Building Tomorrow's Surveyors: The Dutch Cadastre's Approach to Workforce Development

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SUMMARY

The (cadastral) surveying profession in the Netherlands faces significant challenges in workforce sustainability, primarily due to an aging workforce and declining interest among younger generations. This paper presents a solution implemented by the Dutch Cadastre through their comprehensive in-house training program. The approach combines traditional surveying education with practical work experience, offering participants immediate employment while they complete their training. Over the past decade, this program has successfully trained over 250 new cadastral surveyors, demonstrating its effectiveness in addressing the workforce shortage. The paper describes the program's structure, implementation, and outcomes, providing valuable insights for other cadastral organizations facing similar challenges.

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1. INTRODUCTION

The surveying profession stands at a critical juncture globally, with many countries facing significant challenges in maintaining a sustainable workforce. The Netherlands, despite its rich history in land administration and surveying, is no exception to this trend. This paper describes the approach developed by the Dutch Cadastre to address these challenges through a comprehensive workforce development program.

1.1 Current State of the (Cadastral) Surveying Profession

The cadastral surveying profession faces several critical challenges. One of the most urgent issues is the aging workforce, with a significant portion of professionals approaching retirement age or already retired in the past years. Additionally, we are witnessing a concerning decline in the number of students choosing traditional surveying education programs.

The profession is experiencing increasing competition from other technical professions, while simultaneously technological requirements, such as the use of artificial intelligence, demand new skills from surveyors. An important societal development is that people are becoming more assertive, which means surveyors need to adapt and improve their social skills.

These challenges are further complicated by the essential nature of cadastral surveying in maintaining land administration systems and safeguarding property rights. This final point is particularly concerning because cadastral surveyors play a vital role in society. Their work is crucial for maintaining accurate property boundaries and supporting real estate transactions and spatial planning. Without sufficient qualified surveyors, we risk facing significant problems in:

- The accurate registration of property boundaries
- The resolution of boundary disputes
- The protection of property rights
- The maintenance of up-to-date cadastral systems

In essence, these challenges are especially worrisome because surveyors fulfill an indispensable societal function. This is not just about a declining professional field - it's about preserving a vital service that underlies our entire property system.

2. RECRUITMENT AND SELECTION

2.1 Target Demographics

The program targets specific groups of potential candidates. First, it seeks to attract recent graduates from related technical fields who can bring fresh perspectives and up-to-date technical knowledge. The program also focuses on mid-career professionals who are looking for a career change, leveraging their existing professional experience. Additionally, it welcomes individuals who have shown a natural aptitude for technical work, regardless of their background. Finally, the program is designed to appeal to those who enjoy a dynamic work environment that combines both office and field work.

It's important to note that the work of a Cadastral surveyor differs significantly from that of a non-Cadastral surveyor. While there may be less variety in surveying methods, the role includes a substantial legal component due to the existence of specific Cadastral law. As the saying goes, "Cadastral surveyors are made, not born" - highlighting that the necessary skills and knowledge can be developed through proper training and education, regardless of one's background.

2.2 Selection Process

Each year we start one or two classes with new surveyors. Each group has room for 12 to 15 people. However, per recruitment round we receive more than 200 application letters. This shows how attractive our profession really is.

The selection process consists of several comprehensive stages. Candidates begin with an initial technical aptitude assessment to evaluate their baseline capabilities. Following this, they participate in interviews conducted jointly by technical experts and HR professionals to assess both their technical knowledge and cultural fit.

As part of the practical evaluation, candidates participate in a basic field work simulation to demonstrate their practical capabilities. The process also includes an assessment of their learning capability and adaptability, which is crucial for success in this evolving field.

The final stage involves a job shadowing day with an experienced surveyor before making the final selection decision. This hands-on experience gives candidates a realistic preview of the daily work while allowing the selection team to observe their interaction in a real work environment.

3. PROGRAM STRUCTURE AND IMPLEMENTATION

3.1 The Dual-Mentorship Model

The Dutch Cadastre's program implements a comprehensive development approach through its dual-mentorship model. This system combines formal education with practical workplace learning, creating a robust foundation for future cadastral surveyors.
Trainees receive professional education from accredited surveying institutions, providing them with essential theoretical knowledge and industry-recognized qualifications. Simultaneously, they benefit from internal specialized training delivered by experienced cadastral surveyors who share their practical expertise and deep understanding of cadastral-specific procedures and regulations.
An important aspect of the program is that participants are immediately employed by the Cadastre, receiving a full salary and benefits package. This approach not only provides financial security but also helps to create a sense of belonging and commitment to the organization from day one.
The program follows a structured progression pathway that systematically develops both technical and practical skills. This methodical approach ensures that trainees build a solid foundation before moving on to more complex aspects of cadastral surveying.

The entire learning structure is based on Charles Jennings' 70:20:10 model, which recognizes that effective learning comes from three main sources:

- 70% from on-the-job experiences and practice
- 20% from social learning and interactions with colleagues
- 10% from formal training and education

This model perfectly aligns with the dual-mentorship approach, combining formal education with extensive practical experience and peer learning opportunities. It ensures that trainees not only learn the technical aspects of cadastral surveying but also develop the professional judgment and practical wisdom that comes from hands-on experience.

3.2 Educational Components

The educational structure of the program provides a comprehensive foundation for aspiring cadastral surveyors through several key components. The program begins with establishing a solid theoretical foundation in surveying principles, ensuring that all participants understand the fundamental concepts and mathematical principles that underpin surveying work.
Practical field training and equipment operation form an essential part of the curriculum, where trainees learn to handle various surveying instruments and tools with precision and confidence. This hands-on experience is crucial for developing the practical skills needed in daily surveying work.
A significant portion of the education focuses on specialized cadastral law and regulations, reflecting the unique legal aspects of cadastral surveying. This component ensures that surveyors understand their role in maintaining legal property boundaries and rights, and can apply relevant laws and regulations in their work.
The program also places significant emphasis on data processing skills, recognizing that cadastral surveyors hold end-to-end responsibility for parcel formation. Unlike some organizations where field and office work are separated, cadastral surveyors at the Dutch Cadastre manage the entire process themselves. There is no separate back office that processes the surveyors' work, making comprehensive training in both field and data processing skills essential.
Professional ethics and standards are woven throughout the curriculum, emphasizing the importance of integrity and accuracy in cadastral work. This component ensures that surveyors understand their professional responsibilities and the impact their work has on property rights and land administration.

Through this structured educational approach, trainees develop not only the technical expertise and professional judgment needed to become competent cadastral surveyors, but also the complete skill set required to handle the entire parcel formation process independently.

3.3 Integration of Work and Learning

The program offers a strong integration between learning and working, where participants immediately benefit from various aspects. Theoretical knowledge is directly applied in practice, ensuring better understanding and retention of the learning material. This occurs under the guidance of experienced mentors who provide regular feedback to guide and improve development.

Participants are exposed to real surveying challenges, helping them gain practical experience with various situations and problems they will encounter in their career. By being directly involved in the field, they also build professional networks with colleagues and other experts in the field.

Additionally, participants develop a deep understanding of the organization itself - they learn about the processes, culture, and working methods of the Cadastre while developing their technical skills. This ensures that they become not only technically proficient but also understand how to function effectively within the organizational structure of the Cadastre.

3.4 Program structure and duration

The training program is structured in distinct phases over a total period of three years (36 months), allowing trainees to systematically develop their skills:

Boundary Determination Module (5 months) This initial phase focuses on learning how to interact with property owners to determine new boundary locations. During this period, trainees learn the essential skills of communicating with stakeholders, understanding legal requirements, and documenting boundary determinations.

Practical Application of Boundary Determination (18 months) Following the initial module, trainees spend a significant period applying their boundary determination skills in real-world situations. This extended practical phase allows them to gain extensive experience while working under supervision, developing confidence and expertise in various challenging situations.

This technical phase focuses on surveying skills and the process of parcel formation. Trainees learn advanced measurement techniques, equipment operation, and the principles of creating legally valid parcel descriptions. This module also includes comprehensive training in data processing for mapping and parcel size determination. Trainees learn how to accurately process survey data into the cadastral map and how to establish definitive parcel dimensions.

Independent Work Phase (6 months) The final phase of the program allows trainees to work independently while still having access to support when needed. This period serves as a transition to full professional responsibility, where trainees demonstrate their ability to handle complete projects on their own.

3.4 Assessment and Examinations

The program maintains high standards through a comprehensive assessment system. Each significant module concludes with a test, ensuring that participants have mastered the essential knowledge and skills before progressing. Candidates are allowed one retake of each test; if they fail both attempts, they must leave the program. This strict policy maintains the high quality standards required for cadastral surveying.

In addition to the regular module tests, there are two crucial examination moments in the program. One of these is a practical examination where candidates must interact with property owners to determine new boundary locations. This examination has a significant legal component, as candidates must prepare an official report of this work. The ability to properly document and legally record boundary determinations is a critical skill for cadastral surveyors.

4. PROGRAM OUTCOMES

4.1 Quantitative Results

The program has demonstrated impressive results over the past decade, with 242 new surveyors successfully completing their training and joining the profession. The effectiveness of the program is particularly evident in its high retention rate, with over 85% of graduates remaining active in the field after five years.

The initiative has successfully addressed one of the key challenges facing the profession by significantly improving the workforce age distribution, creating a more balanced demographic profile. Additionally, the program has contributed to increased diversity within the surveyor population, bringing fresh perspectives to the field.

A notable achievement has been the career development opportunities within the Cadastre. Graduates of the program have shown strong progression in their careers, taking on more responsible roles and contributing to the organization's continued development.

4.2 Qualitative Outcomes

Beyond the numerical results, the program has achieved several qualitative improvements. One of the most important outcomes has been the enhancement of organizational knowledge transfer, ensuring that valuable expertise and experience from senior surveyors is passed on to the next generation. This is not that easy and we haven’t managed this completely.

The program has fostered stronger loyalty among its graduates, creating a committed workforce that understands and values the Cadastre's mission. This has resulted in high engagement and dedication from surveyors within the organization

The integration of modern surveying techniques has been successful, with new surveyors effectively combining traditional cadastral knowledge with contemporary technological approaches.

Finally, the program has led to the development of a sustainable training methodology that can be continuously adapted and improved, ensuring the Cadastre can maintain a steady pipeline of skilled professionals for years to come. This systematic approach to training has become a model for professional development within the organization.

5. CHALLENGES AND ADAPTATIONS

5.1 Initial Implementation Challenges

The program encountered several significant challenges during its implementation phase. One of the primary obstacles was finding the right balance between work requirements and educational needs. We needed to ensure that participants could fulfill their learning objectives while still contributing effectively to daily operations.

Maintaining consistent mentorship quality across different locations and departments proved to be another significant challenge. With multiple mentors involved in the program, ensuring standardized guidance and support for all participants required careful coordination. This coordination is carried out by a coordinating mentor, with each office having one such coordinating mentor who oversees the mentorship program locally. This structure helps maintain consistency in mentorship quality while allowing for location-specific adaptations when needed.

The program also faced the challenge of accommodating different learning speeds among participants. While some trainees quickly grasped new concepts, others required additional time and support, necessitating a flexible yet structured approach to training.

Managing program costs and resources effectively was and is still an ongoing challenge, requiring careful planning to balance investment in training with operational needs.

5.2 Program Evolution

In response to these challenges, the program underwent several strategic adaptations. The selection criteria were refined to better identify candidates who would thrive in the dual learning-working environment, improving the success rate of participants.

The development of standardized training modules brought more consistency to the educational experience, ensuring all participants received the same instruction regardless of their location or mentor.

A comprehensive progress tracking system (Log) was implemented to monitor participant development more effectively, allowing for timely interventions when needed.

These adaptations have helped the program evolve into a more robust and effective training pathway for new surveyors, better equipped to meet both organizational needs and participant development goals.

6. FUTURE DEVELOPMENTS

6.1 Program Expansion

The program continues to evolve to meet future challenges (AI) and opportunities in cadastral surveying. The integration of advanced technological training is a key priority, ensuring surveyors are well-equipped to work with emerging tools and systems. This includes expanded training in digital surveying technologies, data processing systems, and modern measurement techniques.

The development of specialized tracks after the program will allow surveyors to develop expertise in specific areas while maintaining their core cadastral competencies. This specialization helps meet the diverse needs of the organization while providing career development opportunities.

Permanent education has become an integral part of our department, recognizing that surveyor development continues throughout their career. This ensures that all surveyors stay current with technological advances and regulatory changes.

A crucial future development is the optimization of the program's cost-effectiveness while maintaining and improving educational quality. This involves carefully evaluating the training components to ensure maximum value and effectiveness. Additionally, there is ongoing analysis of the sequence in which different modules are delivered, aiming to create the most logical and effective learning progression for participants..

7. RECOMMENDATIONS FOR IMPLEMENTATION

7.1 Essential Components

Organizations considering the implementation of similar training programs should carefully consider several components. First and foremost, strong institutional commitment is crucial for success. This means not only financial support but also a clear organizational vision and dedication to developing new surveying talent.

Adequate resource allocation is vital, encompassing both financial and human resources. This includes dedicated training facilities, necessary equipment, and sufficient time allocation for both trainees and mentors. Organizations must be prepared to make a substantial investment in the development of their future workforce.

A quality mentorship program is another cornerstone of successful implementation. This requires careful selection and training of mentors, along with a structured approach to knowledge transfer. The experience of the Dutch Cadastre has shown that good mentorship is fundamental to the development of competent surveyors.

Clear progression pathways need to be established, giving participants a well-defined route for their professional development. This includes both short-term milestones within the program and long-term career development opportunities.

7.2 Success Factors

Several key factors have been identified as critical to program success. Executive leadership support is essential, as this ensures the program receives necessary resources and remains aligned with organizational strategy. Leadership must be visibly committed to the program's success and actively champion its importance.

Dedicated program management is crucial for maintaining program quality and consistency. This includes having specific staff members responsible for coordinating training activities, monitoring progress, and managing day-to-day program operations.

Regular program evaluation helps ensure the training remains effective and relevant. This involves gathering feedback from participants, mentors, and other stakeholders, and using this information to make continuous improvements.

Flexible adaptation to changing needs is vital in an evolving profession. The program must be able to incorporate new technologies, respond to changing regulatory requirements, and adapt to shifting industry demands while maintaining its core focus on developing high-quality cadastral surveyors.

8. CONCLUSION

The Dutch Cadastre's workforce development program demonstrates a successful approach to addressing the surveying profession's sustainability challenges. Through its combination of education, employment, and mentorship, the program has created a replicable model for developing the next generation of (cadastral) surveyors.

Finally, we must realize how fantastic the surveying profession really is. The key ingredients for this are: The fact that people can work both indoors and outdoors, people are responsible from start to finish, and technical knowledge is alternated with customer contact.

REFERENCES

70-20-10 Model by Charles Jennings

BIOGRAPHICAL NOTES

Tom Venhorst serves as Team manager for land surveyors at the Dutch Cadastre. After completing vocational education in Geodesy and a Bachelor's degree in Hydrography, he has been working at the Dutch Cadastre for over 20 years. He started his career as a land surveying advisor, and for the past 15 years, he has served as a manager of surveying teams..

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