)

Figure 4 presents the concept of “optimal span”. In the right of the figure, we can see the limit for the number of subordinates, where the effectiveness of supervision drops to zero. Then again, the exact number of subordinates is not crucial, but acts as an intermediate variable between the two lists above and the overall evaluation of organization effectiveness. (Van Fleet & Bedeian, 1977). As can be seen, the “optimal” span depends on so many variables, situation and context. The figure below is a simplification.

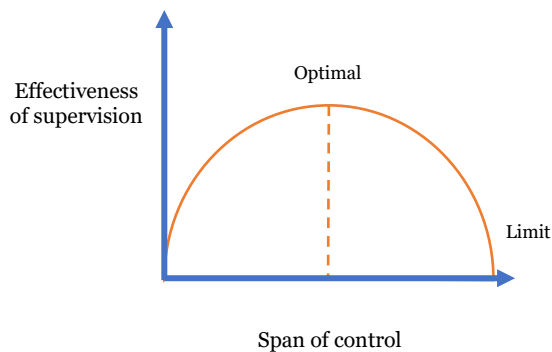


Figure 4: The "optimal span"

The same figure is presented by Meier & Bohte (2000), but instead of effectiveness of supervision the y-axis represents the team output. Whichever factor we take as Y-axis, the concept is similar. Anyway, this is a theoretical model and does not imply that the curve would be such a symmetric construct correlating to span of control.

2.4 Span of control in different environments

Span of control has been studied between various industries and types of function. In her paper Davison (2003) uses metrics from Saratoga Institute's 2001 results stating that when we calculate the average span of control of an organization (management ratio) the median values of organizations studied were:

Table 5: Saratoga Institute's workforce diagnostic system - management metrics

Survey demographic	2001 median
All participants	7,02
Companies, 1-500 employees	4,27
Companies, 2001-5000 employees	9,29
Information sector	4,98
Health care and social assistance	16,18

The span of control changes greatly depending on the industry, company size and work function. Sadly, the size of the population in the survey is not reported, but the currently PwC-owned department (acquisition in 2003) reports now 20 years later having benchmarked hundreds of companies in more than 20 industries (PwC, 2025). It seems the span of control grows the bigger the company is, from 4,27 (1–500 employees) to 9,29 (2001–5000 employees). The same study also points out the *management investment factor (MIF)*, the total management costs per full-time equivalent employee, with the median cost being \$43k for a company of 1–500 employees and dropping to \$13k for a company of 2001–5000 employees, where as in health care the MIF went as low as \$4,8k. (Davison, 2003). It seems the span of control and management costs per employee are inversely correlated.

A study by Remenova et. al. (2018) summarized the number of team members in 268 enterprises. The results are presented in Figure 5. The same study also suggests some other analysis:

- different team sizes appear on all levels of management and for a specific level of management, the span of control is not specific.
- the team size is function-specific, but not significantly, in areas of production, sales, logistics, IT, marketing, PR and human resources. In IT, 57 % of teams consisted of 6–12 people; in finance 42 % of teams consisted up to 5 people and 38 % of teams of 6–12 people; in production 43 % of teams consisted of teams over 20 people and 32 % of teams of 6–12 people; in sales and logistics results are similar, teams up to 5 people or 6–12 people are the most typical team sizes.
- the gender composition of a team is not dependent on the function or the team size.
- the team size is not dependent on the manager's age and increasing experience, nor is manager's age related to how long the manager will hold the position.

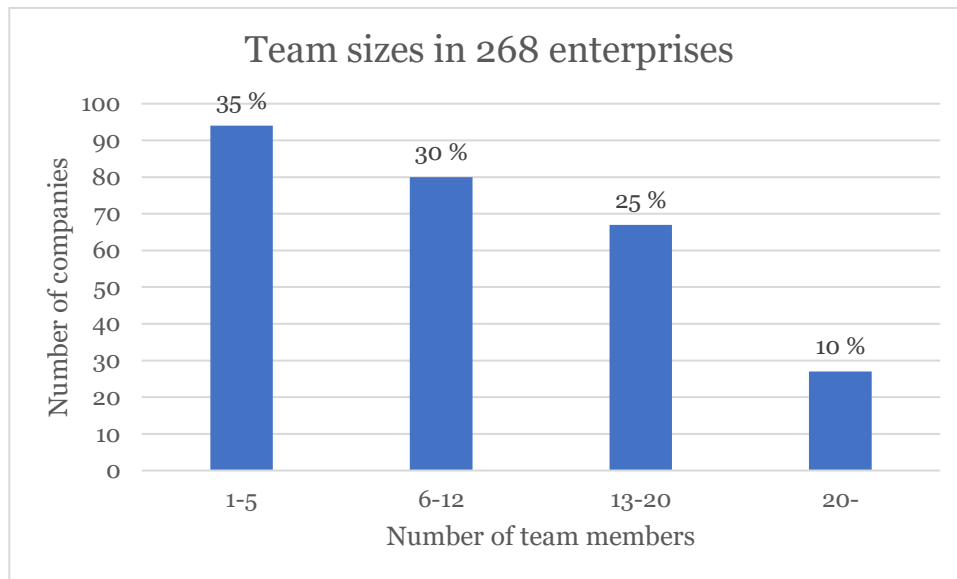


Figure 5: team sizes in 268 enterprises by Remenova et al. (2018)

3 Management and span of control

3.1 Responsibilities of a manager

The responsibilities of a manager have been categorized in different ways during the past century. Based on Martela (2025), Henry Fayol (1918) divided the elements of management into planning, organizing, coordinating, commanding and controlling while Mintzberg (1973) further expanded manager into 10 roles and Williams (2015) divided them into three categories. The same categorization is also mentioned by Nikolowa (2015):

1. Relationship oriented: figurehead, leader, liaison
2. Information management: monitor, disseminator, spokesman
3. Decision-making: entrepreneur, disturbance handler, resource allocator and negotiator.

Van Fleet & Bedeian (1977) focus the tasks as supervision, managing and control. Oksman (2024) points out that leadership is continuous interaction, working with people and processes; a manager is someone who manages, gets along; and management is playing with the given cards. He also gathers from other studies that management is continuous adaptation, conflict solving, negotiation and reconciliation; endless talking and listening, pressuring, encouraging and persuading. Management work comes from two aspects: direct interaction and structures and procedures. (Oksman, 2024). Davison (2023) jumps up to bigger picture and writes that an organization must be directed, managed, led and administered. Belloc et. al. (2025) emphasizes coordination in manager's responsibilities. Interestingly they state that supervision, or monitoring, is a relatively simple and standardized task which builds on routine checks and rules. Therefore, supervision is not so dependent on the manager's education or ability. Coordination, on the other hand, is more skill-based, as it requires adaptability to changing conditions, solving problems with limited knowledge and innovation. A higher managerial competence is beneficial for these tasks.

Martela (2025) expands Mintzberg's work for the ten functions of managers. The managerial functions can be divided into three greater categories: tasks, people and systems, and these categories divide into sub-categories and even smaller pieces. The three levels are presented below in Table 6:

Table 6: The ten functions of managers by Martela (2025) and Mintzberg

Category	Sub-category	Includes:
Task-oriented	Task setting and resourcing	Goals, staffing, budget
	Task execution	Decisions, coordination
	Performance assurance	Oversee, control, feedback, reward
	Information distribution	Acquiring, sensemaking, distributing
People-oriented	Cultivating motivation	Empowering, motivating, recognizing
	Supporting well-being	Emotional, well-being, conflict solving
	Developmental support	Competence, career and team development
Systems-oriented	Organizational change & dev.	Strategy, practices, structures, change
	External interaction	Monitor, network, represent
	Culture building	Values, purpose, atmosphere, togetherness

As seen, the responsibilities of a manager are vast and in real life can be differently emphasized depending on the actual managerial role. If we go back to Table 6, we can see that even though some of the tasks are shared in all managerial levels, the order is logical from smaller details to greater entities. The first category (tasks) shows how actual concrete goals and tasks are organized, resourced, monitored and eventually concluded and rewarded. The second category (people) focuses on people and their motivation, empowerment, recognition, relationships, conflicts and development. The third category (systems) goes higher in the culture, from purpose, strategy and values to structures, atmosphere and to networking and representing the company and its goals. From my experience a lot of content in the Task-category could be delegated from a manager to a project manager or product manager. They also take on some duties from the People-category, but mostly this falls into middle managers and HR. The middle management participates in the Systems-category, but more of it is planned and initiated by top management.

3.2 Skills of a manager

As shown in the previous chapter, managers have a plethora of different responsibilities, and naturally these have to be corresponded with appropriate skills. In his classic paper, “Skills of an Effective Administrator”, Robert Katz divided manager’s skillset into three categories:

1. **Technical skills.** These are the skills related to a specific area of expertise. For example, an accountant needs to understand cash flow, income statements and balance sheets. An engineer needs to know the specific physics, standards and design guidelines in their field of work. A software developer needs to know the necessary coding language,

logic and guidelines of program development and software as a product. These are the skills that make a person a specialist.

2. **Human skills.** The skills related to the ability to effectively interact and deal with others. This relates how likeable a person is as a colleague, how they relate their information or *scale of effect* onto others and how they in general succeed in roles emphasizing the cooperation with other people.
3. **Conceptual skills.** These are the skills that allow an individual to think on larger scales, beyond their specific tasks at hand. Conceptual skills allow you to visualize, create goals and strategies and see how different units and patterns come together.

If we use the three skill categories above (Katz, 1955) and the three functional categories (Table 6) and some imagination, we can figure that more or less the categories correspond in the following way: task-oriented function corresponds with technical skills, people-oriented function corresponds with human skills and systems-oriented function corresponds with conceptual skills. According to Katz (1955) and Williams (2015), the necessary skills depend on the level of the manager. As seen in Figure 6, lower in the hierarchy the requirement for technical skills is higher, and higher in the hierarchy the need for conceptual skills is higher. A strong and steady level of human skills is needed at all levels. In my opinion Figure 6 makes a lot of sense. The need for technical skills is the highest at line manager level, as line managers very often give training to their teams and supervise on a daily level the performance of technical tasks. The middle managers still need a lot of technical knowledge, as more complicated problems go up the hierarchy for higher ups to solve (Nikolowa, 2015). Top managers need fewer technical skills but are still required so they understand the context of what their subordinates and business are about. As line managers oversee the daily tasks and top managers focus on the bigger picture, the requirement for conceptual skills, vision and strategy is in more demand the higher you are in the hierarchy. Human skills are equally important on all levels, as at the end of the day, managers' work is to get their subordinates to do what is needed.

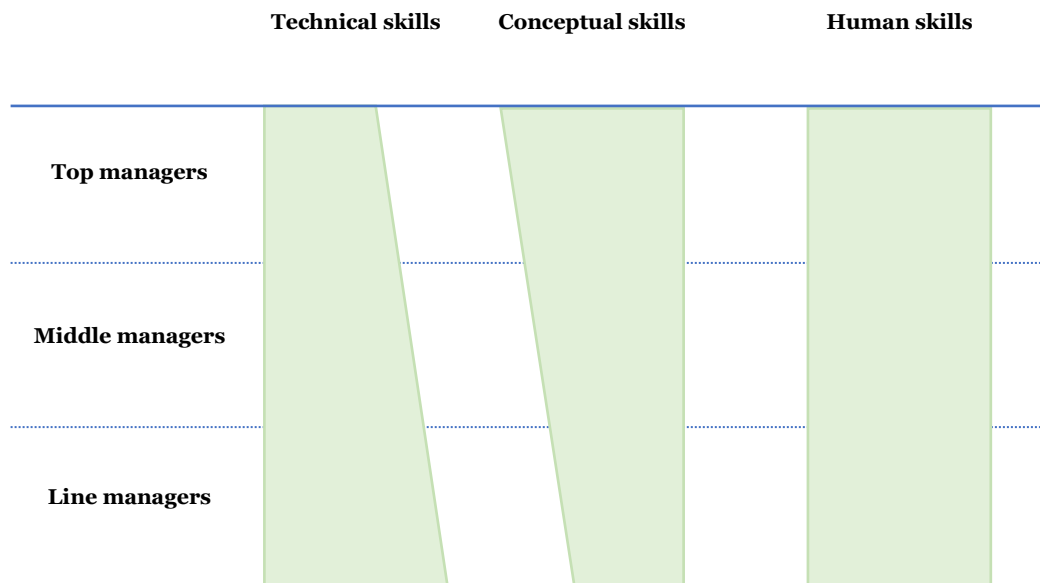


Figure 6: necessary skills based on manager level according to Williams (2015)

The skills for executives include but are not limited to:

- Managing their time and prioritizing how much of their time goes to running a current business vs. developing or transforming the company
- Cross-organizational collaboration and coordination
- Running day-to-day operations vs. overall portfolio management

A study by Nasrallah et. al (2015) simplifies manager skills in routinary engineering teamwork into two independent categories, domain-specific (technical skills) and interpersonal “managerial” skills. The paper also points out that different team sizes require different skills, different emphasis on the domain and managerial skills. They study a context of expertise where different professionals in a team specialize in narrow fields of knowledge and managers use general technical knowledge in combination with general management skills to improve the efficiency of the whole team. They discuss that some teams work well while being self-managed, but the usual setting is to have specialists or subordinates under a manager. The manager coordinates, facilitates and leads by communicating with the environment, motivates and enhances the capabilities of the subordinates, handles disturbances, and handles other needed tasks to reach the team’s goals. Even in a self-managed setting, if the manager is removed, the manager’s tasks do not disappear, but they are shared among the team (Martela, 2019). In this sense I propose that for efficient team management, the necessary skillset in a manager-led or

self-managed team is the same, the responsibilities are just shared depending on whether these skills exist within one person or several. How to share the (managerial) tasks could be approached through a method similar to the economic model of comparative advantage – sharing the responsibilities in the team in the way that gets the tasks done in the most efficient way. (Mintzberg, 1973; Nasrallah et. al., 2015). I further press the idea that coordination and prioritization are the key ingredients in effective managing, and it depends on the team composition how its work is optimized. One important aspect regarding the skillsets is their transferability: technical / domain skills are specific to each industry, while managerial / human skills are more general, transferable on a wide range (Nasrallah (2015) based on Bailey & Helfat (2003)). This leads to conclusion why highly skilled managers are sought after and can easily change companies between industries.

3.3 Span of control increasing, implications on manager skills

The two opposite ends of extreme spans of control are the organization being too top heavy and management spread too thin. Finding the right balance can be challenging (Davison, 2003). In recent decades the span of control has been increasing on multiple levels of management. I will discuss the recent increase in two different settings, first on chief-level, then on more general level.

Neilson & Wulf (2012) studied American Fortune 500 companies' data of 20 years and included observations of executive roles in more than 250 companies. Their study reveals that the number of subordinates for chief-level roles has doubled from around 5 in mid-1980's to almost 10 in mid-2000's. Further, it is common that the first year in a senior executive role is for learning and new executives want to expand the span of control for increased touch on strategy, talent evaluation and running the business. After a "look, listen and learn" period, their strategies are formed, and they might even start transformational programs. From here, as the company's top performers are known, the executives gradually shrink their span of control and give up direct responsibility for people and functions reporting to them. At this point, the span settles around 6 people, and the CEO starts training a potential successor or preparing several executives who have wide financial responsibilities. Interestingly, the more experience a senior executive has, the less they will directly control (Neilson & Wulf, 2012). As we take the increasing complexity of work and enterprises into account, the doubling in the span of control is interesting. They identify three trends:

- 1) Doubling of average span of control of a CEO. In addition, new managers, CEOs in particular, are taking on a broader array of responsibilities and subordinates as they aim to have more comprehensive understanding of their business, and recent technology allows them to easily contact more people. As they've established a steady state, they gradually reduce the number of subordinates until the span follows the norm.
- 2) Amount of COO's is gradually declining from 55 % in Fortune 500 companies in the 1980's to 45 % in 1999 and still shrinking. As the number of chief operating officers is declining, the number of functional chief officers, e.g., chief marketing officer, chief information officer, directly reporting to CEO's is increasing. Also, their roles are taking more on general management responsibility, which leads to the next trend.
- 3) Executive talent is developed and broadened faster than traditional 3–5-year job rotation would allow. Increased market and geographical complexity are one factor here.

This is explained partly by giving multi-functional roles to executives or tasking them with solving some current problems in another division. The paper explains that wider executive roles/responsibilities and wider spans of control bring greater detail up the chain of command. Executives can also collaborate better across the organization. Table 7 shows the change in Chief-level span of control over two decades in Fortune 500 companies.

Table 7: Chief-level span of control in Fortune 500 companies over time

Year	People reporting directly to CEO
1986–1990	4,7
1991–1995	5,3
1996–1999	6,5
2004–2008	9,8

As the span increases, the number of managers goes down compared to normal employees and team sizes increase. This reduces the number of management levels and flattens organizations. For increased value creation, teams in a flatter organization tend to focus more on *core processes* (e.g. product development) and department heads are replaced with *process owners*, the necessary skills for managers relate to cross-functional operation, customer satisfaction and customer value processes, faster decision-making and delegation, communication, negotiation, selling of ideas to right people, system thinking and multitasking. (Davison, 2003). This change of increasing team sizes and thinning out the management comes with risks, which are:

- Lack of supervision and support

- Ineffective decision-making
- Loss of agility or flexibility (who makes the decisions, who has the time to familiarize themselves)
- More manager responsibility for outcome, but less control over teams and day-to-day priorities
- Poor morale
- Longer manager workdays related to increasing complexity

The more subordinates, the less time the manager has per subordinate. Managing a bigger team brings more complexity to relationships, problem solving and task coordination. Nikolowa (2015) has built a mathematical model that proposes that managing a larger span of control is more challenging, but possibly more rewarding. The paper proposes that the supply of managers is large, but the supply of talented managers is scarce. Managing a team progressively reveals manager's capabilities, and as bigger teams bring more problems for the manager to solve, more talent is revealed if the manager succeeds in solving the problems. If a manager has a large span of control early in their career, their probability of failing is high, but if they succeed, their talent and capabilities are proven. Eventually this shows that managers who retain their positions are more talented and the managers who have larger span of control receive higher salaries (and promotions) over their career. The same paper also points out to older research that larger companies pay higher wages to equivalent workers and that talented subordinates amplify the talent of their manager (Smeets & Warzynski, 2008; Fox, 2009).

3.4 Manager's time allocation

Based on the mathematical model of Nasrallah et. al. (2015) it seems that a manager leading a project team needs to use less time on the project if the manager's domain skills are high. The curve is steep in the beginning, already a manager's domain skill level of $2/5$ dropped the time consumption by 20 %. After that the curve remains rather steady and with further increase in domain skill the time consumption fell only to a reduction of 25 % in total. The manager's domain skills also reduced the total engineering time of the team with about the same correspondence. Interestingly, too strong managerial skills have increased both the team's and the manager's project work time, as with high managerial skills the manager spends too much time on building relationships with their subordinates. The model positioned managerial skill level $3/5$ to be the optimal for team performance. There was no harm in having higher domain skill level. It seems a manager must learn to optimize their time usage.

Higher manager's domain knowledge was always better for the team's functioning regardless of span of control, whereas strong human managerial skills were more valuable when the span of control decreased. It seems that in a small team developing good relationships does not decrease the team performance as much as in a bigger team. Williams (2015) pictured how manager's time allocation on different tasks depends on their level of management. Line managers need to plan and organize short-term tasks and lead their workers. Some evaluations are included. When going up the levels to top management, long-term planning, organizing and evaluating are needed. They still lead but in smaller amounts, giving more responsibility to their management team. The time allocation is presented in Figure 7 below.

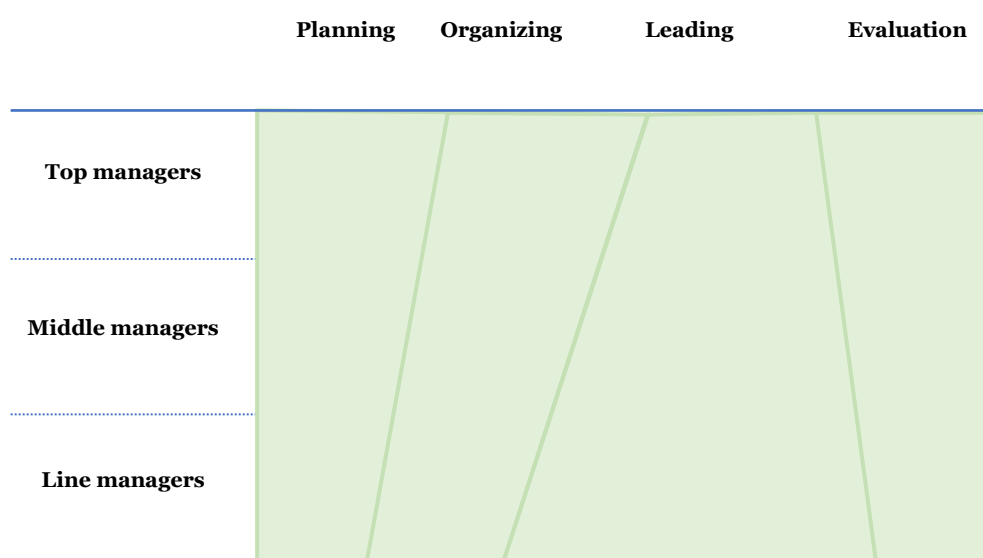


Figure 7: manager task time allocation based on manager level according to Williams (2015)

3.5 Can there be an ideal span of control?

The short answer is “no”, there is no magic number. The correct number depends on multiple factors (Table 3) and the discussion has been on for a long time. Meier & Bohte (2000) discuss opposing span of control theories from the 1960's, Theory X and Theory Y, where the former says that spans should be narrow as executives cannot trust their employees and the latter says that spans should be loose to encourage employees to achieve their potential via bigger independence and responsibility. If we look at top management, at chief-level, an executive should take necessary time to assess their business, people and strategies before deciding how to transform the organization to

their needs. This could take anywhere between 6 and 12 months, or more. As time proceeds, the executives should also reflect on and adapt to new management approaches if it would benefit the business. Many new chief executive officers appoint “traditional” roles in the top management team, whereas it would be better to look for capabilities of people and roles that are needed to thrive their strategy. (Neilson & Wulf, 2012)

When companies streamline their organization, they very often want to lower management costs. As they re-engineer the company’s work processes, they usually reduce the number of management levels, focusing especially on the number of middle level managers. Davison brings in an interesting point: the current question is no more how big the span of control should be, but how big it can be with still being effective. Technological advancement and market pressure seems to be driving the span higher. (Davison, 2003). It is interesting that the earlier statement is from 2003. Now 20 years later, technological advancement is faster, and market competition is even higher.

Some more modern reasons for flattening the organization include lowering the management costs, faster decision-making and response times, increasing and pushing authority and responsibility downward. Some managers can also tend to build their own empire. Urwick (1974 and earlier) brought up that when flattening the organization, the advantages must be compared with increasing costs of confusion and indecision related to too wide spans of control. El-Khalil & El-Kassar (2016) made a study regarding span of control in automobile production industry and found out that span of control had doubled from 1:30 to 1:75 pre- and after 2009. The new span was not optimal and led to a reduction in performance metrics. They conclude that in general the span of control must be lower in fields that require higher skilled employees. In the field of production, too high a span can lead to problems regarding safety, quality and cost. Another study researched the span from the perspective of LMX theory (leader-member-exchange) and concluded that a bigger span means less loyalty towards the leader and less perceived leader loyalty towards the subordinates (Shyns et. al., 2012).

The factors affecting the span are presented in Table 3, but from a strategic point of view, the starting point should be the company’s core focus, goals and market. The means of altering the span are relatively simple – the organization can hire (or fire) more managers, it can reorganize and regroup teams or find and eliminate tasks that are not focused on the company’s core competencies or customer value. (Davison, 2003)

Lastly, to finish this chapter: in their mathematical model paper, Smeets et. al. (2019) discuss the *scale of operations effect*. The effect states that managers with high ability or productivity should have larger spans of control as

that manager's ability also amplifies the subordinates' talent or ability. In their paper Smeets & Warzynski (2008) conclude that the scale of operations effect is a key factor for the operation of real-world hierarchies. They also believe that the manager's span of control should be based on the expected ability of the manager instead of the actual ability. The expected ability is updated by the manager's performance. In the end, the paper draws strong positive correlations between the span of control and manager's performance (the results concerning the correlation between span of control and education are mixed) and builds upon an earlier study which correlates higher spans with higher manager wages and bonuses. As the span of control defines how efficiently managers can manage their subordinates, the span has strong implication for the quality of management and the internal economics of the firm. A higher span is also seen as a possibility for the manager to learn about their abilities and for the companies to learn about the manager's ability. Nikolowa (2015) agrees that average team performance increases as the skill level of the manager increases – while having a manager with no human (cooperation) skills is the same as having no manager at all.

4 Conclusions, limitations and further study

This thesis explored the span of control and elements around it in recent and past literature. Span of control means how many subordinates report to one manager. Organizations aim to increase the efficiency of their processes and effectiveness of outcomes. In terms of organizational design, team performance and organizational efficiency can be estimated through span of control (Remenova et. al., 2018), which has been increasing in the past decades, especially in the chief-level (Neilson & Wulf, 2012). Companies are interested in lowering overall management costs, streamlining decision-making and focusing on core processes as technological advancement and market competition cause increasing pressure. The increase of team sizes and thinning out management usually targets the middle management. Organizations and team sizes have been researched for nearly a century, with V. A. Graicunas publishing his paper on relationships management and the formula on number of direct relationships in 1933 (Davison, 2003).

Managers are chosen to fulfill specific functions in three main categories – tasks, people and systems (Martela, 2025) – with three corresponding skillsets – technical, human, conceptual (Katz, 1955). This paper started working on a topic how the required skillset depends on the team size, leading to the research question: “how does the increasing span affect the required manager skillset?”.

Chapter 2 studied organizational configurations (simple, functional, divisional, matrix, combination, holacracy, network, virtual), the height of an organization (number of management levels) and the width of an organization (span of control). Height and tallness together form a personnel pyramid (Figure 3). It introduced the terms *span of control* regarding a team and *average span of control* or *management ratio* regarding a bigger organization. Both are calculated as regular employee headcount divided by management headcount. (Davison, 2003). Through historical review (Van Fleet & Bedeian, 1977) I found that for cognitive work, an effective span of control has been relatively small, between 3–12 people since times of Napoleon, whereas for standardized common labor the span can increase even to 50–60 subordinates. Several American companies consider a team of 5–7 people to be optimal (Urwick, 1974). Remenova et. al (2018) find that in 268 enterprises the team sizes for cognitive work still settle around 6–12 people, near to what was mentioned above by Van Fleet & Bedeian.

There are at least 30 factors that affect an effective span of control, divided into 4 categories – organization, manager, team, operation – and represented in Table 3. Next, span of control has implications – effectiveness of supervision, productivity, job satisfaction, number of hierarchy levels and

administrative costs – represented in Table 4 which all affect the *overall evaluation of organizational effectiveness*, which could not be further delved into within this paper. Figure 4 discusses the theoretical concept of “optimal span”. Chapter 2 also reviews the span in different environments, finding that bigger companies have larger spans and smaller management costs per employee (Davison, 2003)

Chapter 3 starts with the responsibilities and functions of a manager by Fayol (1918), Mintzberg (1973), Van Fleet & Bedeian (1977), Williams (2015), Nikolowa (2015), Davison (2023), Oksman (2024), Belloc et. al. (2025) and Martela (2025) and corresponding skillsets by Katz (1955). The emphasis on required skillsets depends on the level of management, with human skills being always as important, but technical skills having the most impact closer to line managers and conceptual skills being most necessary at top management (Williams, 2015). Nasrallah et. al (2015) simplified the skillset categorization in routinary engineering teamwork and divided them into domain-specific (technical skills) and interpersonal (“managerial” skills). Martela (2019) found that if a manager is removed, their responsibilities and tasks are not: even in a self-managed team these tasks must be divided between the remaining members. The managerial responsibilities must be shared in a way that gets the tasks done as efficiently as possible (Mintzberg, 1973; Nasrallah et. al., 2015).

The end half of Chapter 3 focuses on research about increasing spans, especially in American Fortune 500 companies. Neilson & Wulf (2012) find that between 1986–2008 the chief level span has increased from 4,7 to 9,8, and that chief-level positions are getting more complex and demanding. The more subordinates, the less time the manager has per subordinate. Managing a bigger team brings more complexity to relationships, problem solving and task coordination. As team sizes increase, the growing need of skills for managers relate to cross-functional operation, customer satisfaction and customer value processes, faster decision-making and delegation, communication, negotiation, selling of ideas to right people, system thinking and multi-tasking (Davison, 2003). There are a lot of risks related to increasing team sizes and thinning management, but with high risks come big rewards: Nikolowa (2015) sees that managing a larger team brings out the manager’s capabilities and potential, with higher salaries and more promotions during their career.

The chapter answers my research question and discusses different views around the span of control. Currently, the question is not how big the span should be, but how big it can be with still being effective (Davison, 2003). Lowering management costs, faster decision-making and response times, increasing authority and responsibility in the lower management levels and

managers' empire building are modern reasons for increasing the span, but the increase also brings risks as stated above and more confusion and possible indecision. The advantages of bigger span must be weighed against the disadvantages (Urwick, 1974). Then again, capable leaders amplify their subordinates' talent or ability (Smeets & Warzynski, 2008).

As for limitations: this paper brought out lot of concepts, ideas and lists regarding the span of control and its implications, but the weight factors are still very unclear. Most things mentioned are so context-specific, that without a large database and more mathematical models it is difficult to define how much specific factors affect specific implications. Eventually we would like to know how many subordinates a manager can effectively manage, but that is not possible without further and deeper analysis.

A lot of studies in management and project management regarding span of control are either very narrow studies (looking at one company, one project, one hospital or one school) or very wide studies (studying possibly hundreds of companies in different industries), so it is challenging to find a relevant meta study based on specific team context. The studies list quite different jobs and try to figure out how their task coordination is related (e.g., nurses, software development and production line workers are discussed in same papers). A lot of empirical studies are very narrow, while mathematical papers draw too ambiguous results from a wide context. Also, many studies discuss situations where a team manager (or project manager) is free to choose their team based on the project, as if group of specialists are waiting on a beach to be chosen for a new project (as the model implies e.g. in Nikolowa (2015)). In many real-life situations this is not the case, as skilled individuals are already working on a task and not able to jump from project to project. The mathematical models related to the topic are complicated, and the number of variables is large. In some models the projects studied were short, which gives a limited image of project work. It is to be noted that a lot of research papers regarding span of control refer to same ("classic") papers as their peers, and cross-referencing is common. It leads to question how much unique studies have been conducted and how much we still don't know about the topic.

The study could have been conducted from the perspective of different leadership theories, e.g., Leader-Member-Exchange (LMX) theory, like some papers referenced in this thesis do (Shyns et. al., 2012), but I didn't want to contemplate it too much, as most leadership theories are old, they focus on specific qualities of a manager and I wanted to have a more summarizing view on the topic. Another perspective would be to take more of a psychological aspect and evaluate how team size affects psychological safety and complexity. Later studies could also dig deeper into the Overall evaluation of

organizational effectiveness, which was mentioned in Chapter 2.3. This also would require a mathematical model and a lot of data and factors to consider.

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